



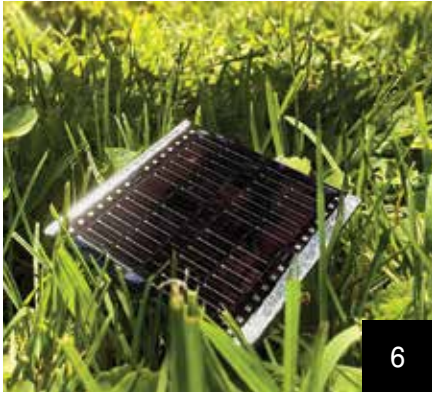
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sustainability matters



Baker's secret
behind better
solar cells



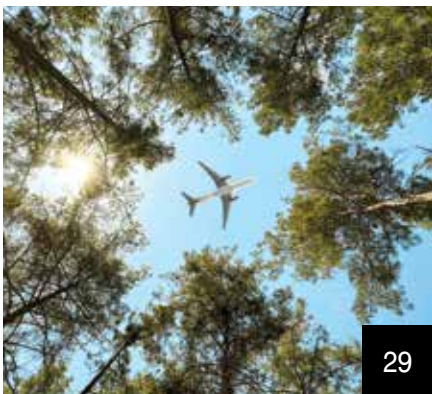
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Baker's secret behind better solar cells

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WORDS from the EDITOR

New federal data released in August showed national greenhouse gas emissions fell 1.6% in the year to March 2026. Electricity sector emissions fell 3.7%, with renewable generation from solar, wind and batteries continuing to displace coal and gas in Australia's electricity grids. These figures followed the Clean Energy Regulator's confirmation of record levels of rooftop solar and large-scale solar decisions in the June quarter.

In our green energy issue, we take a look at how design principles are being developed to create even better possibilities for solar cells in the future. Engineers at UNSW have discovered that solar cell development requires more than just simply sourcing the raw materials for a recipe. Just like making a cake, some fundamental 'baking' skills are also required when making solar cells in order to keep all the raw materials evenly distributed throughout the earliest stages of the manufacturing process. The new design principle could be applied to both solar technology and other compound semiconductors to help push them to new limits of efficiency.

We also explore a complex off-grid solar and battery deployment that is powering three resorts in Fiji. With salt air, extreme heat and no grid, the results achieved in this challenging environment provide a test case for what could be possible for other remote and off-grid projects.

While data centres have become part of the renewables debate lately, we delve into the embedded carbon impacts associated with these infrastructure projects. Construction innovators say there should be a focus on procuring low-carbon materials for these builds right from the start in order to achieve genuine overall sustainability, rather than just focusing on energy and water efficiency.

In addition to many green energy solutions, this issue also includes coverage of topics such as resource recovery, water recycling, and digital solutions for water and wastewater infrastructure projects.

We hope you enjoy the read!



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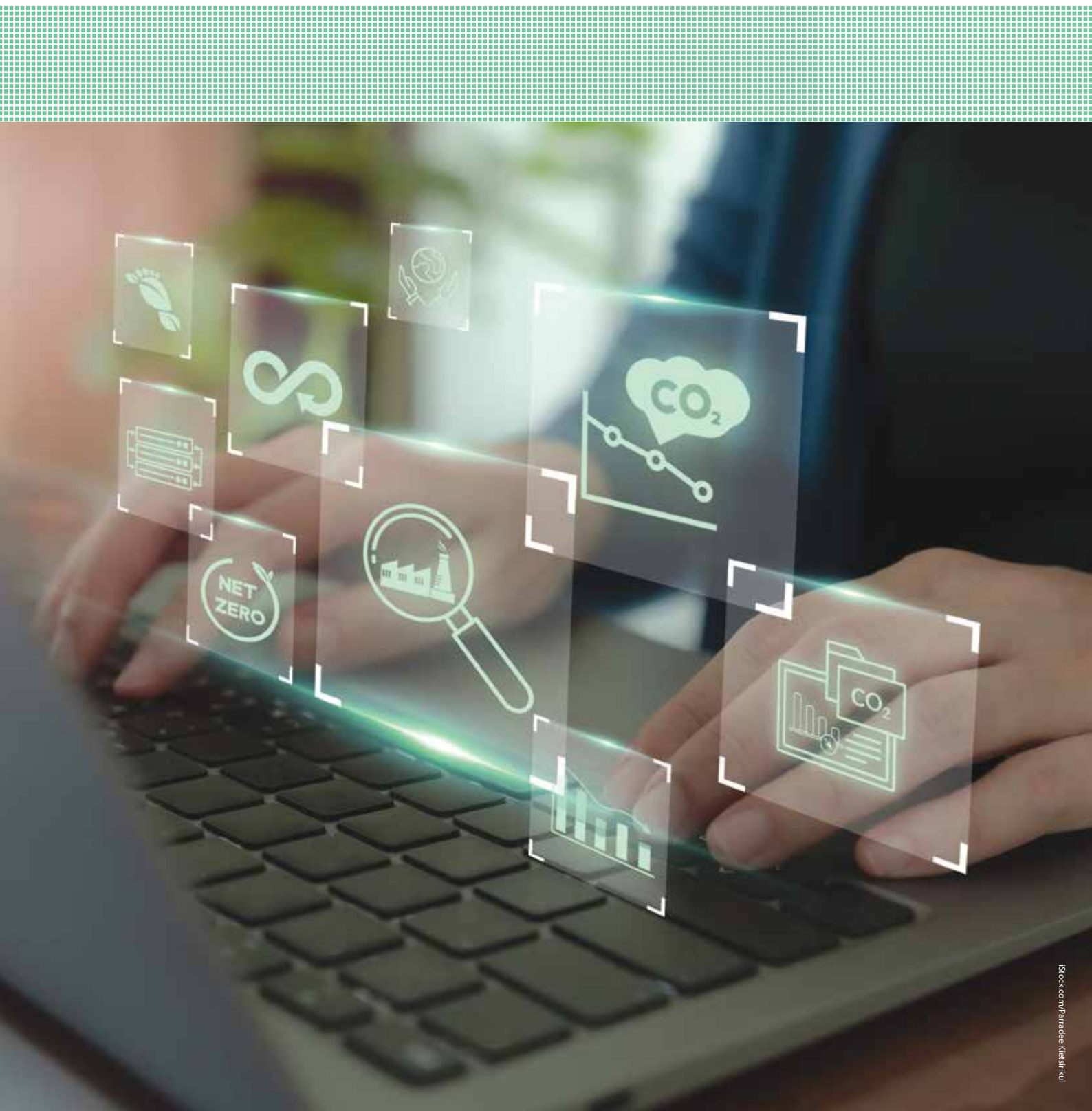
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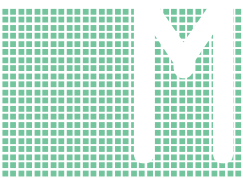
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Climate reporting is exposing a problem bigger than emissions

Lisa Zembrodt, Principal and Senior Director, Schneider Electric



istock.com/Paradee Kietirakul



any Australian businesses are entering the next phase of climate reporting in survival mode.

Inflation remains above target; energy and transport costs are still putting pressure on operating budgets; and economic growth has been modest.

Annual inflation was 4% in May 2026 and GDP grew by 0.3% in the March quarter. For business leaders, those numbers are not abstract. They show up in energy bills, supply contracts, insurance costs, capital decisions and customer demand.

Against that backdrop, it is understandable that some organisations look at the new, mandatory Australian Sustainability Reporting Standards (ASRS) and see another cost.

Climate reporting will reveal how well an organisation understands its own operations. Reliable disclosure depends on accurate data, connected systems and coordination across finance, procurement, sustainability and operations. Those same capabilities help businesses manage risk, identify waste and make better investment decisions.

That is where many businesses will struggle.

The problem is not that organisations lack ambition. Schneider Electric's recent Energy Tech Pulse survey found half of Australian business leaders support mandatory climate-related disclosure, and three-quarters say their organisation is at least somewhat prepared. But only one in eight describe themselves as fully ready.

Many organisations still rely on spreadsheets, fragmented systems and manual processes to manage climate and energy data. These tools may help produce a report, but they do not provide the visibility needed to improve performance. A spreadsheet can tell you what happened last quarter. It is much harder for it to show where energy is being wasted, which assets are underperforming, or how future climate and energy risks could affect operations.

ASRS will force organisations to ask practical questions. Where is energy being

used? Which facilities, processes or suppliers create the greatest exposure? Which parts of the business are vulnerable to heat, extreme weather, grid constraints or rising energy prices? Where could efficiency improvements reduce both emissions and cost?

For many leaders, the first valuable outcome may be the moment of realisation. They may begin the process thinking about compliance and end it with a clearer understanding of what is at stake for the business.

That shift is important because sustainability is often misunderstood. In its true sense, sustainability is about whether an organisation can sustain itself into the future. It is about financial durability, operational resilience and the ability to keep delivering outcomes in a changing economy. Energy is central to that equation.

Our research shows energy costs are one of the leading external challenges for Australian organisations. Four in 10 businesses say energy costs or supply issues have caused them to delay or miss growth opportunities. Nearly half expect continued energy pressures to reduce profitability or increase operating costs.

Those figures should change how businesses think about climate reporting.

If energy costs are affecting margins, delaying projects and constraining growth, then better energy data is not a reporting luxury, it's a business need. The same data required to support credible disclosure can also help organisations identify inefficiencies, improve procurement, optimise assets and reduce consumption.

This is where energy technology becomes critical.

Energy technology brings together electrification, automation and digitalisation. In practical terms, it gives businesses better visibility across energy use, assets, systems and performance. It helps turn operational data into decisions that can reduce waste, improve resilience and support more disciplined investment.

For sustainability teams, this matters because they cannot deliver ASRS alone. Climate reporting depends on data from finance, procurement, operations, facilities, energy managers, risk teams and suppliers. If those teams are working from disconnected systems, reporting becomes slow, manual and exposed to error.

A stronger digital foundation helps create a single view of performance. It allows organisations to move from retrospective reporting to active management. That is the difference between knowing energy costs have risen and understanding where, why and what can be done about it.

The skills challenge cannot be ignored. Almost three in 10 Australian organisations say a shortfall in staff capability is their biggest obstacle to climate disclosure progress. At the same time, 30% say they lack the internal skills required to meet new climate disclosure and compliance requirements.

That does not mean every business needs to build a large in-house sustainability team. It does mean businesses need clear governance, reliable systems and access to the right technical expertise.

The medium-term opportunity is significant. Businesses that properly engage with ASRS can gain a clearer view of how climate, energy and operational risks and opportunities affect their future. Those that use the process to improve data quality and invest in the right energy technology can reduce energy consumption, lower costs and strengthen resilience.

In the short term, many organisations will understandably focus on meeting the next deadline. In the medium term, the leaders will be those that treat climate reporting as a tool to understand their operations more deeply.

They will know where energy is being used. They will know where risk is concentrated. They will know where investment can deliver both sustainability and financial value.

The reporting process will also expose the gap between businesses that can produce a compliant document and those equipped to respond to changing energy costs, climate risks and operating conditions. Organisations with stronger data and decision-making systems will be better placed to adapt and remain viable over the long term.



*Lisa Zembrodt,
Principal and Senior
Director, Schneider
Electric*

The secret to better solar cells?

Think like a baker

The improved CZTS solar cell developed at UNSW is made of fully environmentally friendly materials.

Image credit: UNSW/Ao Wang

UNSW Sydney engineers have harnessed the fundamental skills of bakers to ensure next-generation solar-cell materials form with fewer tiny defects.

The discovery allows the cells to convert sunlight into electricity more efficiently than before and could provide a blueprint for improving a wide range of advanced semiconductor materials.

The researchers said the trick is to imagine baking a cake. Although every ingredient is carefully measured and mixed together, sometimes as the cake bakes the butter can pool in one corner, the cinnamon is stronger in one section, and the fruit sinks to the bottom. So even though the ingredients were all correct and the recipe was followed, the final cake is far from perfect.

Something remarkably similar happens when manufacturing solar cell materials, the researchers said.

