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The missing puzzle piece for a plastic circular economy

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WORDS from the EDITOR

When it comes to sustainability issues, the 'yuck factor' often comes into play. Some sustainability matters — for example, recycled drinking water — have triggered such deep-seated negative responses from the public that they are often ruled out on sentiment rather than evidence.

Let's look at another recent example triggered by Peter Dutton's plan for nuclear power in Australia.

The GenCost economic report released by CSIRO in May found no technical barriers to large-scale nuclear power generation in Australia's electricity system, but it did determine that nuclear power was more expensive than renewables and would take at least 15 years to develop, including construction.

However, Dutton argues that the advantage of a modern zero-emissions nuclear plant is that it can be plugged into existing grids, effectively replacing retired coal plants and avoiding costs associated with a 'renewables-only' system, including new transmission poles and wires.

While there's mixed evidence on this issue, the whole plan may well be ruled out based simply on the yuck factor alone. After all, who wants the risks associated with nuclear power plants and radioactive waste in their backyard?

In this issue, we explore the missing puzzle piece in the plastic circular economy, discover how healthcare, glass and carbon dioxide waste are being upcycled, and consider alternative water supplies for green hydrogen production. We also take a look at 'Myrtle': Australia's new embodied carbon facility.

On a personal note, I'd like to fondly farewell our 'shy and retiring' proofreader, Deborah Bailey. Her professional approach to the art of perfecting our content has been an integral part of the Sustainability Matters team and, in fact, all of Westwick-Farrow Media's networks for the past 27 years. On her last issue for SM magazine, we appreciate her dedicated contribution to the brand and wish her a happy retirement!

Carolyn Jackson
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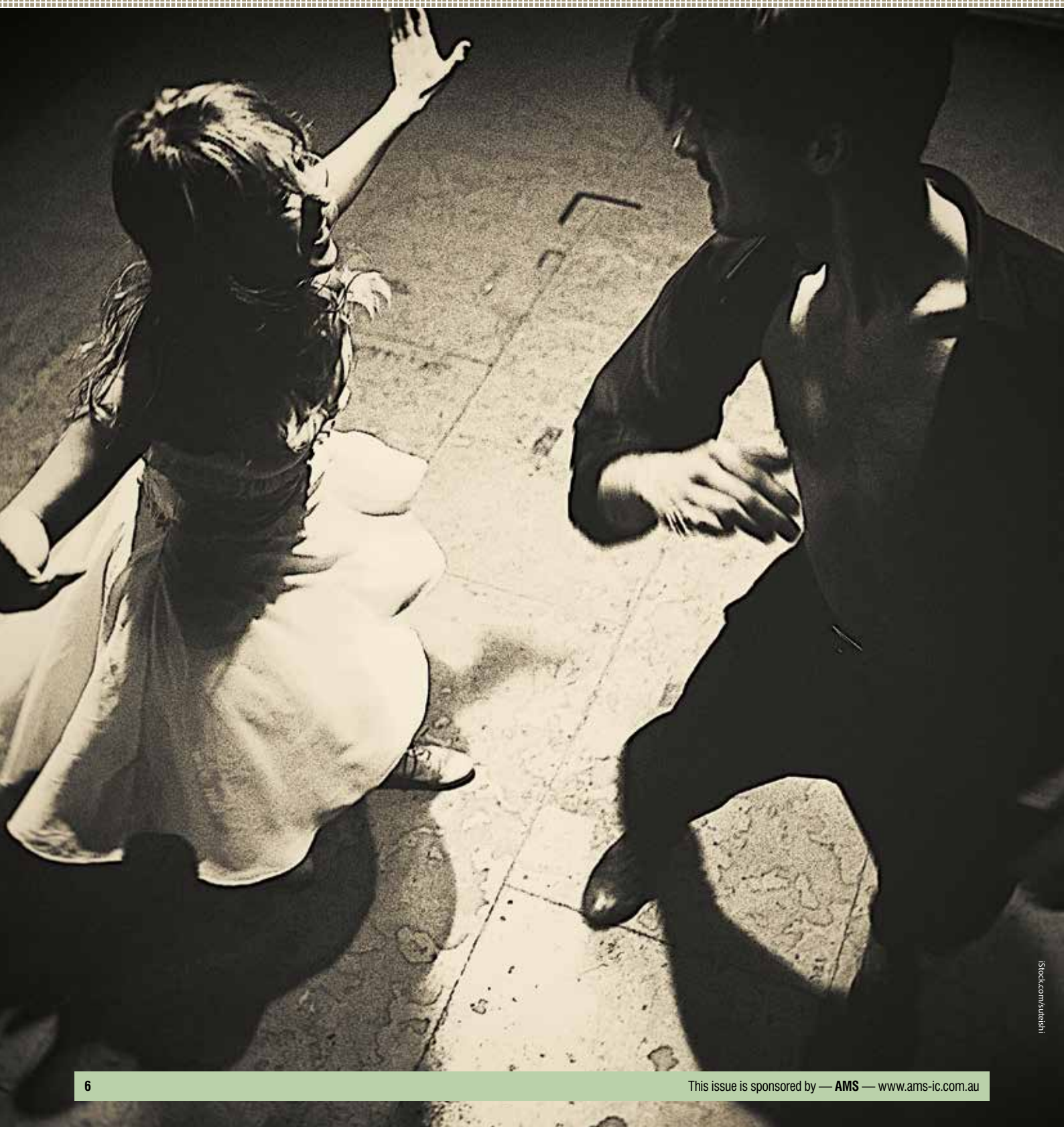
Dirty dancing across a new energy landscape

*Lisa Zembrodt**



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One of my favourite movies as a kid was *Dirty Dancing*; I was energised by the music and dance. Now, when it comes to discussing our evolving energy systems and the need to transition to a net zero future, the dancing metaphor is a great fit. Here's why.

The real-time balancing of electricity generation (supply) and demand is like a dynamic dance and if the two dancers are not in sync, the electricity system could tumble.

Demand has long been the leader, increasing when you flick on your kettle, and its dance partner, generation, follows its lead and increases too.

But the electricity system is transforming. Demand has suddenly flipped into an energetic tango, leaving the flowing waltz of the past behind.

Similarly, generation (supply) is no longer the perpetual follower of demand: grid-scale renewable generation output is growing rapidly. However, electricity generation from renewables is plentiful at times and sometimes it's not dancing at all — when the sun doesn't shine and the wind doesn't blow — making balancing the electricity grid challenging.

Meanwhile, homes and businesses have become power generators in their own right, with rooftop solar, batteries and energy storage systems becoming more prevalent.

Keeping supply and demand moving in sync requires orchestration and incentives, as we transition to renewables and reduce emissions. Together, orchestration and incentives must overcome inconsistent generation and transmission challenges, and ensure increasing volumes of storage.

With storage, we have a new dance partner joining demand to spin around the dancefloor: when generation is resting, storage cuts in.

Importantly, we also need to teach demand to follow its generation partner's lead every now and again. In the energy industry, we call this demand management, and this is the unsung hero and future of the grid.

To make demand management work, we need price signals to motivate changes to energy use by telling the market the true value or cost of each electron. In my *Dirty Dancing* analogy, this is like a conductor changing the beat, driving energy consumption to another time when energy is most available.

Due to supply and demand being out of step, an electron in the middle of the day can be far cheaper than an electron at 7:00 pm.

Today, many residential and small business consumers pay a flat rate regardless of supply scarcity. For larger energy consumers, pricing has been a little smarter, as most pay different rates for peak and off-peak and can therefore pay less by altering when they use energy.

High prices due to global energy supply shortages in the past couple of years have revealed the inadequacy of these old pricing regimes. When supply gets tight, the market operator must step in with expensive interventions to maintain reliability.

The future requires proactive mechanisms to better reflect scarcity and abundance. For example, it could be more cost-effective for a small manufacturer to have two production lines that run during daylight hours (powered by rooftop solar) than it is to have one production line that runs 24/7.

Most importantly, the consumer needs to be rewarded appropriately for helping to maintain grid reliability.

If you coordinate energy efficiency, demand response and demand management properly, you can realise significant value in that flexibility.

Today's major energy consumers have multiple energy assets at their disposal — onsite generation, possibly onsite storage, and maybe untapped ability for demand management. As well as a retail electricity supply contract, they may also have renewable electricity contracts.

In recent years we've identified material savings for Schneider Electric's industrial customers by finding the opportunities in all that complexity. It's no easy task, but once done, consumers can plainly see the value of energy efficiency, demand management and demand response.

Load flexibility is a major asset to the grid of the future. As we upgrade our buildings, production facilities and homes, and add onsite solar or batteries, EV charging and smart technology, we need to think about improving our ability to flex our loads and encouraging changing consumption patterns.

Improving capability for flexing load also improves grid resilience. Of course, energy and decarbonisation are intrinsically linked, as the energy system is responsible for some 75% of Australia's greenhouse gas emissions. Consumers big and small should think holistically about all the energy efficiency, electrification and energy management actions that are part of a wider aim to decarbonise.

We need to teach the steps through price signals, understanding value, understanding and improving demand management capability, and holistic thinking.

If demand is better managed, we can decarbonise and improve our grid much faster so that demand and generation can seamlessly dance in time across a decarbonised grid.

My hope is to see our grid be the first to achieve 24/7 carbon-free energy. It's like the big lift in *Dirty Dancing*, a display of partners taking flight and moving in unison.

**Lisa Zembrodt is the Principal and Senior Director of Sustainability Business for the Pacific Zone at Schneider Electric.*

Why private investment is key to a plastic circular economy

Jacob Duer, President and CEO of the Alliance to End Plastic Waste

The dawn of the plastic age was a milestone in human development, driving our technological revolution, transforming industries, enabling innovation and saving lives — as well as making lives easier. It now threatens to be a millstone, with runaway waste levels that are rising as our population increases and becomes more affluent. It is everywhere — in all industries, across food supply chains and, sadly, in our environment.

Australia's abundant, unique and diverse natural habitats are particularly at risk, not least the Great Barrier Reef and Ningaloo — the national science agency CSIRO estimates 130,000 tonnes of plastic leaks into Australia's marine environment each year while across Asia and the Pacific more than 11 billion pieces of plastic are clogging our reefs, driving the risk of coral disease up from 4% to 89% in plastic-hit areas. Overall, 85% of Australia's terrestrial plastic waste ends up in landfill, a statistic in line with global rates of recycling rates.

The problem is, on the current trajectory, plastic waste levels are set to double by 2050 and triple by 2060 unless we take effective action and develop a circular plastic economy.

Almost all plastics are made from fossil fuels, so increased recycling and reduced production of new plastics alongside efficiencies in use will make a major contribution to achieving net zero targets.

Given Australia's unique ecosystem, it is not surprising that the country is taking action with government commitment to a circular economy, pledging to recycle all plastics by 2040. The CSIRO has developed a circular economy roadmap for plastics and other waste. It estimated that just boosting the recycling rate by 5% will create many more jobs and add US$1 billion to Australia's GDP.[1]

The missing puzzle piece: expanding private investment recognition

These are just a few examples among many initiatives at the state and federal level driven by policy and private enterprise, but they are baby steps. We need to accelerate efforts exponentially to avoid a plastic apocalypse.

This requires collective action through public–private–people partnerships and substantial capital investment. A burgeoning understanding of the issue has spurred numerous initiatives by governments, international organisations and concerned citizens, but to get to a future where plastic circularity is a scalable reality, significant investment needs to step up along the entire value chain or we will fail.