"The cake analogy is really apt because that's exactly what we are doing," said Scientia Professor Xiaojing Hao from UNSW's

School of Photovoltaic and Renewable Energy Engineering.

"With a cake you mix all the different ingredients and put it into the oven. We do a similar thing with solar cell material, except it goes into a furnace," Hao said.

In the research, published in *Nature Energy*, the researchers have shown that it isn't simply the ingredients that matter — it is keeping them evenly distributed throughout the earliest stages of manufacturing.

By preventing those ingredients from drifting apart, the team reduced tiny defects inside the material that limit how efficiently it converts sunlight into electricity.

The findings establish a new design principle that could not only improve this particular solar technology, but also influence the development of many other advanced semiconductor materials.

Looking beyond silicon

Most solar panels are made from silicon, a technology that has become efficient over decades of development. But researchers are already searching for ways to push solar performance even further.

One of the most promising approaches is the tandem solar cell, which combines two different semiconductor materials so each captures different parts of the solar spectrum.

Hao's team, including Dr Ao Wang and Dr Kaiwen Sun, is studying a material known as CZTS made from copper, zinc, tin and sulfur.

Unlike some competing semiconductor materials, its ingredients are abundant and comparatively environmentally friendly, making it an attractive candidate for future tandem solar cells.

The challenge has been that, despite its promise, CZTS has stubbornly resisted attempts to reach the efficiencies needed for commercial adoption.

The culprit is tiny defects that form as the material is manufactured.

Hao said many researchers have tradition-

ally focused on ensuring they started with the correct combination of ingredients.

"A lot of people think once you have the right amount of ingredients for the cake, then everything will be fine," she said. "But sometimes that's not the case. You need to keep the ingredients uniformly distributed from the very beginning and throughout the cooking process.

"The journey matters just as much as the destination. That's the major design principle we've implemented in this research to discover why CZTS can have the imperfections."

Rather than concentrating on whether the ingredients of the solar cell material were wrong and needed to be amended, the team investigated what happens during the first moments of the high-temperature manufacturing process.

They discovered that one element in particular, the copper, was prone to moving away from where it was needed. That seemingly small change triggered the formation of unwanted impurities and tiny structural defects that prevented the material from performing at its best.

The UNSW team then found that strengthening the copper-sulphur bonding during the initial thermal reaction significantly reduced defect formation and enabled the material to achieve record voltage performance for this class of CZTS solar cell.



Rather than concentrating on whether the ingredients of the solar cell material were wrong and needed to be amended, the team investigated what happens during the first moments of the high-temperature manufacturing process.

Eliminating hidden flaws

Although the defects in CZTS are incredibly small, many no larger than individual atoms, their impact on solar-cell performance is enormous.

"When one ingredient drifts away, it forms another phase, which is technically another material. So when the crystal grows, you end up with impurities and tiny imperfections inside it," Hao explained.

"It also causes disorder inside the crystal. Those point defects can trap the photo-generated carriers, and that causes the low efficiency of solar cells.

"Voltage is a direct measure of the energy loss inside the solar cells. Every detrimental defect reduces the voltage. Defect control determines the final efficiency and how much energy can be converted from sunlight."

Using their new manufacturing strategy, the team achieved a certified efficiency of 12.4%.

While that efficiency remains below commercial silicon solar cells, the researchers said the result is significant because it addresses one of the technology's longest-standing scientific challenges.

A solution for other materials

The researchers believe the most important outcome is not simply a better CZTS solar cell.

Instead, they said the work establishes a broader design strategy that could help improve many different semiconductor materials used in future solar technologies.

Wang said researchers have often assumed that if the starting ingredients are correct, the heating process will naturally produce the desired material.

"Most people focus on getting the right recipe and think the thermal process is a black box. They assume that once the ingredients are mixed well then the cake, or in this case the solar cell, will naturally come out as intended," he said.

"But this is not the case. If the butter starts separating in the first few minutes of baking, even a perfect recipe won't produce a perfect cake."

That simple idea could have implications well beyond CZTS. Many advanced semiconductor materials consist of several different chemical elements, making them susceptible to similar problems during manufacturing.

Hao believes understanding, and then controlling, how those ingredients behave during the earliest stages of fabrication could become an important design principle across the field.

"The defect control strategy we've developed is going to be really useful for designing and optimising other compound semiconductors," she said.

"I hope our defect control technology and principle can really be used by other people who are designing more top-cell candidates for tandem solar cells.

"The design principle isn't only about this material. It's about not only looking at the final recipe; we need to design from when we're mixing the ingredients and keep them uniformly distributed. The ingredients may change from one semiconductor to another, but the design principle is the same."



Image credit: UNSW

Scientia Professor Xiaojing Hao working in UNSW's School of Photovoltaic and Renewable Energy Engineering.



Powering paradise



Yasawa Islands, Fiji.

Image supplied

A complex off-grid solar and battery deployment in the Yasawa Islands provides proof that solar technology has the potential to solve remote energy challenges.

Three off-grid island resorts in Fiji's Yasawa archipelago are projected to reduce their diesel costs by 50% in 2026 following the deployment of solar.

With 80% of Fiji's regional energy supply reliant on imported petroleum products, the country could face a 115% increase on its annual fuel import bill from 2025 levels — equivalent to almost three times its healthcare budget. The Yasawa Island Resorts — Paradise Cove, Blue Lagoon and Octopus Resort — were previously 100% reliant on imported diesel for energy generation.

Auckland-based Future Energy NZ engaged SolaX Power Australia to deliver the solar battery energy storage system for the project. SolaX provided the AELIO battery energy storage systems, site inspection, commissioning, design review and operations and maintenance training.

The resorts have now transitioned to a 760 kW solar and 1.6 MWh battery system that is projected to deliver FJ\$850,000 (AU\$538,000) in annual fuel savings across the portfolio.

The project's carbon impact is estimated to have avoided 464.68 tonnes of CO₂ annually — the equivalent of planting 7600+ trees.¹

Danny Fang, Senior Field Application Engineer at SolaX Power Australia, travelled to Fiji to oversee commissioning of the project, which was not without its challenges.

"The Yasawa Islands presented conditions that push energy systems to their limits. With no grid infrastructure, no local supply chain and exposure to coastal heat, tropical rain, humidity and salt air, every component had to be shipped by container and engineered for long-term reliability and durability."

SolaX also delivered hands-on, end-to-end training to the local workforce who had no prior solar experience. These electricians now operate and maintain a full 1.6 MWh system.

"Providing on-the-ground support means genuine local ownership and long-term technical capability for the project on the islands, reducing reliance on expensive external technical support," Fang said.

Nick Wood, owner of Yasawa Island Resorts, said the project protected his business from global fuel price volatility and soaring diesel costs.

"If you look at the fuel we were using at Paradise Cove alone, and the 80% surge in diesel prices due to the conflict in the Middle East, the increase in our operating costs would have been massive. Solar takes that pressure off. Now, we're at

similar levels to what we were at before we energised the system.”

The economics are compelling even before Fiji’s tax incentives — which include a 100% capital expenditure write-off and duty-free importation for solar and battery investments until 31 December 2028.

Wood’s pre-tax payback across the full three-resort project is two to three years. And the diesel cost savings are stepping up as further batteries come online:

- 35% diesel cost saving achieved across the first six months of operation
- 50% diesel cost saving projected across the full year
- 70-75% diesel cost saving target by end of 2027, once further panels and battery capacity are added.

The transition to renewables is also improving resort operations and guest experience. Solar power now provides stable energy to desalination plants previously run on diesel generators, supporting the daily water needs of approximately 200 live-in staff and tens of thousands of guests annually across the three resorts.

Reduced load on diesel generators has also eliminated mid-service shutdowns that previously left guests dining in darkness.

Surplus solar generation is enabling a planned transition from gas hot water to heat pump systems across all three resorts, projected to save a further FJ\$95,000–\$110,000 (AU\$87,000–\$101,000) per year in gas costs.

“A remote Fijian island was a demanding environment: no grid, salt air and extreme heat. AELIO performed across all three resorts and the savings speak for themselves,” said Joey Zhang, General Manager of SolaX Power Australia.



Fijian Future Energy and SolaX solar technicians with solar panel in front of batteries.

Image Supplied

“Our partnership with Future Energy shows what’s possible in remote, off-grid conditions. This solution is available to any operator across the Pacific — and Australia — still relying on expensive imported diesel.”

Alastair Mortensen, Director of Future Energy, said the project demonstrates a compelling case study for future remote and off-grid projects.

“If we can do it here, we can do it anywhere. Remote lodges, rural hospitals, data centres: the barriers to solar are lower than most businesses think. And right now, reducing reliance on diesel has real benefits, not just for the environment, but for their bottom line.”

1. Estimate is calculated based on Paradise Cove data from previous seven months.

SolaX Power Australia
www.solaxpower.com.au

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WEATHER MONITORING DEVICE

Australian environmental technology company SiteHive has launched SiteHive Weather, a system that integrates hyper-local weather monitoring directly into its environmental monitoring platform.

The system combines onsite weather monitoring with the SiteHive Enviro platform, creating a single source that brings

together weather, dust, noise, vibration and water data in one cloud-based system.

Key capabilities of the system include hyper-local weather monitoring integrated with environmental data; automated alerts for rainfall, wind speed and wet bulb temperature; historical weather records to support compliance reporting and investigations; integrated reporting across weather and environmental datasets; and automated site imagery every 15 minutes to verify site conditions.

By connecting these datasets, environmental professionals can better understand the factors influencing monitoring results, identify emerging risks earlier, mitigate the environmental impacts and provide stronger evidence to regulators, project owners and local communities.

Historical weather records are also captured automatically, supporting environmental investigations, compliance reporting and project reviews without requiring users to access multiple systems.

SiteHive
sitehive.com

TERMINAL BLOCKS WITH SNAP IN TECHNOLOGY

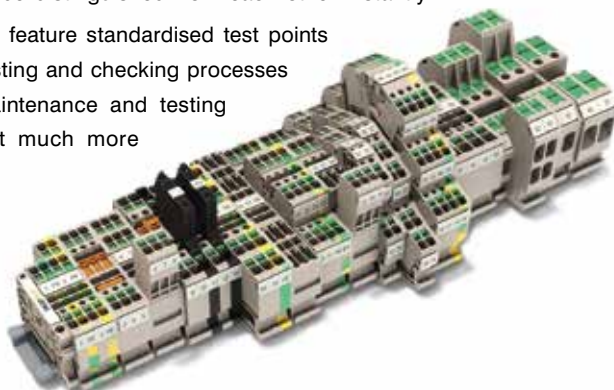
To be cost-effective, installation work in control cabinet construction must be carried out speedily, and preferably automated. At the same time, the connections should be permanently reliable, safe and easy to maintain.

The new Klippon Connect terminal blocks with Weidmüller's SNAP IN technology meet all these requirements, and are easy to use. Stripped fine-stranded conductors just need to be inserted into the connection point, and the connection point snaps shut with a clearly audible click — the conductor is now permanently contacted. To release the connection, users simply need to press the green pusher.

The planning phase is crucial for the success and cost-effectiveness of the entire panel-building process, and requires the intelligent interplay of digital product data and interconnected engineering tools. Efficient, easy wiring is key to installation. Weidmüller's products stand out in this respect with their intuitive handling and clear design. All terminal functions can be distinguished from each other instantly.

Klippon Connect products feature standardised test points which make automated testing and checking processes possible. In this way, maintenance and testing tasks can be carried out much more safely and quickly.

APS Industrial
www.apsindustrial.com.au



BATTERY CONVERTER WITH INTEGRATED MODEM

The ISOIL MV255 FLOWIZ battery-powered converter with integrated modem for ISOMAG electromagnetic flow measurement systems is designed for remote water, wastewater and industrial monitoring points. The MV255 can power any ISOMAG insertion or flanged sensor up to DN1800 while also managing up to two pressure or temperature sensors.

The converter helps utilities and process operators capture more data from remote assets without relying on permanent site power. The unit can be powered by lithium or alkaline batteries, with estimated battery life of 15 years or more depending on measurement conditions. Batteries can be replaced without interrupting measurement, while optional AC, DC or solar power can be used with battery back-up to help prevent data loss during outages.