McKinsey estimates that achieving just 20–30% of recycled content in plastic packaging by 2030 will need $100 billion in investment.

Investment opportunities in plastics have significant parallels with the energy transition, which is also driven by private–public sector partnerships and attracted $1.8 trillion in investments last year, up 17% from the previous year. Private investors, in collaboration with governments and multilateral organisations, are directing investments towards renewable energy and other innovative technologies. Major initiatives like the Just Energy Transition Program (JETP) are allocating up to $50 billion to reshape the energy mix in countries like Indonesia, South Africa and Vietnam. The private sector today recognises the growing demand for renewable energy and related solutions, anticipating increased affordability as technologies advance and economies of scale take effect. We need to get the plastics opportunity similarly recognised.

We have started to see some of the more forward-looking investors recognise

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> **"The problem is, on the current trajectory, plastic waste levels are set to double by 2050 and triple by 2060 unless we take effective action and develop a circular plastic economy.**

the opportunity. Private investment is already a linchpin in many countries through the principle of extended producer responsibility (EPR) — making plastics producers and sellers responsible for waste collection and recycling. In Australia, similar efforts under the Product Stewardship Act cover sectors like oil, electronics and packaging, albeit to a lesser extent. When done right, EPR policies can support the development of a new industry infrastructure and create employment.

Opportunity for engagement in developed and developing economies

Developed countries, despite notable recycling processes, still struggle to lift recycling rates. In Australia, only 15% of plastic packaging is reused, recycled or composted, falling far short of the 100% target set for next year. Managing waste in regional and remote areas presents many challenges, including limited or absent kerbside waste collection services. The AU$250 million Recycling Modernisation Fund aims to address these issues, yet government data suggests that meeting the 2025 National Packaging Targets is still unlikely.

Globally, many countries face difficulties in combating plastic pollution, with over 60% of the 192 countries studied having underdeveloped or incipient waste systems. Clearer legal frameworks and policies are needed to catalyse capital participation from both public and private sectors. A big step in the right direction will be finalising the international legally binding instrument on plastic pollution by the end of 2024. A well-structured global agreement on plastic pollution will help harmonise metrics and reporting requirements for plastic waste and can help mobilise capital via new financial mechanisms, accelerating the development and deployment of solutions that improve resource efficiency.

The Alliance to End Plastic Waste

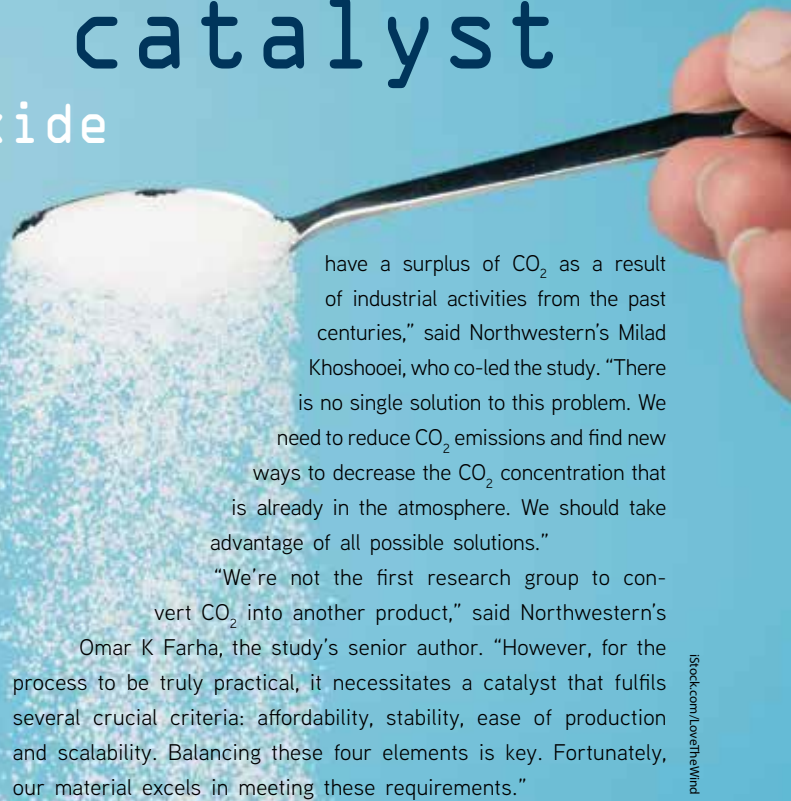
The Alliance to End Plastic Waste is part of the solution, bringing together more than 70 companies across the plastic value chain, local communities, civil society groups, intergovernmental organisations and governments to build collaborative solutions, with a keen focus on matching capital with opportunities that deliver value and positive impact.

The Alliance is collaborating across the world with private enterprise, governments and multilaterals to create awareness and attract investment in the US$120 billion opportunity to develop a long-term, sustained plastic circular economy. We work with universities, partner private equity managers such as Lombard Odier and work alongside governments and development finance institutions to drive public–private partnerships.

While the business and environmental case is strong, plastic circularity as an investable theme is in the early stages of development. Education, reporting and policy efforts can further accelerate participation from capital providers. As a crucial pillar supporting the global sustainability transition, there is a clear opportunity for investors to consider and shape as they seek new factors for portfolio construction and growth.

1. Circular economy roadmap for plastics, glass, paper and tyres, CSIRO Jan 2021.

Sugar-based catalyst upcycles carbon dioxide



In a Northwestern University study, a catalyst made from table sugar converted CO_2 into carbon monoxide (CO), an important building block that could be used to produce a variety of useful chemicals. When the reaction occurs in the presence of hydrogen, for example, CO_2 and hydrogen transform into synthesis gas (or syngas), a highly valuable precursor to producing fuels that can potentially replace petrol.

With recent advances in carbon capture technologies, post-combustion carbon capture is becoming a plausible option to help tackle the global climate change crisis. But how to handle the captured carbon remains an open-ended question. The new catalyst potentially could provide one solution for disposing the potent greenhouse gas by converting it into a more valuable product.

The study was published in the 3 May issue of the journal *Science*.

"Even if we stopped emitting CO_2 now, our atmosphere would still have a surplus of CO_2 as a result of industrial activities from the past centuries," said Northwestern's Milad Khoshooei, who co-led the study. "There is no single solution to this problem. We need to reduce CO_2 emissions and find new ways to decrease the CO_2 concentration that is already in the atmosphere. We should take advantage of all possible solutions."

"We're not the first research group to convert CO_2 into another product," said Northwestern's Omar K Farha, the study's senior author. "However, for the process to be truly practical, it necessitates a catalyst that fulfils several crucial criteria: affordability, stability, ease of production and scalability. Balancing these four elements is key. Fortunately, our material excels in meeting these requirements."

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Healthcare recycling initiative repurposes IV bags

New Zealand's Southern Cross Healthcare has embraced a recycling initiative in which its IV bags are given new life as a surface cover in children's playgrounds.

PVC IV bags from all 10 Southern Cross hospitals around Aotearoa are now being recycled and repurposed, with 4.25 tonnes of plastics recycled during 2023, according to Southern Cross Healthcare's Head of Environmental, Social and Governance, Greg Nelson.

"Each Southern Cross hospital has fully embraced the opportunity to recycle IV bags and reduce our environmental impact, so it's amazing to think all this plastic, which otherwise would've gone into landfill, can now help to keep children safe and create new spaces beyond the operating theatre," Nelson said.

Southern Cross Healthcare is collaborating with Baxter Healthcare, its supplier of IV bags, on the initiative. After use in surgery or other care, the PVC bags are collected and processed by Matta, an Auckland-based provider of surface coverings.

"Baxter covers the costs of recycling, while our hospital staff ensure the bags are collected and stored properly for pick-up. We're delighted to be involved in this fantastic recycling initiative and to be reducing waste from our hospitals," Nelson said.

The IV bag recycling is just one of Southern Cross Healthcare's recycling initiatives. "Since May 2023, some Auckland Southern Cross Hospitals have also been recycling sterilisation wrap," Nelson said.

"It's a large-volume waste product across the whole healthcare industry. At Southern Cross, the plastic is collected by recycling and waste solution provider Green Gorilla before being sorted by the Abilities Group and processed by Future Post into products primarily for agriculture, viticulture and other uses."

Paul Clark, Marketing Manager, IV Solutions and Sustainability, Baxter Healthcare, said that since 2009, Baxter's Plastic Recycling in Hospitals program had diverted thousands of tonnes of medical waste away from landfill. "We're proud to be part of a more sustainable healthcare system, and we're committed to continuing our efforts to reduce our environmental impact," he said.

At the Auckland Surgical Centre alone, Nelson said recycling sterilisation wrap has resulted in a 20% reduction in waste, with the initiative now being rolled out to more hospitals in Auckland.

(L–R) Lisa Olsen, Clinical Nurse Specialist: Infection Prevention and Control, Southern Cross Brightside Hospital with Trudi Neill, Education and Product Specialist from Baxter Healthcare.

"Sustainability is a focus for Southern Cross Healthcare at all our locations, so in addition to increasing the recycling of plastics we are working on a number of other initiatives including reducing the amount of energy we use and how some single-use items can be repurposed. We all have a part to play in reducing our impact on the environment."

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Extra-strong concrete — with coffee

Carelle Mulava-Richards, RMIT University.

Council officers and the RMIT research team were present for the pour of the coffee concrete for the footpath trial in Gisborne.

RMIT University has come up with a novel use for spent coffee grounds — as a valuable component in concrete.

The university is currently collaborating with Macedon Ranges Shire Council on a coffee concrete footpath trial in Gisborne.

RMIT has several other projects planned across Victoria in which coffee grounds will be turned into biochar and transformed into a resource for the construction industry. The RMIT team will partner with Australian-owned BildGroup — a civil infrastructure, asphalt paving and road profiling company — to deliver these circular-economy projects.

Australia generates 75 million kilograms of ground coffee waste every year. Most of this waste currently goes to landfill, but it has the potential to replace up to 655m kg of sand in concrete because spent coffee is a denser material. Globally, 10bn kg of spent coffee is generated annually, which could replace up to 90bn kg of sand in concrete.

While organic waste like coffee grounds cannot be added directly to concrete because it would decompose over time and weaken the building material, the RMIT team has developed a technique to make a suitable coffee biochar via a low-energy process without oxygen at 350˚C. The resulting mixture makes the concrete 30% stronger, the researchers said.

The team is using a similar technique to turn other organic waste, including wood chips, into biochar that can also be used to make stronger concrete. Both types of biochar are being tested in the Macedon Ranges footpath trial.

"It's very exciting to see this world-first trial of our coffee and wood-based biochar in these footpaths collaboration with Macedon Ranges Shire Council," said Dr Rajeev Roychand, from RMIT's School of Engineering.

"Sand is getting scarce over time, and this waste can replace up to 15% of the sand in concrete."

Shane Walden, Council's Director of Assets and Operations, said it was important for the council to be involved in projects such as this and to be working closely with universities like RMIT.

"This not only helps improve the knowledge level of our contractors and our staff, but it also has lots of other benefits and benefits that are important to our community," he said.

"This includes helping the environment, acting sustainably and, most importantly, reducing waste to landfill and having a circular economy."

Walden said that despite the fact that the new concrete contains coffee grounds or mulch, residents aren't really going to see or smell any difference.

Turning coffee concrete into a commercial reality

If the trial concrete footpaths in Gisborne perform well, the RMIT team is aiming for the commercial rollout of its innovation.

"We are currently working in the supply chain sector so that we can make this research into a mainstream product for commercial applications, and we're not only looking into coffee — we're expanding this into all forms of different organic waste," Roychand said.

"Every biochar produced from a different organic material comes with varying composition, in addition to the difference in carbon content, particle size and absorbency, that can boost the performance of concrete in a range of ways."

If this RMIT innovation can be integrated into the supply chain, it might bring cost savings for construction companies and concreters by reducing the amount of cement needed.

"Since we are achieving a 30% increase in strength for the coffee concrete, this could reduce the required cement content by as much as 10%, based on our previous experience," Roychand said.

The trial with Macedon Ranges Shire Council did not reduce the amount of cement normally used to make concrete for footpath projects, but the RMIT team plans to experiment with using less cement in future.

'Transforming spent coffee grounds into a valuable resource for the enhancement of concrete strength' has been published in the *Journal of Cleaner Production*.

Water sustainability issues in green hydrogen production

James Currie, Black & Veatch

Alternative water sources provide a sustainable pathway for water-scarce economies, like Australia, to produce large amounts of green hydrogen.

Green hydrogen is produced when water electrolysis is powered by renewable energy to split water into hydrogen and oxygen. Green hydrogen can be stored, transported and burned to generate power. Green hydrogen production does not result in carbon emissions.

Green hydrogen is an important technology in the shift towards cleaner energy. It can help reduce carbon emissions in applications and industries that are hard to decarbonise, for instance, by serving as a zero-carbon fuel in the production of energy-intensive materials such as cement, steel and chemicals. Additionally, it can serve as a direct replacement for natural gas in power generation.

Green hydrogen can be turned into higher-value derivatives such as green ammonia, green methanol and Sustainable Aviation Fuel. It can serve as a form of chemical energy storage to complement and provide a reliable alternative to lithium-ion batteries. It can also power zero-emissions vehicles using hydrogen fuel cells.

Australia has committed over AU$1.3 billion to develop its hydrogen industry as part of efforts to become a renewable energy superpower, decarbonise its economy and increase clean energy exports to contribute to regional and global decarbonisation with concomitant benefits to energy security.

Abundant renewable energy and land are resources that Australia offers to support its ambitions. It will also require an enormous amount of high-quality water for hydrogen production.

Water is required to perform key functions in hydrogen production including:

- Critical feed for production.
- Plant cooling and domestic water.
- Disposal of rejected water from treatment processes.
- Salt cavern solution mining for geophysical hydrogen storage.

A study in the *Journal of Cleaner Production* proposes that producing 1 kilogram (kg) of hydrogen through water electrolysis requires 9 litres (L) of ultra-pure water. The total water usage of a hydrogen plant can range from 18 to 36 L/kg of hydrogen, depending on the plant's configuration.

According to Black & Veatch's analysis, assuming an electrolyser-specific energy consumption of 55 kilowatt-hours per kilogram (kWh/kg), a 1-gigawatt (GW) hydrogen facility can consume approximately 7 to 15 million L of water per day.

Swinburne University of Technology estimates that about 225,000 megalitres (or 225,000 million litres) of water will be needed for Australia to achieve its AU$50 billion green hydrogen industry. This amount of water is estimated to be around 4% of the amount of water used for Australian crops and pastures in 2019–20, based on Australia Bureau of Statistics data in 2022.

This is a large quantity of water, especially in water-stressed areas.

On top of that, the declining availability of fresh water caused by climate change is making it challenging to manage water resources effectively in water-stressed economies, including Australia. Variable rainfall patterns worsen the impact of drought and aggravate the situation.

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Sustainable pathways

In Australia's arid regions, most available water resources have been allocated for agricultural irrigation and town and city drinking water supplies.

Opting for alternative water supplies, such as desalinated water and recycled wastewater, can sustain hydrogen projects and reduce the withdrawal of existing surface and groundwater resources.

Seawater could be a potential stable supply for hydrogen facilities located near coastal areas, while plants near cities with large, centralised wastewater treatment facilities can turn to recycled wastewater as a viable alternative.

Seawater and recycled wastewater can be treated to the quality needed for hydrogen production. Additionally, the salinity of salt water can be lowered by reverse osmosis. Ultrapure water produced after the final polishing treatment process can then be used for hydrogen production.

As alternative water resources do not deplete existing resources, including local drinking water supplies, they are more likely to be accepted socially. Additionally, water supply alternatives can be recycled back into the hydrogen production process and treated to a higher quality than the original water source.

> **"The viability of Australia's hydrogen economy depends on how effectively it manages the competing water demands from various users, including industry, commercial and residential sectors.**

Regionally, PT Freeport Indonesia (PTFI) appointed Black & Veatch to design and manage the delivery of a seawater desalination plant for its Manyar Smelter in East Java, Indonesia. The seawater desalination plant will support the processing of mine concentrates from the Grasberg mine in West Papua.

Globally, seawater desalination projects that Black & Veatch worked on include the Escondida Water Supply Expansion (EWSE) project at the Minera Escondida mine in Chile and the original Escondida Water Supply (EWS) project.

For Australia's Bundamba Advanced Water Treatment Plant (AWTP), Black & Veatch and its joint-venture partners designed, constructed and commissioned one of its three water treatment plants on a fast-track schedule. Water treatment steps at the Bundamba AWTP include ultrafiltration membranes, reverse osmosis membranes followed by advanced oxidation using ultraviolet irradiation and hydrogen peroxide.

For Melbourne Water Corporation's Eastern Treatment Plant (ETP) in Victoria, Black & Veatch selected a process train of ozonation, media filtration, ultraviolet irradiation and chlorination that significantly improved the quality of discharge into the environment. The process produces high-quality recycled water that the community can use.

Creating bankable projects

While desalination offers a sustainable and climate-resilient water supply for hydrogen generation, it also comes with high energy and production costs. Treatment and regulatory permitting can add to the challenges.

Powering desalination plants with renewable energy sources can help to reduce carbon emissions from the desalination process and provide a rainfall-independent water supply that meets environmental and commercial targets.

Another factor to improve project bankability is locating a high-quality water source before constructing the hydrogen plant. This includes siting seawater desalination facilities near coastal areas to reduce water conveyancing costs.

It also includes seeking water recycling and effluent reuse opportunities near major cities where greywater sources and wastewater treatment facilities are commonly located.

Planning for water holistically can reduce the risks associated with resource over-allocation. This strategy includes implementing an integrated water management system that advances the sustainability objectives of Australia's hydrogen industry.

The system would ideally evaluate the water consumption of hydrogen projects and create plans that balance the requirements of the hydrogen sector and those of local water users.

Equally critical are supportive water management initiatives at the national level, including the use of alternative water sources and simplifying the permitting process for alternative water infrastructure.

Water management and allocation frameworks can also help prioritise the sustainable development of the hydrogen sector.

Planning ahead

The viability of Australia's hydrogen economy depends on how effectively it manages the competing water demands from various users, including industry, commercial and residential sectors.

Incorporating appropriate technologies for hydrogen manufacturing, alternative water sources and process cooling can help optimise water usage and present opportunities for sustainable development.

To identify the right mix of technologies and scale them, the industry needs partners who can support its strategic decision-making, financial and resource commitments, implementation and execution.

*James Currie is Director, Water, Associate Vice President, Australia Pacific at Black & Veatch. Black & Veatch has been supporting Australia's water infrastructure development for over 40 years and remains committed to it.

Tackling plastic waste in health care

With the support of APR Plastics, Recycle Wise has initiated a service previously missing in the healthcare industry. The service provides a recycling pathway for a commonly used type of IV bag.

85% of plastic waste in health care is clean and can be recycled if there is a stream to support it, according to the Ministers Priority List for 2023–2024, which singled out plastics in health care. The List instructs manufacturers, importers and distributors of health items to exhibit enhanced and measurable actions towards product stewardship by November 2024.

In light of this directive, Recycle Wise set out to reduce plastic waste from health care and to support product stewardship by servicing a new stream: an IV bag made from freeflex for delivery of sodium chloride. The freeflex IV bag has been designed to deliver high-quality healthcare standards while at the same time minimising its impact on the environment through recycling. It is now in the majority of clinics and wards in Australia's health and therapeutic care industry.

Nurse holding up IV bags that can be recycled and no longer go to landfill.

Previously, uncontaminated bags in Victoria were going into general waste. With Recycle Wise's IV bag recycling stream, this no longer has to be the case.

Recycle Wise
www.recyclewise.net.au

HUMIDITY AND TEMPERATURE SENSOR

The VC & VR series of Galltec-Mela are rod-shaped compact sensors with high-grade steel housing. These sensors are developed to measure humidity and temperature in a wide range of applications and have been specially developed for use in extreme conditions. They are available with a 1.5 m connecting cable (VC series), without cable (VK series) or with a robust aluminium connecting head and terminal screws (VR series) for measuring relative humidity and temperature in air and other non-aggressive gases.

The advantages of the series .../9 are its improved dynamics, in particular at low air speeds, and also its increased service life, even under more challenging operating conditions (pollutant impact or permanent humidity >95%rh). When air speeds are extremely high combined with a high number of particles, using the series .../9 is not recommended.

The design also makes them suitable for performing equilibrium humidity measurements in bulk materials and in brickwork (only series .../5). Other possible applications include bioenergy and renewables, chemical plants, HVAC and building automation, refrigeration and air conditioning technology, climate chambers, food technology, paper and printing, pharma industry, drying systems, environmental engineering, greenhouses, livestock farming and wine cellars, etc.

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HVAC PUMPS

Armstrong Fluid Technology introduced its extended range of Design Envelope Permanent Magnet (DEPM) pumps to Australia and the wider Asia–Pacific region at ARBS 2024.

These DEPM pumps, with motors up to 45 kW, are designed to deliver a 35–65% reduction in energy consumption compared to conventional integrated pumps with induction motors. This translates into 50% embodied carbon reduction for end users. Design Envelope pumps provide good flow measurement and are available with parallel sensorless control for optimised pump loading and redundancy.

Armstrong's DEPM pumps are used across various industries, including construction, hospitals, energy upgrading, data centres, hotels, commercial property and other sectors with mission-critical facilities, to drive energy monitoring in heating, ventilation, air conditioning and refrigeration (HVAC&R). The motors of these DEPM pumps are built to IEC5 efficiency standards.

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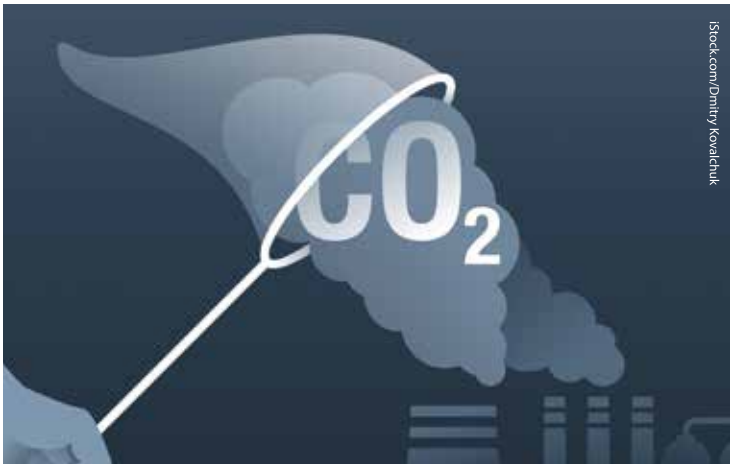
Low-cost material for direct air capture of CO_2



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Researchers at Monash University have developed a group of low-cost solid materials that show great promise for use in systems to capture excess carbon dioxide directly from the atmosphere.