With an integrated cellular modem, the converter enables wireless transmission of measured flow and pressure or temperature data. Encrypted communication, compressed data packaging and SMS alarms support secure, cost-efficient remote monitoring when process thresholds are exceeded. The converter also includes an internal 4 GB data logger for years of flow and pressure recording.

Advanced BIV built-in verification continuously monitors sensor parameters to help anticipate potential problems. Technical specifications include accuracy of $\pm 0.4\%$ of measured value, optional $\pm 0.25\%$ accuracy, repeatability better than $\pm 0.2\%$, analog 4–20 mA output and keyboard, display or mini USB programming.

AMS Instrumentation & Calibration Pty Ltd
www.ams-ic.com.au



Conveyor belt recycling initiative for Gladstone Ports Corporation

Fenner Conveyors (Fenner), in partnership with Tyrecycle, has delivered a conveyor belt recycling initiative for Gladstone Ports Corporation (GPC), providing a practical circular economy model for Australia's bulk materials handling sector.

Fenner coordinated the recovery and recycling pathway for decommissioned conveyor belts from the Port of Gladstone, where GPC operates 65 conveyor systems and more than 48 kilometres of installed conveyor belting.

Through Fenner's circular belting solution, end-of-life conveyor belts are diverted from landfill, transported to Tyrecycle's Brisbane facility for processing, and repurposed into new rubber products.

In June, six conveyor belts totalling 122 tonnes were removed from the Port of Gladstone and returned to Tyrecycle's Brisbane facility before being sent to Tyrecycle Somerton for further processing into feedstock for local use.

Independent analysis commissioned by Tyrecycle estimated the recycling of these belts saved more than 190 tonnes of CO₂ equivalent.



Fenner Conveyors Sales and Marketing Executive General Manager Trevor Svenson said the project showed how industry could turn conveyor belt waste into a local circular economy opportunity.

"Every organisation that begins recycling its belts is contributing to a growing circular economy, supporting local manufacturing, creating

jobs and reducing waste," Svenson said.

The recovered material supports the development of Fenner's InfinitySeries conveyor belting, which incorporates recycled rubber materials, including reclaimed conveyor belts, into new belt construction.

Tyrecycle Head of Trading, Mining and Strategic Development Ashley Battilana said the project proved the Fenner-Tyrecycle circular belting solution in practice.

"The one-in, one-out logistics model removed double handling, reduced supply chain costs and enabled recycling to be completed in Australia within three days of the belt being removed from service," Battilana said.



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Epson Monna Lisa ML 8000

EPSON'S BLUEPRINT FOR SUSTAINABLE FASHION

HOW DIGITAL TEXTILE PRINTING CAN REBUILD LOCAL MANUFACTURING IN AUSTRALIA

Australia's fashion paradox is stark. We're among the world's biggest per-capita consumers of clothing, purchasing an average of 56 new items each year, yet 97% of the apparel we wear is made offshore. That offshoring has hollowed out domestic capability and embedded environmental impacts overseas often out of sight, but not out of Australia's water-stressed reality. With nearly 4000 litres of water required to produce a single pair of traditionally dyed jeans, the status quo is misaligned with one of the driest inhabited continents on earth and a climate future defined by longer, more frequent droughts in key regions.

With that said, the Australian fashion and textile sector still contributes \$27.2 billion to the economy (around 1.5% of GDP) employing about 489,000 people and exporting \$7.2 billion in goods. The challenge and the opportunity is to decouple growth from water- and waste-intensive legacy processes while rebuilding targeted onshore production that is globally competitive, traceable and resilient.

Epson plays a role in supporting a shift towards a more sustainable and efficient on-demand fashion model through digital textile printing, which can help reduce waste and improve production efficiency in certain use cases across the textile industry.

Traditional screen and rotary printing methods require significant water for dyeing, washing and rinsing, generate chemical effluent and push brands toward large minimum order quantities that often lead to overproduction and markdowns.

Epson's direct-to-fabric (DTF) Monna Lisa digital printer and direct-to-garment (DTG) technologies flip that model to on-demand, lower-impact production.

As Epson Australia Managing Director Craig Heckenberg notes, "Digital printing can reduce water use by up to 97% versus conventional screen printing — a vital shift in a country facing structural water scarcity. By enabling right-sized manufacturing these systems cut dead stock, warehousing costs and end-of-season waste. They also accelerate speed to market, moving from artwork approval to printed fabric in hours rather than weeks, which reduces sampling waste and lets brands test different fabrics, colourways and patterns without the overhead of screens and lengthy setup."

Crucially, digital print localises production creating distributed "smart factories" close to demand and insulating brands from global supply volatility while enabling transparent, traceable supply chains.

Momentum is building at an industry level. In March 2026, the Australian Fashion Council (AFC) in partnership with R.M. Williams launched Australia's first National Manufacturing Strategy for fashion and textiles — a decade-long roadmap to rebuild targeted local capacity and modernise skills and technology. Rather than chasing commodity-scale offshore volumes, the strategy backs premium, technology-enabled and traceable production that leverages Australia's natural fibres and advanced manufacturing.

Epson is a technology partner to the AFC in this shift, supporting future onshore capability, workforce development and a transition to a circular economy by 2030.

Digital textile printing is central to this agenda because it supports smaller batches, rapid sampling, personalisation and localised manufacturing: all essential ingredients for high-value, lower-impact production.

The concept is moving quickly toward capability. The AFC and Epson have launched a six-month feasibility study to map the commercial and technical pathways for an AI-powered, on-demand smart factory. The goal is to validate a commercially viable facility that integrates advanced machinery, digital design, workflow software and analytics to connect brands with local manufacturers.

“For our members, this study is where ambition meets infrastructure. A smart, on-demand factory can give brands of every size access to globally competitive, local making without the burden of large minimum orders while reducing waste at speed to market. That is exactly the kind of premium, technology-enabled and traceable capability our National Manufacturing Strategy is built to deliver,” said Samantha Delgos, General Manager, Australian Fashion Council.

By triggering production only when orders are confirmed and using data to optimise scheduling and material yield, such a factory can deliver rapid turnarounds, customisation at scale and minimal waste without the high minimum order quantities that so often lead to overproduction.

Australia already has proof points that this model works. In Sydney, Epson partnered with apparel manufacturer Citizen Wolf to integrate their SureColor F2260 direct-to-garment and direct-to-film printer into a made-to-order operation that produces only after an order is placed. As co-founder Eric Phu explained, “By combining Citizen Wolf’s and Epson’s leading on-demand technologies brands can now offer a wide range of designs and garments, producing items only when an order is confirmed — no upfront capital, no surplus stock, no waste.”

Then The Social Outfit, a social enterprise and fashion label that creates jobs, skills and community for refugee and migrant women, showed another facet of local, low-waste manufacturing. Working with Epson’s Monna Lisa ML-8000 direct-to-fabric printer, the organisation produced ‘Sama’, a community print story designed by 12 women from the Chester Hill Community Hub, printed in Sydney and sewn in Marrickville. CEO Amy Low described the significance of the technology for their model saying, “Our partnership with Epson has allowed us to explore what it looks like to create a fully Australian manufactured garment from printing all the way through to garment production and the experience we can provide to customers in our store.”

At the product-development level, the Monna Lisa platform fundamentally reshapes the journey from concept to collection.

Traditional sampling demands rotary screens, minimum fabric runs and international shipping between mills, printers and design teams, baking weeks of delay and cost into each iteration. With Monna Lisa, designers can move from artwork approval to production-quality strike-offs on the intended fabric in hours.

Merchandising and buying teams gain confidence before committing to bulk, while brands cut waste and development expense. The same flexibility powers on-demand production: instead of forecasting large inventory months ahead, labels



The Social Outfit's 'Sama' design.

Image: Supplied

can print closer to real-time demand, enabling capsule drops, seasonal refreshes, school or team customisation and personalised products.

For companies reporting against ESG frameworks and tackling issues like water use, chemical discharge and obsolete inventory digital textile printing provides tangible, measurable improvements.

This pathway serves both ends of the market. Smaller brands can access premium local production without prohibitive setup costs, starting with short runs, iterating quickly and scaling as demand proves out. Larger companies can deploy smart-factory cells within existing operations or partner sites, use data to right-size runs, reduce markdowns and trace inputs end-to-end.

In each case, the outcomes align: conserving scarce water resources by replacing high-impact dye and wash stages, cutting waste across sampling, production and inventory, reshoring targeted value chains that create skilled jobs and shorten delivery times, and increasing transparency for consumers, regulators and export markets.

The next 12 to 24 months are pivotal. As the AFC and Epson smart factory feasibility study concludes and early facilities come online, Australia has an opportunity to show a practical template for premium, technology-enabled, low-impact fashion manufacturing. The essential pieces are already here: mature digital print platforms, functioning on-demand exemplars, community-embedded social enterprises and a national strategy designed for scale with integrity.

Epson’s bet is simple and bold: give designers and manufacturers the tools to print what’s needed, when it’s needed, where it’s needed. The result is less water, less waste and more value staying onshore.

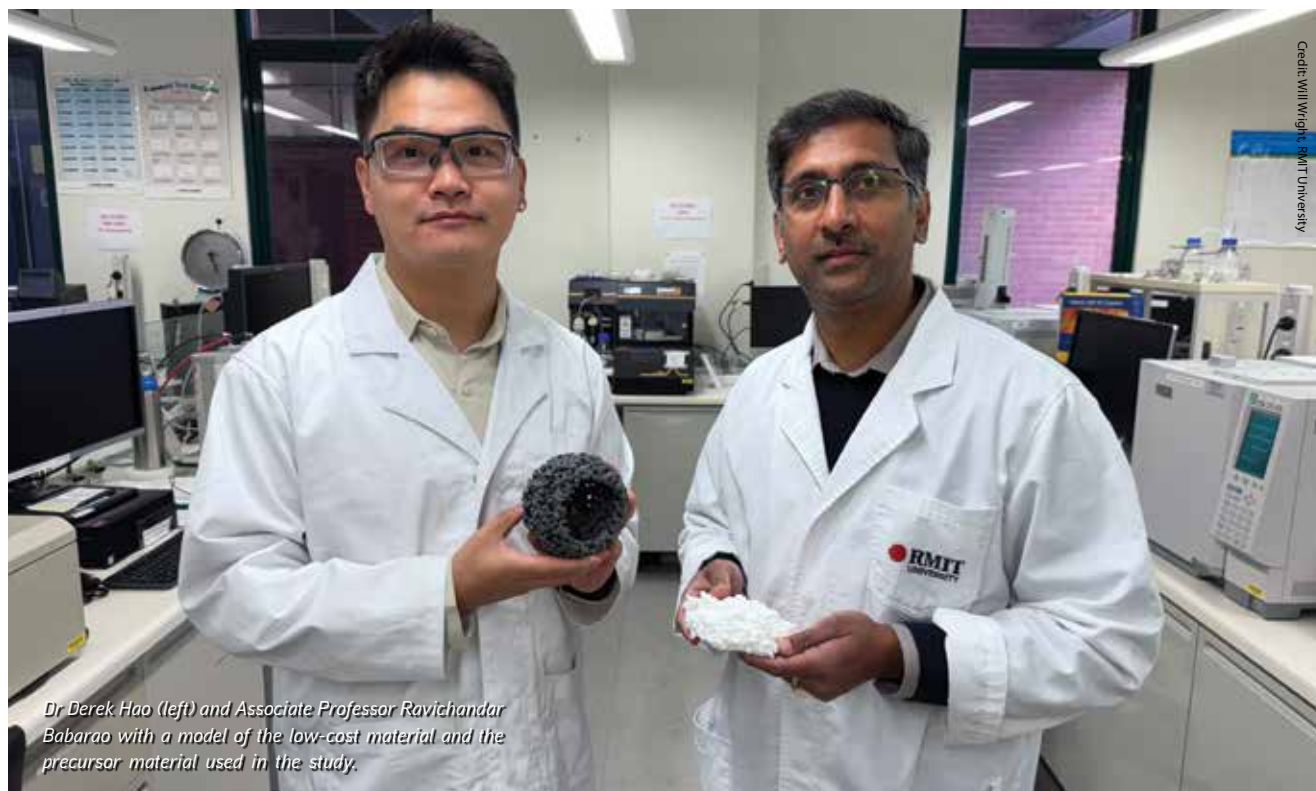
That’s not just a tech story or a fashion story or a manufacturing story, it’s a blueprint for rebuilding an industry to live within planetary limits while creating meaningful local jobs.