The study, entitled Amine-functionalized meso-macroporous polymers for efficient CO_2 capture from ambient air, was published in ACS *Applied Materials & Interfaces*.

Known as "meso-macroporous melamine formaldehyde (MF)", the new materials can be made relatively easily from the common and low-cost chemicals melamine and formaldehyde and have extra-large pores to facilitate direct air capture (DAC) of carbon dioxide.

Until now, large-scale deployment of DAC as a negative carbon emission technology has been slow due to the low performance and high cost of solid materials capable of capturing significant amounts of carbon dioxide at low levels present in ambient air and at normal temperatures.

Co-lead researcher Professor Paul Webley said: "We believe these MF materials represent a significant advance towards commercialisation of DAC processes. The ultrahigh pore volume and the meso-macroporous structure makes MF a superior base for making DAC adsorbent materials."

MF can be formed into droplets, pellets and coatings and can be easily impregnated with tetraethylenepentamine (TEPA), a proven adsorbent for carbon dioxide removal.

Molecular groups known as amines, which contain nitrogen atoms bonded to hydrogen atoms, have a strong ability to form chemical bonds with carbon dioxide and capture it from gas mixtures, even at low concentrations.

(Note: Although CO_2 levels have risen rapidly since the onset of the industrial revolution, from around 280 to 415 ppm, CO_2 accounts for a very low proportion of the earth's atmosphere.)

"Our results demonstrate the great potential of amine-impregnated MF adsorbents for carbon capture, paving the way for the development of advanced DAC systems," Webley said.

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Delegation with Minister Bowen at MCi Carbon Myrtle Foundation Ceremony.

'Myrtle': Australia's new embodied carbon facility

Minister for Climate Change and Energy Chris Bowen has participated in a foundation ceremony for an upcoming carbon capture and utilisation (CCU) facility in Newcastle. The facility, named 'Myrtle', is owned and will be operated by Australian clean technology company MCi Carbon.

MCi Carbon has been developing its proprietary mineral carbonation technology for over a decade, transforming CO_2 into solid outputs such as calcium and magnesium carbonates for use in the built environment.

In 2021, the company secured AU$14.6m from the Australian Government CCUS Development Fund to build Myrtle as part of the government's low emissions and renewable energy strategy. The plant is now under construction in partnership with Orica, its major investor and industrial partner. Located at Kooragang Island alongside the Newcastle Port, MCi's plant aims to transform over 1000 tonnes of CO_2 emissions per annum captured from Orica's ammonia plant and produce nearly 10,000 tonnes of valuable new low-carbon embodied materials.

Speaking at the ceremony, Bowen said, "The regions that have powered Australia for so long are those that will drive our clean energy future for decades to come — and no more so than the Hunter. Today is a good day for the Hunter, for Australia and for MCi Carbon as an innovative Australian technology.

"We're creating positive change for our future, our planet and our decarbonisation while creating thousands of good-paying, highly skilled jobs.

"To get to 43% emissions reduction in our country, we need to reduce emissions at source and in production. That's what MCi's low-carbon bricks are doing, both by reducing carbon emissions in our buildings, as well as storing carbon in ways that aren't in our atmosphere."

MCi Carbon founder and CEO Marcus Dawe said that the company's technology had the capability to change the trajectory of the global path to net zero by permanently and safely locking away more than 10% of global emissions when scaled.

"The technology captures and transforms CO_2 from a harmful gas emission into solid carbon embodied materials. These can be used in cement, concrete, plasterboard, glass, paper and many other manufactured products and as green inputs into the world's future built environment," Dawe said.

Joining Bowen at the ceremony were Federal Member for Newcastle Sharon Claydon MP, Orica CEO & Managing Director Sanjeev Gandhi and Japanese Ambassador to Australia Suzuki Kazuhiro.

MCi Carbon has received significant global investment, including from Japan's Sumitomo Mitsui Trust Bank, ITOCHU Corporation and Mizuho Bank as that country accelerates its transition to net zero emissions.

In Europe, MCi commenced preliminary engineering work in January 2024 for its first industrial large-scale plant in collaboration with RHI Magnesita, the Austrian-founded multinational dealing in high-grade refractory products, systems and solutions. Securing the first demonstration campaign with Myrtle, RHI Magnesita has invested US$10m to scale up the MCi technology to capture and transform about 50,000 tons of CO_2 per year to create carbon negative products for its European customers.

Myrtle is due to be completed, commissioned and operational by early 2025.

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Can I see your (product) passport please!

Digital Product Passports that allow consumers to scan a product's label to read up on its sustainability credentials and understand how to repair and recycle it are one step closer. In time, these passports will likely apply to everyday products like clothing and phones as the world moves to a more circular economy.

Upping the circular economy game in the EU and locally

Agreed in principle by the European Parliament in December 2023, the new Ecodesign for Sustainable Products Regulation (ESPR) will require almost any product in the EU market to provide proof that it's sustainable, durable and recyclable. This means that local businesses need to up their circular economy game to continue to trade with the European Union.

thinkstep-anz circular economy expert Jim Goddin said, "Now is the time for businesses to get ready." Goddin draws on experience gained from many years of working with the Ellen MacArthur Foundation, a leading global circular economy organisation. The Chartered Engineer and Chartered Environmentalist moved from the UK to New Zealand in late 2023 to fulfil a lifelong dream and to support businesses in New Zealand and Australia. "There is a lot of interest in the circular economy in both countries, and it's exciting to be here," he said.

"The circular economy is a concept that changes how we produce and consume goods," Goddin explained. "It moves us away from the current 'linear' model of making, using and throwing away." It dramatically reduces waste, makes the most of resources, extends the life of products and recovers more materials.

Not the same as recycling

"The circular economy isn't the same as recycling," Goddin said. "While recycling is an important solution and converts waste into reusable material, the recycling process can sometimes devalue that material." For example, we can't make a milk bottle from purely recycled materials. There is always virgin material needed.

The circular economy aims to prevent waste and pollution from being created in the first place by designing products so that they, and the materials that make them up, can be used for as long as possible at their highest value. This means thinking beyond recycling and looking at opportunities for consumers to repair and reuse products and for manufacturers to remanufacture them.

Information for a more circular economy

However, one of the greatest challenges to making progress with a circular economy is the lack of data and transparency across supply chains. "We need to know what materials products are made of to keep them in service for longer, to work out how to reuse or repair them, to know if they can be safely composted, or to separate them effectively to maximise the value of recycled materials," Goddin said. This is where Digital Product Passports come into play.

What the ESPR means for Australian businesses

Businesses trading with the EU — or supplying those who do — will need a Digital Product Passport (DPP).

- The DPP tracks where a product has been over its entire lifecycle. It's a digital record that contains information about its 'journey' and what it is made from.
- Companies can apply this information to use resources more efficiently, shore up their supply chains, cut down on waste, extend the lifespan of a product and improve recycling initiatives. Consumers can make more informed decisions.

Businesses may need to provide data on several aspects:

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- How durable the product is. Can it be reused, upgraded
- or repaired?
- Whether it contains substances that cannot be circulated (passed on). Examples include coatings that prevent composting or chemicals that prevent specific uses (eg, food applications).
- How energy- and resource-efficient it is.
- How much recycled content it contains.
- Whether it can be remanufactured or recycled.
- What its carbon footprint is.

Where to start:

See this as an opportunity

This isn't just another hurdle but a chance for you to tell your product's story and for your customers to understand its value. What story do you want them to hear, and how do you back that up with evidence to give them confidence to believe it?

Prepare in advance for the data you'll need

A lot of your data will need to be verified by qualified third parties against established standards. This will take time.

Do your homework

Investigate how you will structure, store and share this information. Many digital platforms are emerging to help you do this. The platforms will eventually all need to work together.

Consider the lifetime of your data

How will you maintain the data? What additional value could you get from it?

Make yourself stand out

Think about your competition. How will the sustainability and circularity of your products stand out from the crowd?

When will I need the passport?

Batteries and vehicles, textiles, electronics and ICT, furniture, plastics, construction materials and chemicals will be the first industries that will need to get their passports sorted. While the final timeline is still being worked on, 2026/7 looks likely for the first industries to adopt DPPs. Others are expected to follow suit by 2030.

Growing up on the remote Orkney Islands off the coast of Scotland, Jim Goddin, Head of Circular Economy, thinkstep-anz, was interested in sustainability from an early age. From watching Europe's largest experimental wind turbine from the windows of his small school to admiring a stream-powered electricity generator at his parents' property, he was also fascinated by engineering. As a leading expert in circular economy, he has collaborated with prestigious organisations such as the Ellen MacArthur Foundation. He has worked extensively on developing eco-design tools like calculators that measure circularity and assess business risks resulting from critical materials and hazardous substances legislation.

From glass waste to energy-efficient bricks

Team leader Associate Professor Dilan Robert (third from left) with the RMIT research team behind the energy-smart bricks in a lab at RMIT University.

Image credits: Seamus Daniel, RMIT University.

RMIT University engineers have created a new type of energy-efficient brick from scrap materials.

In collaboration with Australian recycling company Visy, the engineers used a minimum of 15% waste glass and 20% combusted solid waste (ash) as substitutes for clay in their bricks.

Team leader Associate Professor Dilan Robert said about 1.4 trillion bricks were used in construction projects globally every year.

"Business-as-usual brick production produces harmful emissions — including carbon dioxide, sulfur dioxide and chlorine — and puts a serious strain on our natural resources, particularly clay," said Robert, from RMIT's School of Engineering.

Replacing clay with waste materials in the production of the new bricks helped reduce the firing temperature by up to 20% compared with standard brick mixtures, offering potential cost savings to manufacturers.

Importantly, test results indicated that using these bricks in the construction of a single-storey building could reduce household energy bills by up to 5% compared to regular bricks, due to improved insulation.

In addition to their energy efficiency benefits, the new bricks comply with stringent structural, durability and environmental sustainability standards, with the technology meeting the key compliance requirement of fired clay bricks set by Standards Australia (AS 3700).

Waste glass that the team can use in their energy-smart bricks.

The team's energy-smart bricks in a range of colours.

"Bricks play a key role in preventing energy loss from buildings," Robert said.

"We can also produce lightweight bricks in a range of colours from white to dark red by changing our formulations."

Dr Biplob Pramanik, the RMIT team's environmental engineer, said the new bricks were safe to use in construction projects.

"Our bricks, manufactured from industry waste, meet state environmental regulations," he said.

In Victoria, Visy recycles glass packaging back into new bottles and jars. The new bricks provide a solution for the use of fines — pieces of glass smaller than 3 mm — which cannot be recycled into bottles.

Paul Andrich, Innovation Project Manager at Visy, said the company was thrilled to find a solution for material that cannot be recycled into food and beverage packaging.

"Diverting this waste into bricks with added insulation, rather than landfill, is another way we are powering the circular economy," he said.

The researchers now plan to expand the use of their technology.

"We are focusing on scaling up the production process to facilitate the commercialisation of our innovative bricks in collaboration with brick manufacturers in Melbourne," Robert said.