Epson Australia Pty Ltd
www.epson.com.au

EPSON



Green hydrogen production receives boost using low-cost materials



RMIT researchers and international collaborators have found a way to increase green hydrogen production using low-cost materials, providing a potential pathway to cheaper clean fuel.

By improving a widely used compound, titanium dioxide, the team reported hydrogen production more than 80 times higher than the commercial untreated version under the same test conditions.

Lead researcher Dr Derek Hao, from RMIT's School of Science, said the research added to a growing effort to make hydrogen production both more efficient and more affordable. Many of the most effective hydrogen-producing systems rely on expensive metals such as platinum.

"By showing how a common material can be improved to produce more hydrogen, the study points to a practical direction for future work," he said. "If similar gains can be achieved under real-world conditions, it could help bring down the cost of clean hydrogen production at scale."

RMIT collaborated with Zhoukou Normal University and Xinyang University from China on the research.

"This work shows that comparable performance can be achieved using low-cost, widely available materials, which is critical if hydrogen production is to scale up," Hao said.

The researchers said one approach to hydrogen production uses light to split water into hydrogen and oxygen. However, in practice, much of that energy is lost before it can do useful work.

This research focuses on reducing that waste, helping more of the energy go into producing hydrogen rather than being lost along the process. Rather than developing an entirely new system, the team upgraded titanium dioxide, a material already used widely in coatings, pigments and energy technologies.

They made a series of small but targeted changes, including adding small amounts of nickel, introducing defects that help

guide how energy moves and shaping the material into tiny hollow spheres to better capture light.

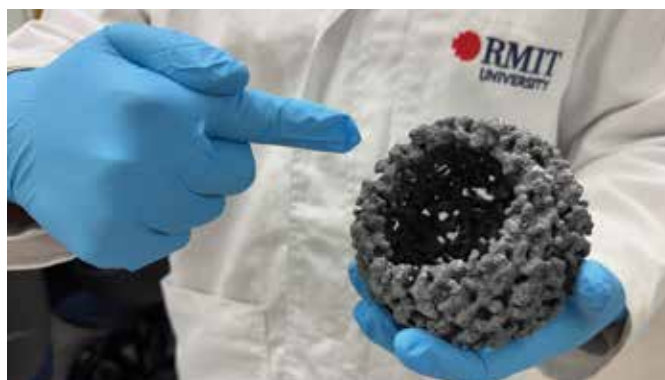
Together, these changes allow the system to hold onto energy longer and direct it to where hydrogen is formed.

In lab testing, the improved system produced significantly more hydrogen than standard versions, particularly when exposed to ultraviolet light. It also maintained performance over repeated testing, suggesting the approach is stable over time.

The experiments were carried out under controlled laboratory conditions using a methanol-containing solution, meaning the system demonstrates hydrogen production in a simplified setting rather than full water splitting. Performance was strongest under ultraviolet light, though the researchers observed some activity under visible light.

Further work is needed to test how the approach performs under full sunlight and without added chemicals.

The study is published in *Applied Catalysis B: Environment and Energy*.



A close-up of a model of the low-cost material developed by researchers, which boosted green hydrogen production more than 80-fold in laboratory testing.

From compliance to circularity

Three ways pharma manufacturers can rethink resource management

Tiyo Kok Fong, Asia Pacific Market Manager for Pharmaceuticals and Healthcare, Water Technologies, Veolia

Access to medication and clean water is a balancing act. As the production and access to medication grow, a new set of water-related challenges presents itself, such as antimicrobial resistance, ecotoxicity, and emerging contaminants including residual active pharmaceutical ingredients (APIs) and endocrine-disrupting chemicals (EDCs) in surface waters, groundwater, soil, drinking water, or even within the food chain.

For pharmaceutical companies looking to improve their environmental, social and governance (ESG) performance, effective water management within manufacturing processes can serve as a strategic lever to translate typical challenges into opportunities for environmental sustainability and business resilience. Here are some areas that decision-makers can consider:

1. Water quality and process resilience

Water is deeply embedded in pharmaceutical manufacturing — not only as a utility, but as a critical raw material used across production, formulation, dilution, cleaning and rinsing processes. Depending on the application, water demand can be substantial: in some cases, producing a single ton of active ingredient may require hundreds of cubic metres of water across production and cleaning operations.

This reliance creates a unique operational challenge. Because water readily dissolves, absorbs and transports contaminants, maintaining consistent quality standards becomes essential — not just for regulatory compliance, but for process integrity and product safety. Most pharmacopeias therefore require pharmaceutical manufacturers to begin

with drinking water and further purify it to application-specific standards, such as purified water or water for injection (WFI).

For pharmaceutical manufacturers, water security has become a strategic imperative — not merely an environmental consideration, but a fundamental pillar of operational resilience and long-term business viability. As a result, pharmaceutical manufacturers devote significant resources to water purification, microbiological control, and the maintenance of highly controlled water systems. In an industry where water quality directly affects both product quality and operational continuity, pharmaceutical water control is a continuous, dynamic process, rather than a static checkpoint.

2. Water consumption and reuse

Water reclamation and reuse are becoming more compelling as rising raw water and discharge tariffs narrow the cost gap between recycled and fresh water. API manufacturing facilities that generate larger volumes of wastewater with lower contaminant levels could recycle water for cooling towers, washing applications and other ancillary needs.

Digital monitoring capabilities are also accelerating the adoption of water reuse initiatives. AI-driven predictive maintenance flags membrane degradation and system wear before it affects performance, while online microbial analysis gives operators real-time contamination visibility.

Together, these tools give operators a clearer picture of water and wastewater treatment processes, enabling informed decisions about optimising water consumption. They also support a more connected view

of operations, where water performance is considered alongside energy use and overall process efficiency. Water reuse and recycling will increasingly become an essential pillar for the long-term viability of operations.

3. Solvent recovery

Spent solvents can constitute between 50 and 80% of the waste of a chemical API plant, and up to 40% of these solvents can be regenerated through innovative volatile organic chemicals (VOC) treatment technologies. Recovered solvents can re-enter production or be sold to third parties — converting what was a disposal cost into a revenue stream. Technologies capable of achieving these recovery rates are well-established and deployable at API manufacturing scale.

Maximising these benefits often depends on how recovery processes are integrated with existing production and waste-handling systems, ensuring that efficiencies gained in one area do not introduce trade-offs in another.

By approaching these three areas as an integrated system rather than separate compliance tasks, manufacturers can convert typical challenges into tangible sustainability and commercial gains.

Looking beyond individual treatment technologies — to how water, waste and energy systems interact across an operation — is where that integration becomes most effective. When these capabilities are brought together, manufacturers gain a more precise and resilient response to both operational demands and environmental pressures, safeguarding critical resources and supporting environmental security for manufacturers and the communities they operate in alike.



Nanocomposite membrane used to recycle PET plastics

Engineers from Monash University have developed a new filtering material that could make plastic recycling cheaper, easier and more environmentally friendly by helping recover and reuse valuable chemicals during the recycling process.

The nanocomposite membrane formulation was developed in collaboration with CSIRO and The University of Texas.

Published in *Chemical Engineering Journal*, the study focuses on improving glycolysis, a chemical recycling process in which PET plastics are broken down using a liquid chemical called ethylene glycol. PET plastic is commonly used in drink bottles, food packaging and clothing textiles.

During glycolysis, PET plastic is broken down into valuable chemical building blocks, but the process is costly because recovering and reusing ethylene glycol from the reaction mixture is challenging.

Rather than relying on energy-intensive methods, the team designed highly selective nanocomposite membranes that act like filters, separating water from ethylene glycol. This allows ethylene glycol to be recovered at high purity and reused in the depolymerisation process, helping reduce chemical use and improve the cost-effectiveness of chemical recycling.

Lead author Dr Hamidreza Mahdavi, a Research Fellow at the Monash Department of Materials Science and Engineering, said the work addresses a major gap in current recycling systems.

"Plastic waste still contains valuable building blocks. Our work shows that membrane technology can help recover these building blocks more efficiently from PET recycling streams, so they can be reused rather than wasted," Mahdavi said.

"Instead of only recovering energy from end-of-life plastics, we are trying to recover the building blocks needed to make new materials. This is an important step toward a more circular approach to plastic recycling."

The research demonstrates that this membrane-based separation approach can operate under conditions relevant to real-world recycling processes, offering a practical pathway to scale.



Dr Hamidreza Mahdavi holds the advanced membrane developed by Monash researchers, designed to selectively separate valuable materials and contaminants at the molecular level.

The technology could be applied across a wide range of PET waste streams, including bottles, packaging, trays and synthetic textiles.

In the long term, the innovation could help reduce plastic waste, lower emissions, improve the economics of recycling, and support the transition to a circular economy.

This latest work builds on a broader research program, following an earlier review of advanced technologies that identified membrane solutions as promising, and a subsequent perspective paper on integrating them into PET recycling.

The new experimental study is the next step, demonstrating membrane-based ethylene glycol recovery in practice, with further research already planned to advance the technology.



CHIP TRAPPER LID REBUILD KIT

The EXAIR Chip Trapper provides an efficient way to remove solids such as chips, swarf or shavings from used coolants or other liquids, prolonging their useful life.

The Chip Trapper Lid Rebuild Kit bolsters performance on older units and helps maintain optimal efficiency. By replacing a few key components on the Chip Trapper system, an older unit can be restored to like-new condition.

Chip trappers are pneumatic vacuums; thus, they have no moving parts to wear out over time and provide a long-lasting solution for any process. However, over time, performance may degrade due to worn sealing rings or prolonged chemical reaction between the sealing gaskets and sump coolant.

The kit comes with replacement bulkhead, quick connect and sealing gaskets to replace faulty or worn-down seals that may limit the Chip Trapper's performance. Also included is a detailed instruction label outlining how to properly use the Chip Trapper valves.

The Chip Trapper Lid Rebuild Kit comes in versions for 30-, 55- and 110-gallon Chip Trappers.

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

Digitising sustainability: how a work management platform and AI are transforming infrastructure sustainability management

Luke Fergus, Sustainability Manager, CPB Contractors

Project: Selfs Point Sewage Transformation Project, TasWater

The challenge of managing sustainability at scale Infrastructure projects pursuing formal sustainability ratings face a common problem: the evidence is everywhere and the system to manage it rarely exists. Evidence sits across spreadsheets, shared drives, emails and consultant reports, while one or two people carry the burden of tracking dozens of interlocking requirements across a multi-year delivery program.

For the Selfs Point Sewage Transformation Project (STP) Upgrade in Hobart, a significant

water infrastructure project delivered for TasWater under the CDO Alliance, this challenge was not just an operational inconvenience. As the project is pursuing a formal infrastructure sustainability rating through the Infrastructure Sustainability Council (ISC), the integrity of the evidence chain directly determines the credibility of the rating outcome. Poor data management means missed criteria, rework, risk and an inability to demonstrate accurate sustainability performance for the project.

The question the project team asked was simple: could a purpose-built digital management system, integrated with AI, do this better?

Building the system: a three-layer work management ecosystem

The answer took the form of a bespoke work management ecosystem built in Monday.com, one of the first implementations of its kind for an Australian infrastructure project. The approach, however, is not platform-dependent and can be configured in comparable work management tools such as Airtable, Smart-sheet, Microsoft Power Platform or Notion. This makes it a transferable model for any organisation already working within a preferred digital environment.

The system is structured across three functional layers: governance, delivery, and reporting and AI. Together, these layers connect sustainability criteria to evidence, workflow and accountability in a single, auditable environment.

At the governance layer, a rating register maps all applicable sustainability criteria to their status, target score, evidence requirements and assigned team members. Criterion boards track the state of each submission, from 'not started' through to evidence-locked, with automated reminders and escalation workflows reducing the risk of requirements falling through the gaps.