The team is also looking to collaborate with industry to explore applications of waste material in other construction products.

Their latest research has been published in the international journal *Construction and Building Materials.*

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EQUIPPING FUTURE LEADERS TO TACKLE CLIMATE CHANGE CHALLENGES

In a world grappling with the escalating impacts of climate change, urgent action is essential to confront the environmental challenges threatening our planet's future. Human activity has led to changes to Earth's climate of a magnitude unprecedented over centuries and thousands of years. As the effects of climate change rapidly intensify, demand for specialists trained to address these pressing issues has never been greater.

At the University of Newcastle, the Master of Environmental Management and Sustainability aims to develop these specialists. The program offers a unique blend of environmental courses that focus on key principles of environmental management, sustainability, and climate change.

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

"The Master of Environmental Management and Sustainability program gives students a good understanding of the complexities of the natural world, the vulnerability of socio-economic and natural systems to climate change as well as strategies to mitigate the activities that are driving our changing climate and strategies to adapt to the changing climate," emphasised Michael Osborne, an academic who teaches into the program.

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.

Photo of student Danielle (right) and staff members from SPREP, the Ministry of Natural Resources and Environment in Samoa and the Japanese Technical Cooperation Project for Promotion of Regional Initiative on Solid Waste Management, Phase II in Pacific Island Countries (J-PRISM II). Taken on 30 April 2024.

Current student Danielle spoke about one of the courses offered within the program. "The course content was highly relevant, addressing critical aspects of environmental science and public policy. The focus on climate change — an urgent global challenge — captivated my interest and underscored the course's significance," Danielle emphasised.

"I gained a comprehensive understanding of international climate agreements and conventions. Learning about the processes behind launching, negotiating, and ratifying these agreements was eye-opening," she added.

"The knowledge and skills I acquired through ENVS6545 [Impact Assessment and Climate Change Policy course] are invaluable to my work. I am already applying my learnings related to the IPCC, international treaties, and the achievement of sustainable development goals (SDGs)," she continued.

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.

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Reaching a grand alliance in energy

Ron Beck, Senior Solutions Director, Aspen Technology, Inc.
and Dr Carole Nakhle, CEO, Crystol Energy

The United Nations, in the Emissions Gap Report 2022, has warned the international community is falling far short of the Paris Agreement goal of limiting global warning to 1.5˚C this century. To save the planet from an imminent climate crisis, responses from governments need to be commensurate with calls for concrete and immediate actions.

Following which, subsequent negotiations at COP 28 resulted in more than 200 nations signing an agreement towards an accelerated energy transition. The path forward includes tripling global renewable capacity and doubling energy efficiency by 2030.

A massive transformation

The world needs to reduce greenhouse gases (GHG) by unprecedented volumes and at unparalleled speed, which is achievable only through a large-scale, rapid and systematic transformation. According to the UN Environment Programme, to hold global warming to 1.5˚C, emissions must fall by 45% from those forecast under current policies by 2030. Even to reach the 2˚C target, a 30% cut is needed.

The Intergovernmental Panel on Climate Change (IPCC) states that the largest share and growth in gross GHG emissions occur in CO_2 from fossil fuels combustion and industrial processes, followed by methane. Lowering GHG emissions will require a significant curtailing of the demand for fossil fuels — that is, oil, natural gas and coal.

The world's primary energy mix continues to be dominated by fossil fuels, which provide 82% of global energy used, with 7%, 4% and 7% coming respectively from hydropower, nuclear and modern renewable energy. Oil continues to be the most-used fuel, and consumption of all fossil fuels continues to grow, as outlined by the Energy Institute (2023).

Affordability and reliability

Energy security has always been an important pillar of energy policy among net importers. The International Energy Agency (IEA) states that long-term energy security mainly concerns timely investments to supply energy, in line with economic and environmental needs. Short-term energy security focuses on the ability of the energy system to react promptly to sudden changes in the supply-demand balance. Energy enables people to meet basic needs, and its cost represents a large share of the expenditures of many households. High fuel prices may therefore trigger undesirable political reactions. Second, inter-fuel substitution cannot happen immediately unless the technology and infrastructure for the reliable production, storage and use of renewable energy is readily available, including global expansion of electric grids. Hence, maintaining investment in all sources of energy to meet existing demand remains key to ensuring future reliable supplies.

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While volatility in prices has always been a feature of fossil fuel markets, the energy crisis of 2022 has also shown that fossil fuels can respond to that volatility rather swiftly. This is a key capability that is not currently available with green energy, such as solar or wind.

Climate goals

Despite recent setbacks, progress has been made on the climate front. Investment in renewable energy continues, governments are not cancelling climate targets and companies are adopting measures to reduce their carbon footprints. Carbon markets emerging in geographies, such as Indonesia, are already creating market incentives in those locations. A similar economic phenomenon is already happening with purchases of carbon credits in major carbon removal processes, such as the Bison Project in the US, by the major cloud data centre companies and airlines.

While emissions have grown worldwide, for many countries, rates have plateaued or even begun to decrease in recent years. Technology has played a central role in accelerating the energy transition, as it improves the efficiency of operations and reduces the carbon footprint of conventional fuels, while supporting the deployment of green energy. Digital technologies — the Internet of Things (IoT), mobility and cloud technologies, machine learning and artificial intelligence (AI) in particular — are transforming the way the world produces and consumes energy.

In a 2022 report, the IPCC argues that such technologies can contribute to the mitigation of climate change and the achievement of several sustainable development goals (SDGs). The report cites AI as improving energy management in all sectors, increasing energy efficiency and promoting the adoption of many low-emission technologies, including decentralised renewable energy. Digital technologies to support decarbonisation are now reaching the phase of industrial scaling, which will require partnerships for further development. For instance, Europe's SARAS refining group has partnered AspenTech to deploy an advanced emissions management solution to closely track and reduce emissions and improve ability to monetise carbon emissions credits. Nissan Chemicals is employing industrial AI software from AspenTech to operate ammonia production plants with steam methane reforming better, reducing steam and energy use by several percent. Saudi Aramco and AspenTech are collaborating to introduce a generative AI-based solution to strategically plan for decarbonisation of assets.

A balanced energy transition

GreenTech and energy transition approaches require the right regulatory and market framework, as well as the necessary funding, to flourish. In this respect, the government's role in providing an enabling environment is essential — but there are dangerous consequences that can come from the enactment of certain policies.

In particular, the excessive use of subsidies for green energy technologies has raised several concerns. Because poorer countries lack the funds to subsidise green technology, the drain on their capital reserves raises another important aspect of the energy transformation, that of a just energy transition.

The World Energy Council (WEC) publishes the energy trilemma index, which ranks countries in terms of progress on three competing demands: energy security, equity and environmental sustainability. The countries that have achieved the best performance on those three criteria are rich countries, whereas poorer countries typically score lower. Poorer countries, however, are often rich in hydrocarbon resources, as well as various metals and minerals needed for the energy transition. In those countries, people have complained about what they described as "climate colonialism", which can negatively affect support for and the speed of the global energy transition.

A grand alliance

The oil and gas industry has an important role to play in enhancing energy security by ensuring reliable supplies, as well as accelerating the energy transition. With technology, there is always a new and better way of doing things. The infrastructure used for oil and gas activities can play an important role in the deployment of green technologies, including carbon capture and storage (CCS) and offshore wind power. The industry also has the capital to fund green projects and the know-how to execute them.

Saudi Arabia, the world's largest oil exporter, is building the world's largest plant to produce green hydrogen at scale. The industry also has skills that can be deployed to support a rapidly growing green sector. The world's largest national oil companies are diverting substantial revenues from their traditional business to fund green projects.

It is hard to imagine meaningful progress without collaboration and cooperation between various stakeholders everywhere in the world. Former British Prime Minister Winston Churchill once described the alliance between Great Britain, the United States and the Soviet Union as the "Grand Alliance", which was key to victory in World War II.

Today, the climate crisis has far-reaching consequences that will affect generations to come. Averting it requires another Grand Alliance between various stakeholders around the world. It requires a unity of purpose between security, affordability and sustainability.

INLINE AIR REGULATOR

When using pneumatic power tools, overpressure is an ever-present concern that can result in financial, performance and, in some cases, health and safety issues. Factories, assembly lines and repair shops require pneumatic tools to perform their various tasks as fast and efficiently as possible. Each pneumatic tool is designed to perform best at a given pressure. Operating the tool at a higher pressure not only reduces the performance but also shortens the possible lifecycle of the tool.

In today's environment where each cost is micromanaged, compressed air usage is a serious consideration. Compressed air is expensive to generate as there is a lot of energy (electrical and mechanical) involved in producing it. Therefore, it is crucial that compressed air usage is managed correctly.

ProtectAir's ToolReg is an investment in energy efficiency. It is designed to optimise performance and lengthen the lifespan of the tool, as well as preventing loss of production time due to the damaged tool being out for repairs. The automatic secondary pressure relief releases all the residual pressure in the pneumatic tool to prevent unexpected activation (common in nail guns and staplers).

Factory set to prevent pressure changes, the ToolReg is fully tamper-proof and designed so that only the required pressure is used for each individual pneumatic tool. ToolReg is available in various preset pressures from 2 bar up to 8 bar to suit tools and equipment with ¼″ up to ¾″ compressed air inlet sizes.

Compressed Air Australia Pty Ltd
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HEAT PUMPS

Ecoforest ground source and air source heat pumps are designed to be energy efficient, sustainable and versatile, with solutions based solely on renewable, natural energy.

Suitable for a wide range of building sizes and applications, the heat pumps offer scalable solutions for diverse heating and cooling needs. Ecoforest has slowly been transitioning its entire range of heat pumps to the eco-friendly natural refrigerant R290 with a global warming potential of 3.

The Ecoforest range offers a geothermal solution without the need for drilling. For example, the ecoGEO+ range of ground source heat pumps can be connected to an external air unit, so there's no need for drilling or a ground loop. This lowers the installation cost and is appropriate for applications with limited land area.

The range also includes the versatile ecoGEO+ Compact ground source heat pump with Australian Watermark certification. As well as heating and cooling, this heat pump provides domestic hot water thanks to its integrated 165 L tank. The compact unit is suited to both homes and businesses.

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ULTRASONIC LEAK DETECTOR

EXAIR's Ultrasonic Leak Detector (ULD), a handheld instrument engineered to help locate the source of leaks in a compressed air system, has received an upgrade in look and function. Up to 30% of the compressed air generated in industrial plants is wasted through leaks that go undetected. The ULD can play a role in identifying and pinpointing leaks, allowing repair and cost savings. Testing the various unions, pipes, valves and fittings of a complete installation can be done quickly and effectively at distances up to 6.1 m away.

High-pressure gases create high-frequency turbulence when moving into an area with lower pressure, creating an ultrasonic or 'white noise' sound that is beyond the range of human hearing. The ULD can detect these vibrations, creating an audible sound through supplied headphones as well as indicating intensity via front-facing LED display as it moves closer to the leak origin. The ULD can be adjusted to filter out background noise in busier plants with "+" or "-" buttons for fine-tuning sensitivity. This new model offers a heightened ability to detect leaks in hard-to-reach areas while also complying with the IEC 61326-1 standard that designates its ability to operate in typical electromagnetic environments often found in industrial plants.

The Model 9207 Ultrasonic Leak Detector is CE compliant and comes complete with a hard-shell plastic case, headphones, parabola, tubular adaptor, tubular extension and AA batteries.