The delivery layer captures subcontractor and project team data through integrated webforms and API connections, removing the manual transcription step that introduces errors in conventional systems. Energy, water, >

materials and waste data flows directly into structured boards, feeding three live sustainability dashboards for Energy and Carbon, Water, and Resource Efficiency. This means senior stakeholders and asset owners are not waiting for end-of-project reports to understand sustainability performance; the data is visible, current and decision-ready throughout delivery.

That real-time data infrastructure also has value beyond the project itself. As Australian organisations navigate mandatory climate-related financial disclosure under AASB S2, the ability to capture, structure and report environmental performance data at the project level strengthens the quality and auditability of disclosures at the organisational level. For asset owners such as TasWater, systems that generate structured, evidence-backed sustainability data as a natural by-product of project delivery support both ratings submissions and broader regulatory obligations.

Integrating AI into sustainability management

The reporting and AI layer is where the approach breaks genuinely new ground.

The project's Sustainability Digital Management Plan (SDMP) formalises an approach that had not previously been documented for a formally rated infrastructure project: the use of AI to generate draft criterion narratives, with manual review and governance retained throughout. Each criterion response uses a dual-column format, with an AI-generated draft alongside a manually reviewed and approved version.

This structure preserves human accountability, which the rating framework requires, while significantly reducing the time needed to produce technically accurate, well-structured submissions. The approach is also transferable. Any organisation using a structured work management system can adopt the same logic if it supports data columns, document links and review workflows.

Beyond criterion narrative drafting, the AI layer provides semantic search across the evidence repository, enabling team members to locate relevant documents without navigating complex folder structures. It also helps flag anomalies in data, such as energy consumption figures that fall outside expected ranges relative to construction milestones, before they propagate into formal submissions or external reports.

The result is a system that does not replace sustainability expertise, but amplifies it. The sustainability manager spends less time on administration and more time on analysis, quality assurance and strategic decision-making.

What it has delivered on Selfs Point

The Selfs Point STP Upgrade has achieved a strong sustainability performance record, supported directly by the digital management system's ability to capture and verify evidence at the point of generation. Key outcomes to date include:

- 23% replacement of Portland cement with supplementary cementitious materials (SCMs), directly reducing embodied carbon in the project's concrete-heavy civil works
- 8% reduction in lifecycle greenhouse gas emissions across the full asset lifecycle
- Greater than 90% renewable energy contribution across the project lifecycle

Each of these outcomes required sustained data collection, subcontractor engagement and evidence management over several years. The digital management ecosystem provided the structure needed to manage the workload at the level of rigour expected for a formal sustainability rating, while also producing data suitable for external reporting.

Setting a new standard for digital innovation in sustainability

The project is pursuing an innovation challenge submission framed around Digital Transformation for Enhanced Sustainability Performance — an approach that rewards going beyond industry norms through process innovation, outcome innovation or knowledge transfer that other projects can learn from.

The combination of a formally documented AI methodology (the SDMP dual-column approach), a three-layer work management architecture purpose-built for sustainability rating management and the project's quantified outcomes positions Selfs Point as a genuine innovation reference for the sector.

Critically, the system is designed to be transferable. The framework developed for this project is being structured as a reusable template applicable to other TasWater projects and is documented in a way that other infrastructure proponents, contractors

and asset owners can adapt to their own formally rated work, regardless of which work management platform they use.

What this means for the sector

The Selfs Point approach offers four lessons for infrastructure sustainability practitioners, project owners and asset managers:

Digital management is no longer optional at scale. As sustainability rating frameworks raise the evidence bar across all criteria, the administrative load of managing a rating without purpose-built tooling creates genuine risk, not just to the rating outcome, but to the integrity of reported sustainability data.

1. AI adds value where expertise already exists. The greatest risk in AI-assisted sustainability work is assuming the tool replaces domain knowledge. At Selfs Point, AI drafting is a starting point, not an endpoint. The governance structure ensures every AI output is reviewed, approved and traceable.
 2. Innovation in process is as important as innovation in materials or technology. The sector rightly celebrates low-carbon concrete, novel treatment processes and circular economy outcomes. The Selfs Point experience suggests that how a project manages its sustainability performance, the systems, the data flows, the governance, deserves equal recognition as an area of genuine innovation.
 3. Project-level data systems are the foundation for organisational-level disclosure. With mandatory AASB S2 climate-related financial disclosure now a reality for many Australian organisations, the connection between project-level environmental data capture and corporate reporting quality has never been more direct. Systems that produce structured, auditable sustainability data at the project level do not just support rating submissions, they build the evidentiary base that boards, auditors and regulators will increasingly expect.
- For TasWater, the Selfs Point STP Upgrade is not just a demonstration of what good sustainability performance looks like on a water infrastructure project. It is a demonstration of how that performance gets captured, verified and communicated in real time, and that the system and methodology doing so is itself a replicable contribution to the field.



Researchers recover silver from end-of-life solar panels



Associate Professor Mahshid Firouzi at the University of Newcastle holding solar cell material.

University of Newcastle researchers are taking a step towards making solar panel recycling economically sustainable.

The team has successfully scaled up a process that recovers valuable silver from end-of-life solar panels, demonstrating almost 100% silver recovery during the continuous pilot-scale flotation trial for solar panel recycling.

Researchers recovered silver from almost half a tonne of retired solar panels, building on the team's earlier research showing that froth flotation — a mineral-processing technique widely used in the mining industry — could recover silver from solar waste without the need for acid.

Associate Professor Mahshid Firouzi, Deputy Director from the University of Newcastle's Centre for Critical Minerals and Urban Mining (CRITIUM), said the challenge was no longer whether silver could be recovered from solar panels, but whether it could be recovered at a scale and cost that made recycling commercially viable.

"Our earlier small-scale batch research proved flotation could recover silver from solar panels," Firouzi said. "This latest work demonstrates that the process can operate continuously at a much larger scale with nearly 100% silver recovery, bringing us closer to commercial implementation."

The pilot processed 22 kg of solar-cell material recovered from approximately 460 kg of end-of-life solar panels, which is equivalent to around 23 residential solar panels. The researchers recovered almost 100% of the silver and concentrated it into a high-value product representing just 1.25% of the original material.

The resulting product contained more than 80 times the silver concentration of the original solar cell material.

The team's preliminary economic assessment suggests the flotation-based process could be three to five times less expensive than conventional acid-leaching approaches. Recycling solar panels is currently estimated to cost around \$10–15 per panel, compared with only a few dollars to send a panel to landfill.

"At the moment, recycling often costs more than landfill. But if recyclers can efficiently recover and sell the silver contained within solar panels, that changes the economics completely," Firouzi said. "Silver is the highest-value material in a solar cell. Recovering it has the potential to make solar-panel recycling far more financially attractive."

The University of Newcastle process uses water, air and small amounts of chemicals that help the silver attach to air bubbles, allowing it to be separated and recovered without acid.

"We're applying proven mineral-processing technology to one of the fastest-growing waste streams in the renewable energy sector," Firouzi said.

"If we're serious about building a circular economy, we need to think not only about how we generate clean energy, but also how we recover the materials that make those technologies possible."

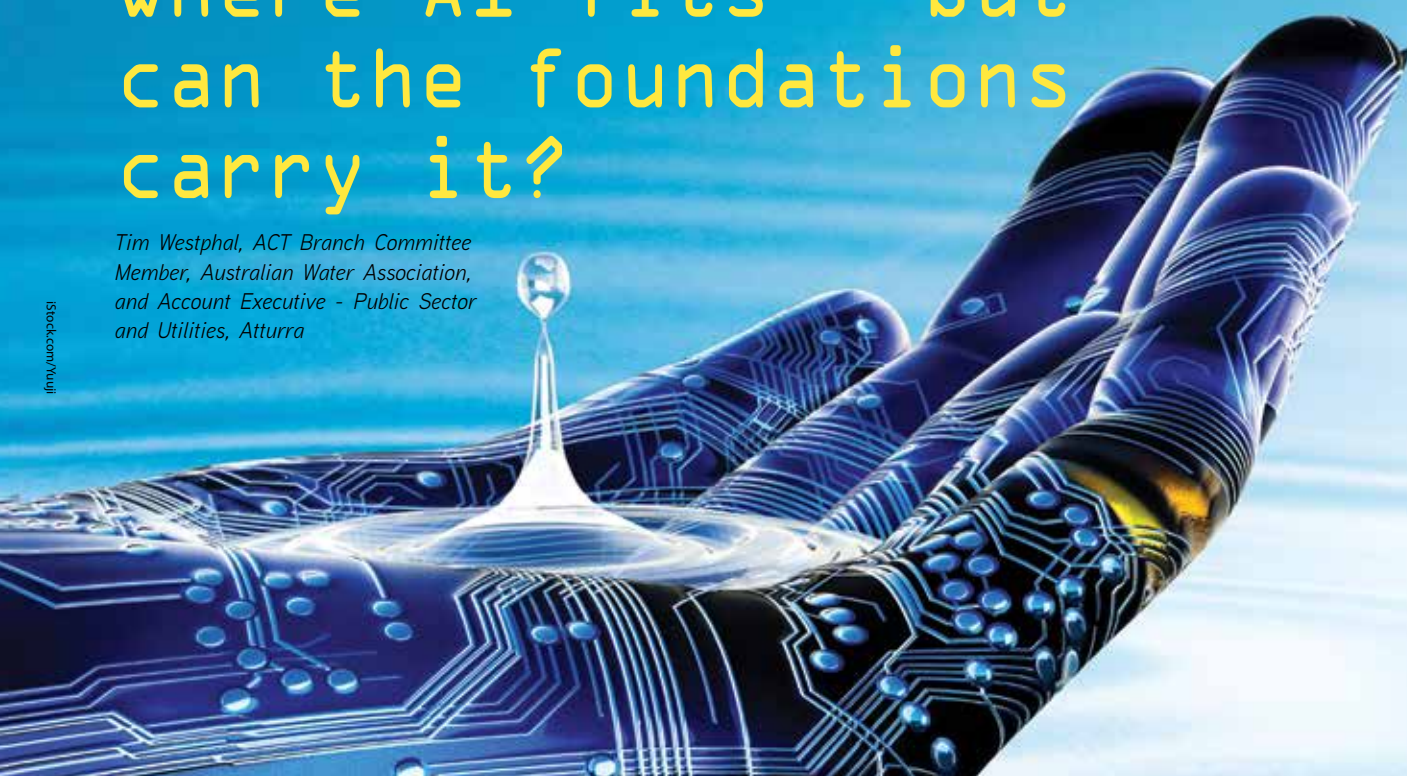
The research team is continuing to investigate opportunities to apply the technology to other waste streams, including printed circuit boards from decommissioned data centre equipment and other electronic waste.

The findings have been released as a preprint in *ChemRxiv*.

Water utilities know where AI fits – but can the foundations carry it?

Tim Westphal, ACT Branch Committee Member, Australian Water Association, and Account Executive - Public Sector and Utilities, Atturra

istock.com/Muji



AI dominated the floor at Ozwater 2026, but many of the conversations kept returning to a more basic question: whether the digital foundations beneath it – connected systems, trusted data, governance – are ready to carry it.

Over three days of conversations at Ozwater 2026 with operators, engineers, analysts and asset managers, the same theme kept surfacing: real enthusiasm for AI, paired with real uncertainty about whether the underlying systems are ready for it.

Australian water utilities have been collecting data for decades. What many lack is the foundation to use it: connected systems, trusted data, governance to act on it with confidence.

The ambition within the sector is genuine. Utilities described wanting to utilise AI for earlier leak detection, more accurate demand forecasting, better asset performance and treatment optimisation. Yet the constraint attendees kept describing had little to do with the models themselves. It came back to the information feeding them, and whether it was current and reliable enough to support an operational decision.

A consistent gap between appetite and readiness

The pattern held across utilities of varying sizes: a strong interest in AI that rested on data foundations that are not yet ready to carry it. This was widespread rather than confined to any one type of organisation, and it ran deeper than a handful of isolated data quality fixes.

In one organisation, performance reporting ran on an eight-day lag, assembled by hand across several delivery partners and dozens of separate reports. Elsewhere, early AI pilots had stalled. The technology was rarely the issue. The data beneath it was unclassified, poorly governed and scattered across systems that did not talk to each other. Engineers talked about hunting for documents they could not find; analysts talked about results they were not willing to put their name to.

For most utilities, the difficulty wasn't the AI use cases themselves. Many had already identified where they wanted to apply AI, and some were building prototypes themselves.

The hard question was whether they had the digital foundations to support those ideas safely and at enterprise scale. Without those foundations, AI tends to expose and amplify the gaps already there rather than resolve them.

None of this is abstract. It plays out in daily operations: field crews with little visibility of work already under way, customer results going out with missing or incorrect details, and teams patching the gaps between systems with spreadsheets, email and manual re-keying. Layer AI over an environment like that and it tends to magnify the existing risk rather than remove it.

Where the most valuable data gets stuck

Control room and SCADA teams will recognise the pattern. Some of the most valuable operational data sits in specialised systems built for exactly that purpose, and that specialisation is a strength rather than something to engineer away.

The problem is that this data often doesn't flow cleanly into forecasting, reporting or customer systems. The systems can stay separate and specialised; it's the data between them that needs to interconnect. Today, what

bridges them is usually a manual layer of re-keying and duplication, and what comes with this is delay. That delay matters most in the moments operators are already under pressure. For example, managing a flood event, triaging several contamination alerts at once, or weighting maintenance and efficiency against environmental impact.

AI is only ever as useful as the environment it runs in. While the underlying systems stay disconnected, 'real time' stays aspirational and the data remains hard to trust. In water operations, where a decision can carry immediate consequences, that gap is not a side issue for the IT team to tidy up later. It shapes whether AI can be used at all.

Regulation raises the bar

This carries extra weight because water and sewerage operators are designated critical infrastructure under the *Security of Critical Infrastructure Act 2018*, which sets obligations around risk management, cyber incident reporting and the protection of essential services. In that setting, decisions about AI are wrapped up tightly with governance, accountability and public trust as much as with the technology itself.

It also explains why the 'move fast' instinct from other sectors sits awkwardly in

water. Utilities carry obligations across public health, billing integrity, regulatory reporting and service continuity. Automation that can't be explained or audited is unlikely to win the confidence of a board or a regulator, let alone the public.

Doing the work in the right order

For many utilities, the more useful next step is not a further AI pilot but the slower work of integration. This means connecting operational, customer and enterprise systems so information can move between them cleanly and in context, without people translating it by hand. It rarely makes for a compelling demo, but it is what allows anything built on top to scale.

The utilities that get the most from AI tend not to be the ones running the boldest pilots. They are the ones that sequence the work by establishing trusted foundations, governing the data, proving value in a controlled setting, and only then extending automation into higher-stakes decisions.

There is nothing anti-innovation about working this way. Sequencing is what gives innovation something solid to stand on. In a sector where accountability can't be handed to an algorithm, getting the order right is very much about having a sound AI strategy.

From data-rich to decision-ready

The water utilities sector has already put real money into capturing data. The work now is making that data usable and reliable enough to support better decision-making. Interest in AI is no longer in doubt; what will set utilities apart is their willingness to do the less visible work that using AI responsibly demands.

For a sector under pressure to modernise without putting essential services at risk, that willingness may matter more than any single technology choice. The utilities organisations that invest in trustworthy foundations first will be the ones able to get real value from AI when they turn to it.



Tim Westphal, ACT Branch Committee Member, Australian Water Association, and Account Executive - Public Sector and Utilities, Atturra

PORTABLE METHANE DETECTOR FOR LANDFILL APPLICATIONS

The Huberg SEM5000 is a field-proven portable methane detector for landfill surface emissions monitoring.

The detector is the latest addition to QED's Huberg range of gas analysers and detectors. Built around LASER-based tuneable diode laser absorption spectroscopy (TLDAS) technology, the SEM5000 is designed to provide fast and precise readings at levels as low as 1 ppm, with zero cross-sensitivity to other gases.

With a response time of below two seconds, technicians are able to accurately pinpoint the location of leaks during walkover surveys, making the detector suitable for landfill surface emissions monitoring, wellhead and surface penetration leak detection, environmental compliance surveys or methane hot spot detection.

Designed for the field, the detector features a rugged IP65/NEMA4 enclosure, with the entire device weighing 2.9 lbs — half as much as comparative technologies, according to QED — allowing it to be easily carried by a sole operator.

The detector is able to warm up in 30–60 seconds and features a field-swappable 10-hour battery, providing enough power for a full working day and minimising the need for back-to-base charging. ATEX Zone 1 certification allows the instrument to be used in hazardous environments, with an operational range between –25 and 50°C.

Equipped with GPS, Bluetooth and QED's bespoke SEMSoft software, the detector allows users to easily manage data and generate reports for compliance, with the transfer of readings to a PC, tablet or mobile device for reporting and analysis.

The SEM5000 can be used for up to two years before it requires factory calibration, which is handled through the QED Express servicing program.

QED Environmental Services
www.qed.com.au





istock.com/TinaFields

Upcycling wastewater algae in manufacturing applications

A UNSW project with Sydney Water and Pacific Bio is exploring whether algae that has already helped clean wastewater can be put to work again, this time giving discarded textiles a new life.

The early-stage research is exploring whether the biomass can be converted into a binder and combined with underutilised materials such as discarded textiles to create new materials for manufacturing.

Textiles are an initial test case, with the researchers ultimately interested in how the

binder could be used across a much wider range of manufacturing applications.

“The opportunity is to look at this algae biomass not as an end product of wastewater treatment, but as the starting point for something else,” said Mariëtte van Bueren, Research Officer in UNSW’s School of Chemistry.

“We’re exploring whether the unique properties of algae biomass can be used

to create natural binders that could replace fossil fuel-based alternatives across a wide range of manufacturing applications.”

“Developing a new material isn’t just about whether the chemistry works,” said UNSW Associate Professor Anna Wang.

“You need to understand where the raw materials come from, how they can be processed and whether there’s a useful application at the other end. Mariëtte’s background in seaweed research, design and economics allows her to consider all those questions together.”

Van Bueren’s research builds on her Master of Philosophy at UNSW, where she investigated seaweed valorisation under the supervision of Associate Professor Patrick Spicer from UNSW Chemical Engineering and A/Prof Wang from UNSW’s School of Chemistry.

Giving wastewater algae a second life

The research builds on Sydney Water’s algae treatment trial at its Picton Water Resource Recovery Facility. Pacific Bio’s RegenAqua technology uses native green macroalgae during the final stage of wastewater treatment to naturally remove nutrients such as nitrogen and phosphorus, improving water

quality before it is reused or safely released into local waterways.

As the macroalgae grow, they capture nutrients from the water and convert them into harvestable organic biomass.

That biomass represents an important opportunity beyond water treatment.

The UNSW team are using the biomass to develop a natural binder, similar to a glue or resin, and testing how it performs when combined with discarded textile fibres and other materials.

“Wastewater treatment plants are called Water Resource Recovery Facilities because of the potential to harness the value of nutrients, energy and water supplies — but it is a big change to deliver a circular economy approach. It requires new partners and community support to unlock the value of materials previously considered ‘waste’. It also requires science, research and new technologies to manage chemicals from our urban environment,” said Emma James, Recycled Water Lead at Sydney Water.

Creating new pathways for discarded textiles

Textiles provide an important test case for the potential of the new binder. Every year, more than 300,000 tonnes of clothing is either sent to landfill or exported from Australia.

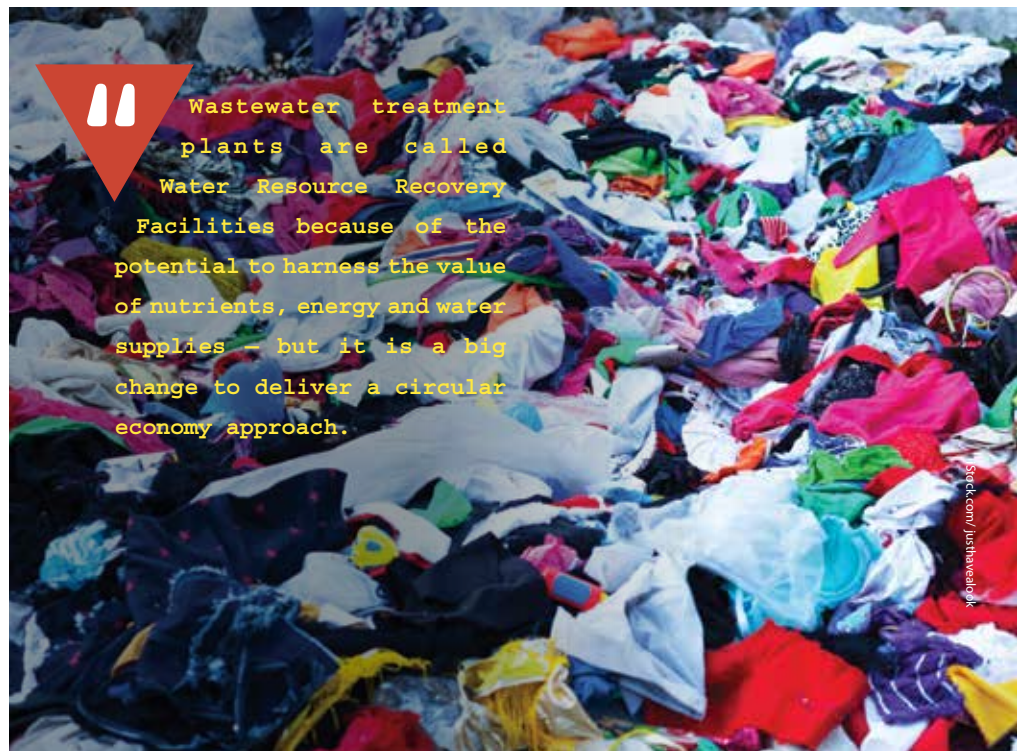
Recycling textiles can be difficult because garments often contain blends of fibres, dyes, buttons and zips.

“A broad range of chemicals are used in textile production processes, including PFAS, glues and dyes,” Van Bueren said. “To enable sustainable textile recycling, these should be removed before recirculating the material.”

Rather than requiring perfectly sorted materials, the researchers are investigating processing methods robust enough to work with a wide variety of discarded textiles.

“If we’re serious about reducing landfill, we need recycling processes that can deal with the reality of mixed textiles, not just the easy materials. That’s the challenge we’re trying to solve,” Van Bueren said.

“This is a global challenge, and we’re trying to contribute our part by identifying and researching different processing methods and pathways to produce the resin and new biocomposite materials.”



One biomass, growing possibilities

The textile application is just one potential pathway for the algae biomass.

Pacific Bio is already exploring applications for RegenAqua biomass across areas including agriculture, energy and building products.

For the UNSW researchers, the next step is to understand what makes the algae-derived binder distinctive and where those properties could be most valuable.

“When you’re working with something completely new, the first step is to understand its strengths and weaknesses,” Van Bueren said.

“Once we know what it does well, we can identify where it can deliver the greatest value.”

Turning local resources into local products

The research is also exploring how processing could work at a local scale.

Many sources of biomass are available in relatively small quantities or can vary in quality, making them less suited to large, centralised commercial operations. Smaller processing technologies could potentially allow biomass to be converted into useful materials closer to where it is generated.

For councils, utilities and remote communities, that could reduce transport requirements while creating value from locally available resources.

“The vision is for local communities to turn their underutilised materials into something valuable,” Van Bueren said.

“Rather than shipping materials across the country, we could create products close to where those materials are generated. It’s a simpler way of thinking about recycling and a much more circular one.”

From research to manufacturing

The project is approaching its conclusion, with the researchers aiming to produce a prototype resin and examples demonstrating potential applications.

“By the end of this project, we hope to have a prototype resin that demonstrates the potential of this technology and its applications,” Van Bueren said.

“The next step is to secure more funding to work with Sydney Water and a textile industry partner to develop functional products and build the technology needed to transform locally available biomass and other underutilised materials into valuable new resources.”

The project received funding through the UNSW Science Translational Impact Seed Fund, which supports early-stage collaborations between researchers and industry, government, charities, not-for-profits, NGOs and foundations.