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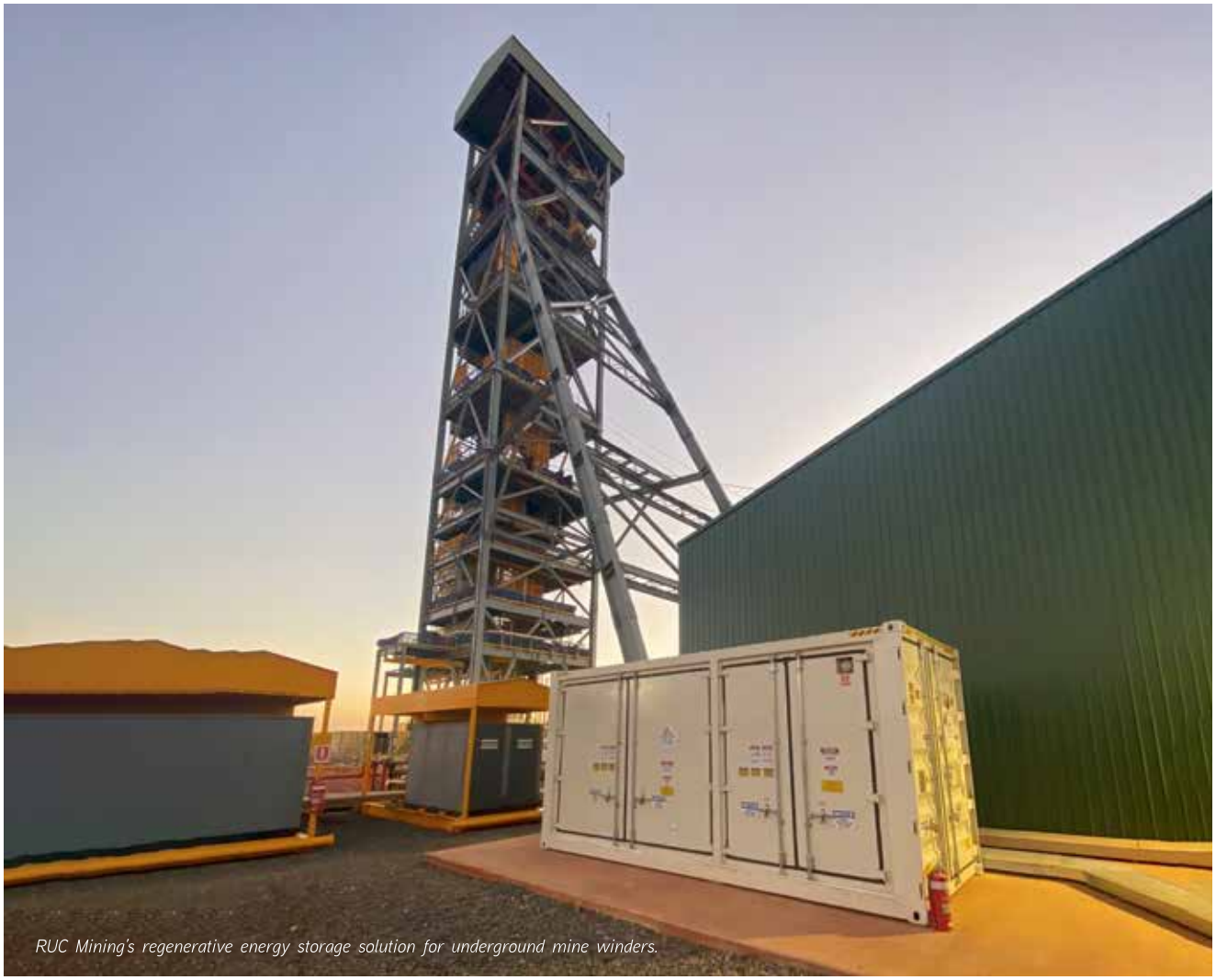

RUC Mining's regenerative energy storage solution for underground mine winders.

The mining industry has come one step closer to sustainability thanks to an innovative idea from Australian company RUC Mining, which specialises in underground mining hoists.

Underground mining hoists, or winders, are powerful machines used to raise and lower minerals and materials in a mine shaft. They enable the efficient vertical transport of materials — thus avoiding the necessity for larger machinery and further costs.

While travelling upward, the hoists require a large amount of power, but this is not the case on the way down.

This led to a stroke of inspiration on the part of RUC Mining: what if energy generated on the way down could be stored, then used to power the upward journey?

The sustainability implications and broader contribution to the electric mine of the future were huge — but there was a technically complex and challenging task to figure out first.

RUC Electrical Manager Greg Bell set to work on making the idea a reality. He and the RUC team chose a couple of strategic partners, Rockwell Automation and Energy Power Systems Australia (EPSA), to create a fully integrated solution that could be rolled out to hoists across the globe.

The collaboration has led to the RUC team creating what they believe is the world's first regenerative energy storage solution for underground mine winders, allowing these machines to run totally on their own stored energy rather than requiring a separate diesel generator.

RUC has now installed its RUCShaw 512 single-drum winder for the first time in an Australian mine. The winder is powered by 710 kW drives, has a hoist capacity of 5 m/s with 12-tonne line pull and operates with a design depth of 1600 m.

Handling the technical complexities

When hoisting a load up a mine shaft, electric motors consume energy. But when travelling downwards, they have the potential to become generators.

"Most mine hoists use a brake resistor pack with a cooling fan to deal with the heat generated. But these packs create a single point of failure, and are application-specific, so they need recalculation if a variation in brake power is required," Bell explained.

"Instead, we proposed for the generating power to be supplied back onto the incoming supply bus, to be absorbed by system loads."

To make this solution a reality, Rockwell Automation provided its Active-Front-End (AFE) Powerflex 755TR regenerative variable speed drives, Low Voltage Motor Control Centres and GuardLogix controllers. It also provided ThinManager software for application management; FactoryTalk View Site Edition software

for a complete real-time overview of HMI operations; network and security services; and product and technical support.

The battery selected to store regenerative energy was a Cat PGS 1260 battery energy storage system (BESS) supplied by EPSA, which provided added redundancy through its parallel inverter and battery stack architecture.

"We have one operational project where we have implemented this solution with two hoist drives, and we are looking into incorporating this into future projects. We also see potential for this solution to be rolled out on new and existing mine shafts internationally," Bell said.

Sustainability gains

RUC has estimated that during the initial installation over a 24-month period, the regenerative energy storage solution will achieve a reduction in diesel consumption of 1427 kL (saving approximately $2 million) and a reduction of 3.85 tonnes of CO_2 output — the approximate equivalent to travelling 12,700 km in a petrol car.

It will also result in an approximate 42% reduction in greenhouse gas emissions from power generation.

"In addition to these strong sustainability benefits, the regenerative energy storage solution also reduces daily operating costs, reduces plant operating hours and maintenance requirements, and provides an additional level of redundancy to the power system that was not available in passive components such as load banks," Bell said.

Striking out into the unknown

Not only did it require a complex integration of technologies, but the regenerative storage project involved a lot of industry firsts, so there was no existing template to follow.

The RUC team chose Rockwell Automation to supply the regenerative variable speed drives for the regenerative energy storage solution.

"Some companies dislike being the first to do something, because there's no guarantee it will work. But Rockwell was supportive from the start. They helped us select the right drives for powering our hoists and worked to integrate this seamlessly to achieve regeneration coordination with the battery," Bell said.

"I can't speak highly enough of the Rockwell technical team — they are some of the best engineers I've worked with. Another major benefit was the Rockwell vendor manuals and technical information. These are first-class documents, and the latest versions are all available online, which was crucial for training the workforce and working remotely. Revision control was taken out of my hands because we were always accessing the latest version," he added.

Because power goes straight back to the battery with no heat loss, Bell said this type of solution could readily be scaled down to any energy application — even something like elevators.

"We have plans to use this technology more widely, because if you think about the electric mine of the future, vertical haulage delivers the most affordable, operable and achievable solution for transporting material out of the mine. The technology has great export potential, too, so we can showcase Australian innovation on a global scale," he said.

Rockwell Automation Australia
www.rockwellautomation.com/en-au.html

Gorman-Rupp pumps "don't miss a beat" for Kingston SE Council

The Kingston District Council (KDC), situated in the picturesque Limestone Coast of South Australia, has been diligently serving its community since its establishment in 1873. Over the years, it has embraced advancements in technology and infrastructure to ensure efficient and reliable service delivery, particularly in the critical domain of wastewater management.

Recently, Heath McAvaney, Regional Manager for Hydro Innovations, paid a visit to the council to discuss its wastewater pumping operations. KDC Operations Manager Colin Burnett explained the system to him.

They have 11 smaller pump stations pumping to their main station in which two Gorman-Rupp T3A60S-B sewage pumps are located, operating above-ground, allowing easy access. Burnett stated that "the Gorman-Rupp pumps do the heavy lifting at the end of the process", pumping 800 m to settling ponds.

Burnett went on to say that "these pumps don't miss a beat" and that "they require little maintenance". The pumps were installed well before Burnett arrived at the council (7 years ago), and one had in fact clocked up 21,664 h of operation.

Gorman-Rupp self-priming centrifugal sewage pumps can operate on suction lifts up to 7.6 m, can deliver flows to 180 L/s with a single pump and can deliver pressures to 95 m. They can also be upgraded with Eradicator or Eradicator Plus technology to handle flows with heavy concentrations of stringy materials such as rags, wet wipes and matted hair.

These pumps have been employed in sewage pumping stations and sewage treatment plants around the world for decades. Being located above the ground makes them easy and safe to access for monitoring or maintenance.

Burnett joked to McAvaney that the long life of the pumps is great for him and the council, but not so good for McAvaney's pump sales.

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www.hydroinnovations.com.au

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Untapped solar could achieve billions in savings

Researchers from UNSW Sydney have examined the untapped solar potential of residential buildings across Australia. Their report found that people living in apartments, social housing and private rental houses are missing out on $9.3 billion per year in possible cost savings.

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While Australia may be a world leader in residential photovoltaic deployment, with rooftop solar installed in almost one in three houses, most of those houses are owner–occupier dwellings — leaving rentals out of the equation.

The report, 'Rooftop Solar Potential of Australian Housing Stock by Tenure and Dwelling Type' was commissioned by Solar Citizens and conducted by researchers from UNSW School of Photovoltaic and Renewable Energy Engineering in collaboration with the Australian Photovoltaic Institute. It found total potential for rooftop solar installation is estimated at approximately 61 gigawatts (GW), which could reduce greenhouse gas emissions by 785 megatonnes over the next 20 years.

The research involved an analysis of all residential buildings in Australia in order to estimate how many extra solar panels could be installed on those sites. As of June last year, approximately 15.1 GW of residential solar is installed in Australia.

The report found there is approximately 45.8 GW of unrealised potential solar energy on houses and apartments across the country — three times the number of panels currently installed on roofs. New South Wales, Victoria and Queensland were found to have the highest share of this solar potential across the country.

"Our analysis found the power of solar can deliver average annual household bill savings of $1300 each year," said Dr Mike Roberts, UNSW Senior Research Fellow and one of the authors on the report.

"Apartments are another housing type where government investment now will pay high dividends in cheaper bills and less emissions for long into the future," he said.

Apartment buildings are missing out on three gigawatts of solar power, Roberts said. Social housing and the rental sector — which include both houses and apartments — are missing out on more than two gigawatts and 12 GW respectively.