Mural by artist Jimmy Dvate highlighting the connection between recycled water, sport and community wellbeing.

Three projects, one sustainable water future

South East Water is accelerating water sustainability across Melbourne's south-east. Three major recycled water projects are helping to strengthen water security, build climate resilience, reduce recycled water discharges to the environment, support local economies and reduce reliance on precious drinking water supplies.

Together, the Dingley, Monterey and Western Port recycled water schemes have the potential to deliver almost six billion litres of recycled water annually, and provide fit-for-purpose water for public spaces, community facilities and agriculture in Melbourne's south-east.

Dingley Recycled Water Scheme

The Dingley Recycled Water Scheme is a major investment in recycled water infrastructure that supports Melbourne's water security and climate resilience. Co-funded by South East Water and the Victorian Government, the project will deliver up to 1.8 billion litres of Class A recycled water each year to more than 40 sites, including parks, sports grounds, golf courses, nurseries and market gardens.

The project recently passed its halfway milestone, with 20 kilometres of the scheme installed and a new pump station under construction at Braeside Park. Expected to begin supplying recycled water in 2027, the scheme will help keep local green spaces thriving year-round while generating more

than \$90 million in economic benefits and supporting over 240 jobs.

Monterey Recycled Water Scheme

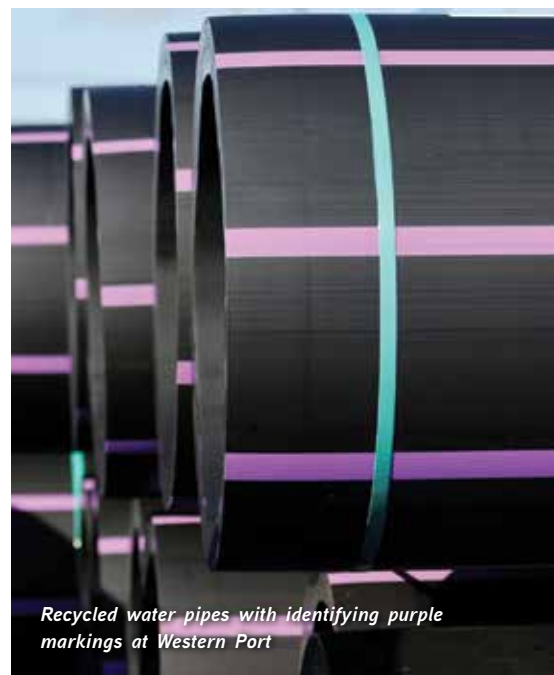
Completed in 2026, the Monterey Recycled Water Scheme delivers around 98 million litres of Class A recycled water annually through a 2.3-kilometre underground pipeline network in Frankston North.

The scheme supplies a reliable, climate-resilient water source to local sporting reserves, community facilities and The National Golf Club Long Island, helping maintain green open spaces while reducing reliance on drinking water.

To celebrate the project and promote water sustainability, South East Water partnered with Frankston City Council and artist Jimmy Dvate to create a community mural highlighting the connection between recycled water, sport and community wellbeing.

Western Port Recycled Water Scheme

Construction is also progressing on Stage 1a of the Western Port Recycled Water Scheme,



Recycled water pipes with identifying purple markings at Western Port

which will deliver up to 4 billion litres of Class A recycled water each year to farms across Cardinia Shire.

The project includes approximately 49 kilometres of pipeline connecting farming communities including Pakenham South, Cora Lynn, Garfield and Bayles.

By providing a reliable, climate-resilient water source, the scheme will support agricultural productivity while reducing reliance on groundwater and local waterways.

Supported by the Australian Government's National Water Grid Fund and South East Water, the \$113.2 million project is expected to generate \$104 million in regional economic output and support more than 90 jobs. Recycled water deliveries are expected to commence in 2028.

Collectively, these projects demonstrate the importance of recycled water in building climate resilience, supporting growing communities and securing water supplies for the future.

South East Water's General Manager Liveable Water Solutions, Charlie Littlefair, said the schemes reflected the organisation's commitment to investing in long-term sustainability and alternative water sources.

"Projects like the Dingley, Western Port and Monterey recycled water schemes demonstrate how South East Water is investing in infrastructure that will benefit our communities for generations to come," Littlefair said.

"By investing in recycled water infrastructure, we're reducing pressure on drinking water supplies, supporting greener and more liveable communities, and helping build a more climate-resilient future for generations to come."



HYBRID CONTINUOUS GAS ANALYSER

Emerson has released its Rosemount QX1000 continuous gas analyser, suitable for use in continuous emissions monitoring systems (CEMS).

The QX1000 uses paramagnetic detection for O₂ and quantum cascade laser direct absorption spectroscopy for all other gases to meet stringent performance requirements. This integration of different technologies and a modular approach provide a flexible, single-system solution tailored to diverse application needs.

The analyser's robust design with low maintenance requirements also reduces lifecycle cost and downtime.

It uses cold/dry technology, with a sample conditioning system transporting gas extracted from the process to the analyser through a thermoelectric chiller to reduce the temperature to about 4°C, so most moisture condenses and drops out.

Users can easily integrate the analyser into existing plant infrastructure, or it can be provided as part of an integrated Emerson system solution, including the sample conditioning system.

Measurements made by the analyser are suitable for CEMS applications due to its high selectivity and accuracy.

Leveraging the intrinsic high selectivity of laser-based measurement, the analyser provides precise monitoring of complex gas streams while delivering continuous, real-time data.

Off the shelf, it supports measurement of key regulatory gases, including CO, CO₂, O₂, NO, NO₂ and SO₂, with different configurations typically offering detection of one to four gases. Measurement of additional gases, such as CH₄ and N₂O, is also available.

Emerson
www.emerson.com



SA utility-scale battery begins trading with OptiGrid

Lunio Energy, a utility-scale battery developer, has successfully commissioned its first Australian battery energy storage system (BESS) in South Australia with OptiGrid, an Australian battery optimisation and trading intelligence platform that is built for the National Electricity Market (NEM).

The 20 MWh BESS in Strathalbyn, South Australia is now participating in the NEM using OptiGrid's OptiBidder platform to optimise energy trading and market bidding.

The platform uses proprietary AI-powered forecasting and optimisation algorithms to determine the maximum revenue for Strathalbyn's grid-connected battery on the NEM.

By using the platform, the Strathalbyn battery will respond to market signals by optimising charge and discharge decisions, submitting bids across Contingency FCAS markets, and capturing value from price volatility and system needs.

"We selected OptiGrid to optimise trading of the Strathalbyn



battery after OptiBidder showed strong results on the capture rate through our evaluation," said Seth Thuraisingham, CEO of Lunio Energy. "Their team also brought real depth on the NEM and how batteries operate in South Australia, which gave us confidence through the investment decision. With the battery now live, OptiBidder is the engine that turns market

volatility into revenue for the asset."

Sahand Karimi, CEO of OptiGrid, said, "We're delighted to be working with Lunio Energy on their first battery project in South Australia.

"Beyond the technology, we configure OptiBidder to each operator's trading strategy and commercial goals. With Lunio, we're confident the Strathalbyn battery will perform at its best and deliver the maximum returns."

OptiGrid

optigrid.energy

UTS pilot project to mitigate methane emissions



A pilot plant is being built at the University of Technology Sydney (UTS) Tech Lab facility in Botany that will optimise the performance of a combination of catalytic process technology and high-efficiency heat exchangers.

A collaboration between UTS researchers and Howden, a provider of air and gas handling products, the project is initially focused on emissions from mines but will also help tackle methane emissions from landfill sites, waste disposal units, energy providers and users requiring high-density energy such as data centres.

"Methane mitigation is critical for climate action as it offers the fastest way to slow global warming impacts," said UTS Catalysis and Process Engineering group lead Professor Michael Stockenhuber.

"We have developed a technically superior catalytic methane mitigation technology for low-concentration methane emissions. The technology excels in low temperature operation, reduced reactor volume and long-term stability.

"The technology potentially can reduce methane emissions from mining by more than 90%. Emissions from mining contribute approximately 10% of all greenhouse gas emissions worldwide."

Howden General Manager APAC Livio Salvestro said, "Howden has been supplying ventilation solutions to the Australian mining industry for over 100 years, where methane emissions have been identified as a serious issue.

"We are excited to be partnering with Australia's leading catalysis researchers at UTS to develop an industrially viable product to significantly reduce greenhouse gas emissions."

Stockenhuber said, "Catalytic technology has a clear advantage compared to thermal mitigation systems owing to lower operating temperatures and much smaller footprint.

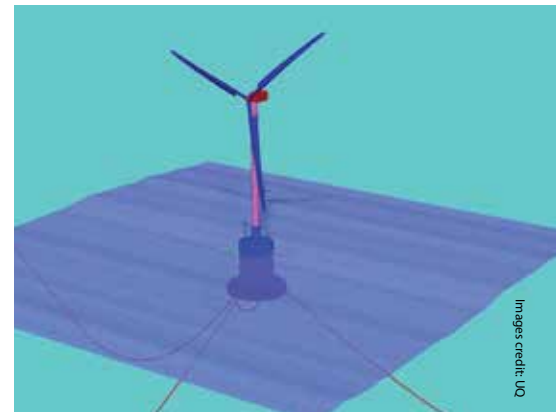
"Our research has successfully demonstrated consistent, high conversion under standard operation for more than six months at temperatures as low as 460 degrees centigrade.

"Besides the lower operating costs and size of the units compared to thermal oxidisers, the reduced temperature also results in a reduced risk for the operation on mine sites and other applications."

Stockenhuber said there were more than 10 years of collaboration behind the development of a prototype and Howden and UTS had now formalised an agreement to commercialise the technology within three years.

"We expect the pilot plant to be running from the end of 2026, after which a demonstration plant is planned to treat mine ventilation air onsite," Stockenhuber said.

"The technology will then be ready to provide a pathway to reach national and international methane emissions targets."



Wave basin testing showed Zhao's floating turbine model can survive a one-in-100-year storm and be moored in up to 200 metres of water.

design also provides superior longevity with fewer maintenance requirements.

"Using conventional marine construction materials in a cost-conscious configuration allowed us to significantly reduce costs," Zhao said. "We also used internal stabilisation features to lower its centre of gravity to make it more stable."

"These features mean it is possible to keep the wind tower vertical even under strong wind conditions, increasing the efficiency of power generation."

Using deep ocean and extreme weather simulations, Zhao confirmed his prototype can be scaled to support a full-sized tower similar to those on land.

Modelling also showed the design could survive a one-in-100-year storm and be moored in water up to 200 metres deep, where fixed offshore turbines had previously been limited to a depth of 50 to 60 metres.

Further testing undertaken in a wave basin facility at Shanghai Jiao Tong University in China provided further validation and increased confidence in the proposed design.

Zhao said the technology is expected to be ready for commercial adaption or implementations in the next two years. He said he is working with industry partners to explore how the turbine can be down-scaled to niche applications to offer offshore industries cheaper, flexible energy solutions.

"We see tremendous potential for this technology to be adopted across Australian offshore industries," Zhao said. "It could provide clean, reliable power for offshore operations, the decommissioning of aging offshore platforms, emerging offshore aquaculture, and future deep-sea data centres."

Floating wind turbine design could access cheaper energy

Ocean engineers at The University of Queensland have overhauled the design of floating wind turbines in a bid to secure easier access to cheaper energy from strong offshore winds.

Associate Professor Wenhua Zhao has tested a scale model design that could support a 3.6-megawatt turbine consisting of an 87-metre tower and blades spanning a 120-metre diameter floating in 200 metres of water.

Zhao said governments and marine-based industries worldwide had shown interest in floating turbines because they can be assembled and deployed in harsh ocean regions with consistent, forceful winds, while

overcoming the limit of water depth to unlock vast renewable energy potential.

But despite investment in the technology, Zhao said the uptake had been limited by the cost of engineering complex substructures and anchoring mechanisms.

"The issue is not about whether floating turbines work, or whether they offer benefits for shipbuilders, resources companies or aquaculture," Zhao said. "The issue is the price. Floating turbines are currently about twice as expensive as turbines fixed in shallow waters, and almost four times the cost of land-based turbines."