Roberts said apartment residents could be saving an average of $500 to $700 a year on their energy bills and could be paying off the system in five years or less.

"While we have seen recent action on solar for social housing through collaboration between several state and federal governments, this approach should be fast-tracked to a greater number of social homes, given the outstanding cost savings on bills and other benefits delivered," he said.

The report makes it clear, Roberts said, that certain sectors, such as social housing and rental properties, need targeted incentives to encourage more landlords to consider adopting rooftop solar.

"For rental properties, a big part of the problem is because the cost of installing solar is absorbed by landlords but the benefits go to the tenants," he said.

"To address this, this report recommends giving tenants increased visibility of the financial benefits of solar which could be reflected in their rental rates — allowing landlords to recoup their investment costs.

"Targeted subsidies, such as Solar Victoria's Solar Rebates for Rental Scheme, could also incentivise landlords to invest in solar, as could rule changes to allow the associated capital costs to be offset through instant tax write-offs."

The report also found that closing the solar potential gap would create 240,000 additional job-years of employment in the solar industry, supporting those working in solar sales and installation roles — the equivalent of employing 48,000 people for five years.

"Unlocking this solar potential can return money to people's pockets, deliver 785 megatonnes in avoided carbon emissions over 20 years and the up-front investment is repaid in bill savings for households within about five years," said Joel Pringle, National Campaigns Director at Solar Citizens.

"Cleaner, cheaper rooftop solar energy is a win for both energy bill relief and reducing climate pollution. One in three Australian homes has now gone solar; we need greater government support to ensure the financial and health benefits are extended to all Australian households."

How the perfect blend of tyres and plastic led to a sulfur-free oil

When tyres are broken down, the liquid oil that is formed normally contains hazardous sulfur-containing compounds, presenting a challenge for the safe upcycling of tyre waste.

Now, a team of scientists from Monash University appear to have solved this problem, using a coffee grinder, a freezer and a furnace. Their study is believed to be the first of its kind.

The chemical engineers found that there were strong synergies between tyre scrap and plastics, including low-density polyethylene (LDPE) and polystyrene, when all of these materials were treated together in a system using a process known as rapid pyrolysis, which subjects them to high temperatures over a short time.

The team found that blending either polystyrene or LDPE with tyre scrap for pyrolysis effectively eliminated the production of sulfur-containing compounds.

The team's leader Professor Lian Zhang, from the Department of Chemical and Biological Engineering, said LDPE and polystyrene are both commonly used across a range of consumer goods including packaging, plastic bags and films, bottles and containers, and even medical disposables.

"Adding these plastics and using this process to break down tyres can substantially reduce the risk of releasing hazardous materials into the environment," Zhang said.

"We believe our findings provide a very solid foundation and justification for using co-pyrolysis as an effective and value-added technology for upcycling potentially troublesome waste products."

PhD student Wahyu Narulita Dewi, first author of the team's study, said further analysis allowed the mechanisms underpinning the interactions between the chemical components in the system to be identified in detail. The study has been published in the journal *Waste Management*.

The Monash team is now working to develop and optimise the technology with the aim of enhancing the yield and the quality of the sulfur-free light oil produced by the process.

Scrap tyre chips were frozen with liquid nitrogen and ground using a coffee grinder, blended with plastics and placed in a furnace at 600˚C. Image courtesy of Monash University.

Their research is being supported by Tyre Stewardship Australia, a tyre industry organisation that promotes the development of viable markets for end-of-life tyres.

Further related research will also be a focus of a new Australian Research Council (ARC) Industrial Transformation Research Hub for Value-Added Processing of Underutilised Carbon Waste. Led by Zhang, the Hub will be launched later in 2024.

Siemens releases AI apps for water utilities

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Siemens has expanded its software portfolio for the water industry to enable users to optimise plant operations using artificial intelligence, without the need for technical expertise. Self-service solutions enable users to address the most pressing issues in water and wastewater operations: reducing water loss, preventing pollution from sewers and ensuring the reliability of treatment assets.

"Digital technologies have not yet been widely adopted in the water sector so far," said Anja Eimer, General Manager Global Water Business at Siemens. "The existing OT and IT device landscape is complex, skilled workers are in short supply and the business benefits of many digital applications have often been unclear. With our new software offerings, we are addressing these conditions and enabling water companies to perform AI-based operational analyses."

The digitalisation solutions are offered with pre-integrated hardware and software, so that AI-based analytics applications have been combined with corresponding sensors to make the installation process as easy as possible and to achieve faster analytics results.

AI to combat leaks and pipe blockages

The SIWA Leak Finder app uses data from smart flowmeters to reduce water losses from pipe leaks by up to 50%, according to Siemens. The app's AI analyses flow data and identifies leaks as small as 0.2 litres per second. While data from any flowmeter can be used for the app, the integration of the Siemens Sitrans FM Mag8000 sensor eliminates the need for specialised knowledge or Siemens services for installation.

Siemens' SIWA Blockage Predictor application applies AI to water level data from sewers collected by sensors such as the Sitrans LR110 radar level transmitter to detect blockages, inflow and infiltration. Based on a single sensor installation, the app can be used in the event of network overflows or in manhole chambers. Siemens says the application finds nine out of ten blockages and saves users time by automatically generating performance reports for regulators.

Both the SIWA Leak Finder and SIWA Blockage Predictor apps can process and analyse operational data from smart sensors via a connection to the cloud — without the need for additional IT expertise. In this way, the sensor data is available in the respective application within two hours. The apps' AI is automatically trained and implemented with the sensor data from the day of installation. Cybersecurity is also taken into account in the design of the apps. Mendix, Siemens' low-code platform, can also be used to create interfaces to the respective company's IT making it possible to connect the data from the SIWA apps to ERP systems.

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Fast-tracking Australia and New Zealand's clean energy transition

Alexey Lebedev, Vice President – Pacific at AVEVA

Accelerating the digitisation of key industries could enable us to hit our nations' emissions goals faster.

We may be at the beginning of the end of the fossil fuel era but will that end come around fast enough? Post COP-28, the most recent United Nations Climate Change Conference held in Dubai in late 2023, it's a question well worth asking.

That carbon dioxide and greenhouse gas emissions must be drastically reduced is not in dispute. Governments around the world have acknowledged it's an urgent imperative, if average temperature increases are to be contained to 1.5˚C above industrial levels.

Unveiled in May 2022, the Australian Government's whole-of-economy Long Term Emissions Reduction Plan outlined its plans to achieve net zero emissions by 2050 and, across the ditch, our Kiwi cousins have adopted a similar target.

Picking up the pace of change

But while the stage is being prepared for a just and equitable transition away from traditional energy sources, emissions look set to continue their steady northward creep, in the short term at least.

Under current national climate commitments, they'll be 9% above 2010 levels by 2030; hardly the drastic reduction we desperately want and need.

As the damaging effects of climate change become ever more apparent — Australia has just weathered another summer of sweltering-ly high temperatures and wildly wet conditions, while New Zealand continues to recover from tropical Cyclone Gabrielle's bruising $8 billion assault in February 2023 — it's clear we need to take some big steps to achieve a sustainable transition faster.

Doing more with digital

So how can we do it? By improving the efficiency of our industrial sectors and boosting the development and deployment of renewable energy is the short answer.

At present, industry is responsible for 32% of the world's CO_2 emissions, with 73% of greenhouse gases deriving from energy.

The World Economic Forum believes there's enormous scope to reduce those figures, by harnessing the power of digital technologies, including advanced algorithms, artificial intelligence and data analytics.

From boosting energy efficiency and reducing waste and carbon emissions at source, through to converting harmful greenhouse gases into high-value commodities, such as fertiliser and fuel additives, forward-thinking businesses are already reaping the rewards of their judicious deployment.

Adopted at scale in heavy-duty emission sectors such as energy, mobility and materials, digital technologies have the potential to reduce emissions by up to 20% by 2050, according to WEF's calculations.

The benefits for businesses that go down this route extend beyond the ESG arena: documented gains include profitability gains of up to 10% and three-fold returns on investment.

Working together for good

What's more, there's an opportunity to amplify those gains, should industrial organisations opt to take a more collaborative approach with the other stakeholders in their supply chains and eco-systems.

India's Pimpri Chinchwad Smart City is a case in point. The amalgamation of more than 4600 municipal systems and applications, from water and wastewater to traffic management, into a single, unified operations centre has enabled its leaders and residents to breathe more easily, environmentally and literally. That's because taking a data-driven approach to service delivery has reduced pollution and congestion, minimised water losses and lowered energy use by an estimated 22%.

Similarly impressive outcomes have been recorded in food and beverage giant Danone's Indonesian operations. Deploying a manufacturing execution system across four production sites provided decision-makers and line managers with real-time access to detailed production data. In addition to being able to offer higher quality, fully traceable products, factory performance has improved and wastage has been slashed: a win for Danone and the planet both.

Taking smarter, swifter steps towards sustainability

Opportunities for local businesses and industries to use digital technologies in similarly creative ways are extensive and those that choose to do so sooner may well gain an early mover advantage.

What's good for business is even better for the long-term health and wellbeing of our region and the wider world.

If your organisation is yet to explore the possibilities, there's no time to lose.

Heat recovery station. Image courtesy of Kaeser Compressors Australia.

Heat recovery

could save money and the environment

Compressors and the compressed air they generate are used in a multitude of applications. However, the fact that compressor exhaust heat can be harnessed often remains forgotten.

Up to 96% of the drive energy supplied to a compressor is available for reuse — this is referred to as "heat recovery". Heat recovery not only saves energy and costs, but also reduces the operator's CO_2 footprint.

Of course, this heat could simply be conveyed away. However, there are plenty of ways to make use of this readily available energy source that occurs as a by-product of the compression process. The simplest and most efficient method is to use the compressor exhaust heat directly, eg, for heating adjoining rooms or spaces.

Here, instead of discharging hot air from the compressed air station outside, an air ducting system directs it to neighbouring warehouses or workshops. When no hot air is required, the heated exhaust air is simply conveyed outdoors by means of a flap or louvre. A thermostatically controlled louvre enables hot air to be provided as and when required in order to maintain a constant temperature.

In addition to providing full or supplementary heating for operating spaces, hot compressor exhaust air can be used to support applications such as drying processes, generating hot air curtains or preheating burner air for heating systems. The corresponding investment costs can often be amortised within a period of one year.

Compressor exhaust heat can also be used to supply existing hot water heating and service water systems; depending on the available storage capacity, water temperatures of over 70ºC can be generated.

There are several ways to achieve this. The most cost-effective method is to use a plate-type heat exchanger integrated into the compressor, which is connected to the compressor cooling fluid circuit and transfers energy from the heated cooling fluid to the water that requires heating. Depending on whether the hot water is required for particularly sensitive production or cleaning processes, for showering and washing, or for general heating systems, special safety heat exchangers or conventional plate-type heat exchangers may be used.

These enable 70–80% of the installed compressor output to be used for heating purposes without the need for any additional expenditure on energy. This variant of heat recovery is also possible with primary water-cooled rotary screw compressors. Heat recovery is principally worthwhile when the compressors in question feature a power output of at least 5.5 kW.

Establishing actual requirement

Since very few operators know their exact air demand, it is worth conducting a compressed air audit before installing a

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compressor system. Performed using analysis tools such as the ADA/KESS (Air Demand Analysis/Kaeser Energy Saving System), this audit can determine the precise demand data for a project. This data can then be used to determine the planning steps for the air station operator, as well as the investment costs and potential for energy savings.