To address this hurdle Zhao and his colleagues at UQ's School of Civil Engineering used geometry — based on the first principle of offshore hydrodynamics — to inform the creation of a scale model that can be built and installed at a 40% discount to similarly sized floating wind turbine structures. Zhao's



Metal replacement creates low-cost tandem solar cells

An international team of researchers has built a tandem solar cell that doesn't rely on the scarce and expensive metal indium.

The research breakthrough replaces indium-based oxide with abundant tin oxide, a material that costs 1% of the cost of indium, without sacrificing performance.

The researchers said the study will bring next-generation tandem solar cells a step closer to commercial production, potentially creating cheaper solar panels that generate more electricity from the same amount of sunlight.

Professor Yuan Cheng from Monash Suzhou and the Department of Materials Science and Engineering at Monash said

the milestone marks the first realisation of a large-area, highly efficient indium-free perovskite tandem solar cell, showing that the technology can be scaled beyond laboratory-sized devices.

"Considering the cost of tin is a mere 1% of that of indium, this breakthrough unveils a new material paradigm and a highly viable engineering route for low-cost, sustainable and scalable tandem photovoltaics," Cheng said.

"Ultimately, this work is of paramount strategic importance for propelling the industrialisation and terawatt-scale deployment of next-generation ultra-high-efficiency photovoltaic technologies."

As demand for solar energy continues to grow, reducing reliance on scarce materials is becoming increasingly important. Indium is used in a wide range of electronics, and its limited supply presents challenges for large-scale manufacturing.

By replacing indium with tin oxide using a low-damage reactive plasma deposition process, the researchers created solar cells that achieved a certified efficiency of 31% in a commercially sized



mini-module while also improving durability.

The devices also withstood heat, humidity and more than three months of outdoor operation while maintaining strong performance.

Cheng said achieving more than 30% efficiency in a commercially sized tandem module is a major technical milestone, and demonstrates that high performance can be maintained without relying on scarce, high-cost materials.

"The research team developed a reactive plasma deposition (RPD) process for tin oxide (SnOx) films to serve as the recombination layer, achieving a remarkable certified efficiency of 33.6% on 1 cm²," Cheng said.

"By further extending the application of RPD-SnOx to both the front and rear transparent electrodes, we successfully fabricated indium-free tandem solar cells. Remarkably, we scaled this technology up to a 207.9 cm² mini-module, obtaining an outstanding certified efficiency of 31%."

The research paper has been published in *Science*.

SMART VALVE WITH ELECTROMAGNETIC THERMAL ENERGY METER

The CS611 Thermag Valve from ISOIL is a 2-way control valve with an integrated electromagnetic thermal energy meter. It provides energy control, energy calculation and billing in accordance with the EN1434 and MID directive 2014/32/EU.

The valve measures and monitors energy consumption in heating and cooling systems, both in new and existing buildings, and is designed to enable full connectivity with building management systems (BMS) and IoT platforms.

It is also able to manage different fluids such as water or water mixed with glycols with high accuracy and approved for billing according to the MID directive 2014/32/EU.

The valve body is made of DZR anticorrosive brass, and the flow sensor is made in PEEK with HC276 electrodes. Both valve and meter are integrated in an all-in-one device with a compact body, reducing the time of installation.

It can be programmed to control the flowrate according to several quantities which can be selected by the BMS through the Ethernet port or the communication protocol (Modbus or BACnet).

Those quantities include flowrate, thermal power, temperature differential, inlet temperature, outlet temperature, pressure differential, and external source from the process or the BMS.

AMS Instrumentation & Calibration Pty Ltd
www.ams-ic.com.au



Creating jet fuel from forest waste

A \$32 million federal government investment into Australian-made jet fuel produced from forest waste is bringing it a step closer to powering flights.

The government hopes the investment will make the country's fuel supply more resilient and less vulnerable to overseas shocks.

Through the Australian Renewable Energy Agency (ARENA), the investment will help develop HAMR Energy's project — which aims to use forest waste to produce renewable methanol in Australia, which can then be converted into sustainable aviation fuel, renewable diesel and other low-carbon liquid fuels.

"Australia has an abundant supply of forest waste, and turning it into fuel for hard-to-abate sectors like aviation would be a win for emissions, Australian industry and regional jobs," said Minister for Climate Change and Energy Chris Bowen. "Projects like this can help strengthen Australia's long-term fuel resilience by supporting more domestic fuel production and a more diverse fuel supply, making us more resilient to global energy shocks."

ARENA's funding is in two stages, with \$12.5 million available for the early Front End Engineering Design phase, and a further \$19.5 million subject to HAMR Energy securing the necessary co-funding to commence the detailed design phase.

The forestry waste consists of by-products and residues such as sawdust, bark, woodchips, thinnings and other material left over after harvesting and processing has occurred that typically have limited other markets. This will generate additional revenue to plantation owners alongside their existing primary products.

"Producing new clean fuels here in South Australia and over the border in Victoria, will create new opportunities across the forestry, manufacturing, engineering and aviation sectors," said Minister for

Infrastructure, Transport, Regional Development and Local Government Catherine King.

"We are proud to be investing in this project that turns waste into fuels. It brings together a range of industry partners and investors with Australian expertise in aviation, fuels and engineering who will help us take the next step with these biofuels."

With a total project cost of \$92 million, the funding will be used to undertake development and design work to prepare three facilities for future investment decisions:

- A biomass processing facility located in Victoria will process approximately 600,000 tonnes a year of forestry residues.
- The Portland Renewable Fuels methanol project located in Portland, Victoria will produce approximately 300,000 tonnes a year of renewable methanol.
- A Methanol-to-Jet project located in Gillman, South Australia will use the methanol to produce approximately 140 megalitres of sustainable aviation fuel each year.

Liquid fuels make up around half of Australia's national energy use. Sustainable aviation fuel is one of the best ways of reducing emissions from aviation, particularly on long-haul flights where alternatives are limited.

This project could support the development of a new Australian low-carbon liquid fuels industry, more jobs and investment opportunity across the forestry, manufacturing, engineering and aviation sectors.

"Australia's foresters have always been innovators. That's why our government is backing new opportunities through significant investments in low-carbon liquid fuel," said Minister for Agriculture, Fisheries and Forestry Julie Collins. "This will mean more opportunities taking flight for our proud forestry industry, backing jobs in regional communities."

"Producing more low-carbon liquid fuels right here in Australia doesn't just benefit our fuel security and emissions reduction, it supports Australian foresters and our regions."

Australia's data centre future will be built on concrete

Steve Fergus, co-founder and CEO of Neutralis



Australia is moving quickly to position itself as a serious player in the global AI economy. Data centres are being announced at pace. According

to a report by Data Centres Australia, 90 are currently sitting in the country's data centre capacity pipeline, with its operational capacity projected to more than double by 2030. As a result, energy debates are intensifying, along with community and environmental impacts.

But before a single server is switched on, every data centre must first be built, and the way we build them will shape whether Australia's AI future is genuinely sustainable or simply energy-intensive with a greenwash alibi.

Concrete is the critical link here and it's not a marginal input, not by a long shot. It is foundational. Hyperscale data centres can exceed 100,000 square metres in footprint, and are engineered more like infrastructure than commercial buildings, with oversized foundations, dense reinforcement, and structural systems designed to carry extreme loads. Australia already has more than 250 data centres, with at least 175 more projected by 2030. Each of those facilities represents thousands of tonnes of concrete locked in before a single watt is consumed.

We are among a group of construction innovators working hard to build the infrastructure of a low-carbon, AI-enabled future using materials that embed significantly less carbon upfront. Cement alone is responsible

for about 8% of global carbon emissions, and a large share of emissions produced by the construction industry, with embodied carbon already contributing around 10% of Australia's total emissions and rising.

The construction sector has already captured many of the easy gains through incremental improvements. But incremental reduction is no longer enough to materially shift outcomes at scale, especially in the face of the kind of massive infrastructure growth seen in the data centre space. Data centres are not experimental builds; they're capital-intensive, risk-sensitive assets. Engineers will not specify uncertainty, builders will not accept cost or program-risk, so it's critical that new materials must slip into the supply chain seamlessly.

If Australia wants its data centre expansion to align with its climate ambitions, policy must move beyond targets and reporting and focus on enabling adoption of new and better materials that exist today.

First, procurement signals matter. If embodied carbon becomes a measurable factor in public and regulated procurement, the market will respond quickly. So why not signal more sustainable, market-ready materials, as well as those made in Australia, and preferably regional Australia. These materials and the locally based manufacturing are already happening: now is the time to fast-track it.

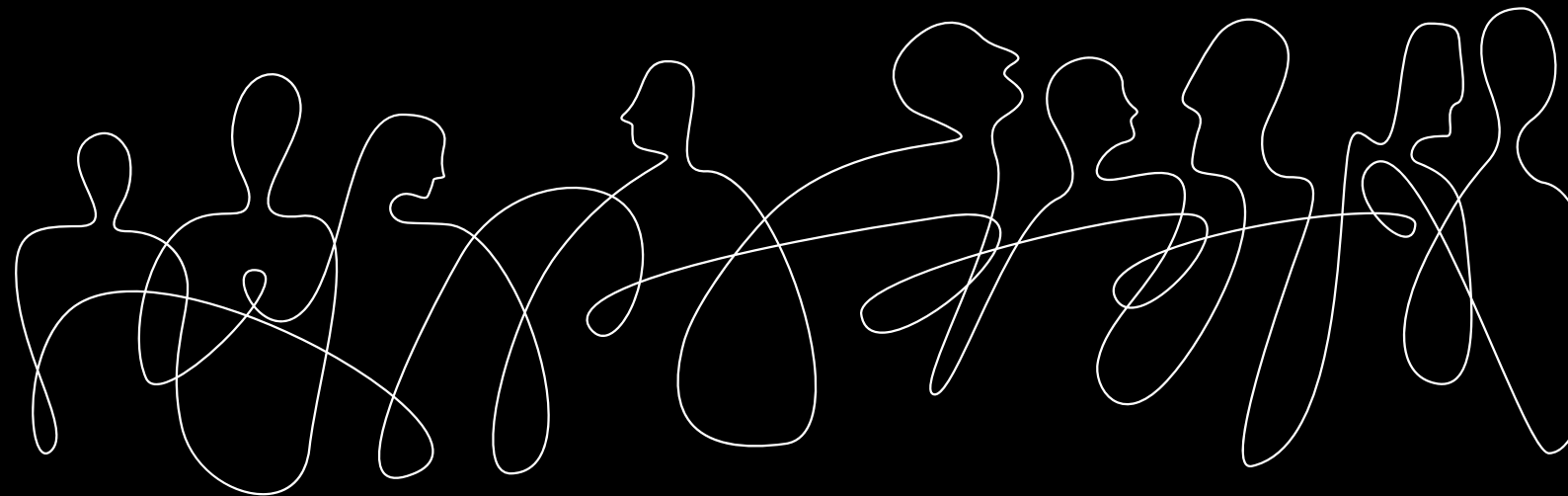
Second, compliance pathways must

be clear. Materials that fit within existing standards scale, while those that require exceptions do not. There's a big difference between something promising that has never left the lab and a material or technology that's already proven in the world. All too often the oxygen in the room is taken by exciting, but untested, academic 'breakthroughs' when tomorrow's solutions are ready to go now. Australia needs a strong and innovative research backbone, but it also needs to take leadership by promoting the innovation advantages we already have.

Third, policy must recognise that this is not just an environmental issue. Cement is also a source of cost volatility and supply risk, so reducing dependence on it can improve resilience just as much as it does emissions.

It's important to note that none of these steps require the government to pick winners. The industry just needs the right conditions where better materials are supported, promoted and allowed to compete fairly. The key to winning the sustainability game is to understand that, in construction, the commercial interest must also win, otherwise sustainability will become either a hand brake or exclusion from the process.

We need to get this right. The bricks and mortar of tomorrow's digital infrastructure are already here, they're cheaper and more sustainable. But now the government, supported by industry, must ensure that these materials are seen and adopted at speed and scale.



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