In the case of a completely new installation, optimised solutions are devised and suggested from the outset so that the operator can independently compare different system variants and select the most cost-efficient choice.

Where building management systems are used, it is recommended to conduct a thermal audit in conjunction with the compressed air audit so that the heat balance can be determined in parallel with the air consumption. This allows thermal data such as temperature flow and return to be investigated in addition to compressed air data such as volume, pressure and required air quality.

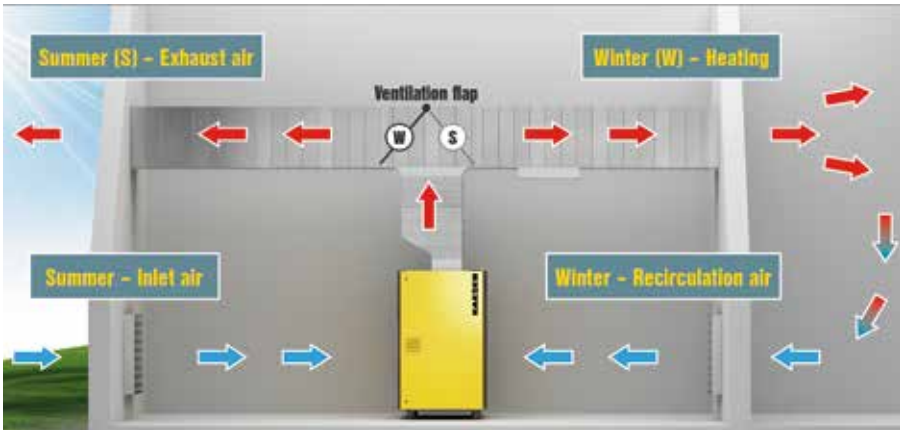
Once these details are established, it can be determined what percentage of the compressor exhaust heat can be absorbed into the normal heat requirement of the project. This in turn allows the size of the storage vessel and the required temperature to be calculated. In the best-case scenario, 96% of the heat output can be used.

What to consider:

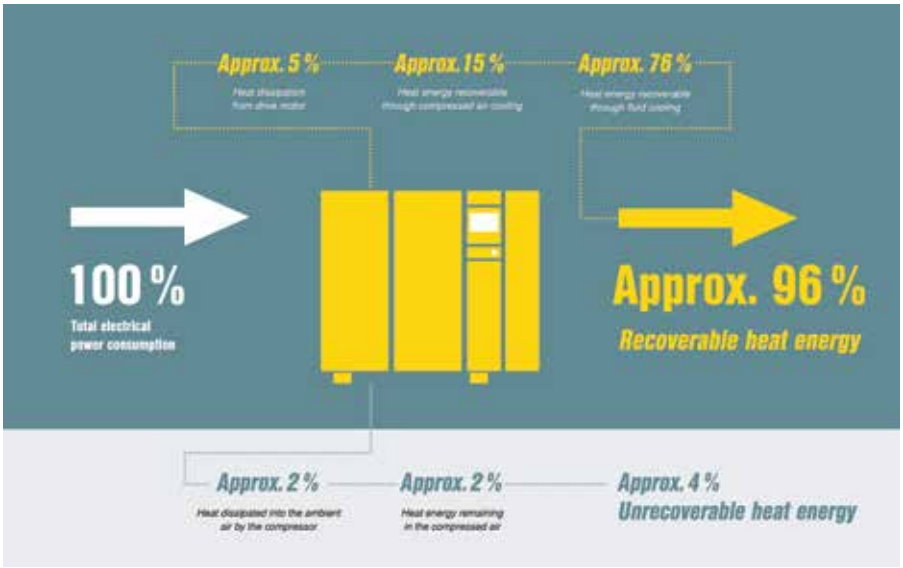
A few points must be taken into account when planning or optimising a compressed air station. For example, compressors and heating systems should not be placed in the same room, since optimal use of these requires different room climate conditions and the compressor must not be permitted to draw in dangerous admixtures.

The compressor room needs to be well ventilated; the room for the heating system does not. In an ideal world, the two rooms would be separate but situated near to one another, so that the ducting route between compressors and heating system can be as short as possible.

Since the volume of accumulating heat and the heat requirement are rarely identical, it is important to ensure that there is sufficient thermal storage potential in the form of large vessels. This guarantees optimum supply when generation and consumption volumes differ.



Heated air from the compressor can be used for effective heating of neighbouring spaces via ducting.



Up to 96% of the energy used to generate compressed air can be recovered.

Air- or water-cooled compressors?

Once the design has been decided, it is vital to select the correct compressors. In general, two different cooling methods are available for compressors: air cooling and water cooling.

In the case of the former, air ducts with thermostatically controlled flaps convey the hot exhaust air directly from the compressors to the neighbouring operating spaces. To minimise heat losses, the distance the exhaust air needs to travel from the compressor to the point of use should not be too far.

Even if it is not required year-round, heat recovery with this type of system pays dividends: the required investment for heat recovery is relatively low and can usually be amortised within just a year. Systems equipped with additional hot water heat recovery can supply water at temperatures up to 70ºC throughout the year, and even higher if needed.

In the case of water-cooled compressors, the user-end requirements and cooling water costs also play an important role; in principle, however, heat recovery as described above can also be achieved here by means of a second connected circuit.

Summary

Heat recovery can significantly increase the efficiency of a compressed air system and reduce environmental damage by preventing emissions of greenhouse gas.

For more information about KAESER heat recovery, visit: au.kaeser.com/products/rotary-screw-compressors/heat-recovery.

Kaeser Compressors Australia
au.kaeser.com

Transforming pill packaging into fencing

Pharmacycle sorting line.

The Vinyl Council of Australia (VCA) is collaborating with several Australian industry partners to recycle waste PVC pharmaceutical blister packaging.

VCA member Think Fencing, based in Portarlington, Victoria, has partnered with Pharmacycle to recycle blister packaging collected via Pharmacycle's drop-off points, located in pharmacies, hospitals and local council sites across Australia.

Chemist Warehouse has recently joined early adopters Bloom The Chemist and National Pharmacies as a drop-off location, introducing the program in 100 of its stores across Victoria.

"We are seeing significant interest from consumers, pharmacies and the healthcare sector in being able to recycle this type of material, in part driven by the focus on blister packaging in the ABC's *War on Waste* program," said Pharmacycle's Business Development Manager Michael Klapsogiannis.

To date, Pharmacycle has recycled over 32 tonnes of blister packaging, adding up to more than 21 million individual blister packs.

From blister packs to fencing

Once the packaging has been collected, Pharmacycle weighs and sorts it, removing any contaminants, such as unused pills or other medical packaging, to ensure that the material streams are as clean as possible. The material then undergoes a size reduction and granulation process, before the PVC (and a small volume of other plastics) are separated from the aluminium through an electrostatic separation process — the same machinery used by PanelCycle to separate aluminium composite panel (ACP) cladding. The aluminium is then sent to Weston Aluminium in NSW for reuse, while the PVC component is sent in powdered form to Think Fencing.

Using an AI-driven prototype device developed by the CSIRO, Think Fencing analyses the material to understand its key properties, because each batch varies slightly depending on the level and type of contamination. The results of this analysis are used to optimise the mix of the material with other recycled content streams, including credit card surplus material from Placard, window profile offcuts from VCA member aluplast and necessary additives, to ensure the blend meets Think Fencing's required specifications.

"With such a variety of material streams, it's really important that we can understand the properties of the recyclate we're using," said Think Fencing Chief Technical Officer Jack Fitzgerald.

"The CSIRO analyser has been a game changer in the way we understand and incorporate recycled material."

Since the introduction of the analyser, Think Fencing's recycled content usage has increased from 15 to 85% in the company's primary PVC fencing ranges, and makes up a similar proportion in the soon-to-be released OneDeck decking range. Virgin material is used to 'cap' the products to ensure a consistent visual finish.

Given the cost of the recycled feedstock is almost 70% cheaper than the virgin material Think Fencing used to source, the company is planning to use a variety of other recycled PVC materials, including PVC pipe scrap, playing cards and vinyl flooring.

"This collaboration highlights the recycling potential of diverse product types when they're kept out of mixed waste streams — given that existing recycling infrastructure is currently ill equipped to manage these materials effectively," said Vinyl Council of Australia Chief Executive Jim Coulston.

Future expansion

Given the project's success, Think Fencing plans to develop a new recycling plant and warehousing facility in Victoria along with a warehousing facility in Brisbane to allow more PVC products to be collected and recycled. Funding and industry partners are being sought to support this growth.

The CSIRO analyser is currently undergoing a patent process, with a formal demonstration of the technology to be presented by CSIRO's Melissa Skidmore at the PVC AUS 2024 conference in June.

Pharmacycle plans to increase its number of collection points from 400 to 1000 by mid-2024, and is confident that with industry support it will be able to continue growing its program.

To learn more about Think Fencing, visit onedeck.com.au.

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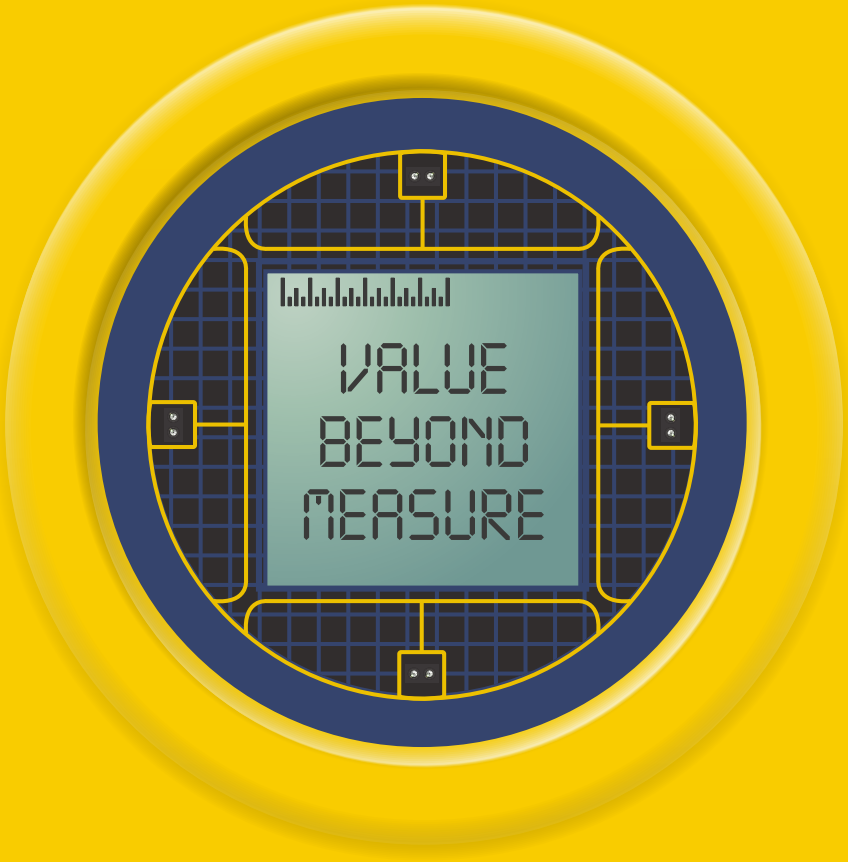

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