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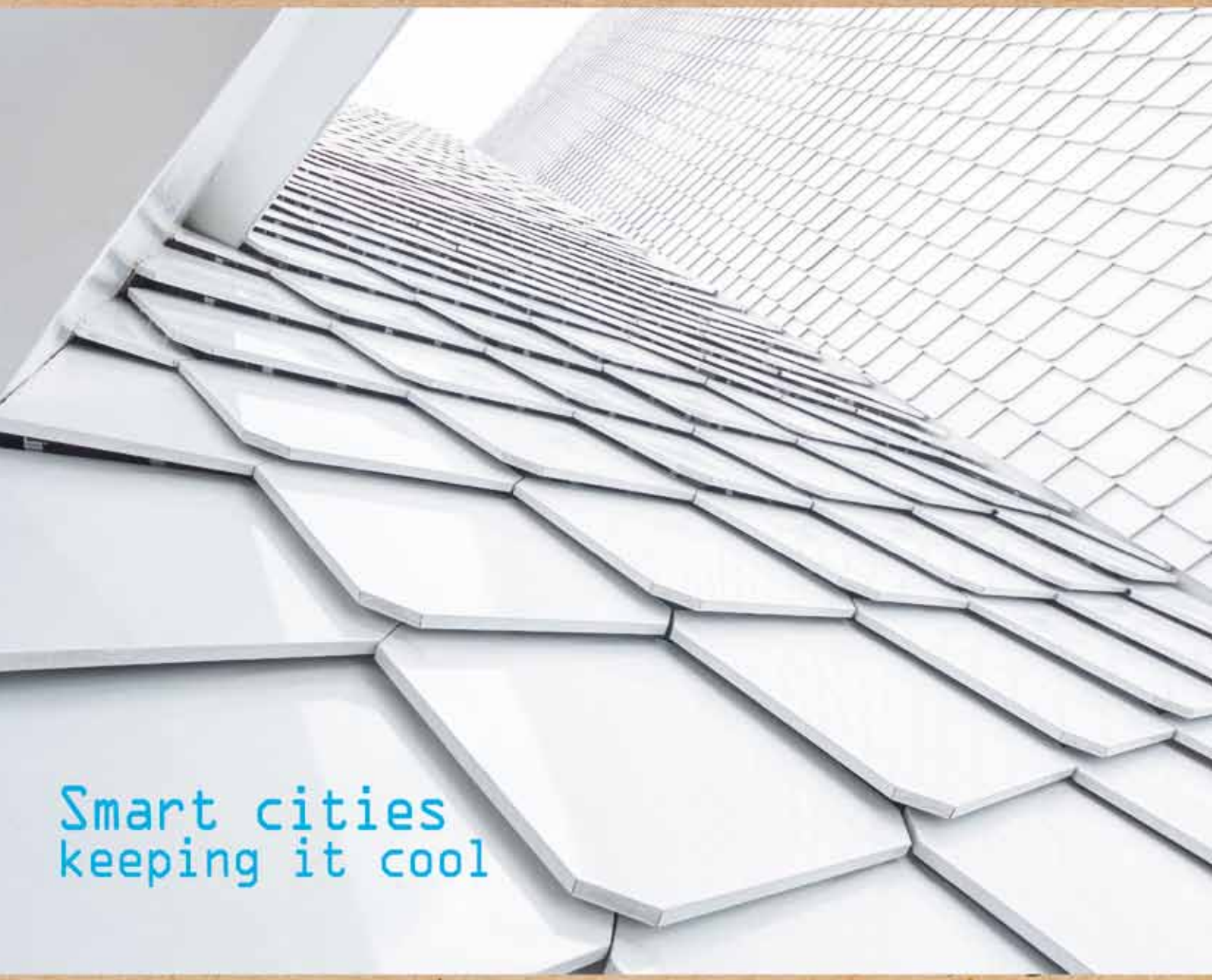

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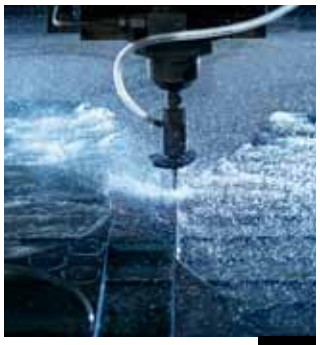

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WORDS FROM THE EDITOR

Could remote working help with the development of smart cities?

We've all been impacted by the pandemic over the last two years but not all of these impacts are negative. Initially, as people were grounded, there were noticeable huge improvements in air quality. Many, like me, even enjoyed the shift to remote working — with some of us even more productive than ever under the new working model.

Now, researchers from Lithuania, Cyprus and Germany have studied how the remote working model could help combat energy and environmental problems and thus contribute to smart cities development. The research team demonstrated that at least 4 L of transportation fuel and 7.4 kg of carbon dioxide can be saved per hour of remote work per 100 employees.

Smart cities of course need efficient digital and telecommunications technologies which allow teleworkers to reduce the need for transport, reducing congestion in traffic and pollution.

Smart urban transport, water and waste networks, and smart energy-efficient buildings can all be used to save on the energy and material resources and minimise carbon emissions in a similar manner.

Who knows what the 'new normal' will be, but maybe not all the lessons from the pandemic will be lost and at the very least a hybrid working model will remain — it appears to be a very smart solution.

Enjoy this issue, which features many other smart city solutions.

Carolyn Jackson

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Risky business:
why sustainability is now central to mitigating risk

*Lany Harijanti**

> **... the role of risk manager is no longer confined to traditional financial risks and regulatory expectations but progressively is contributing more into how to support a sustainable business model.**

The COVID-19 pandemic has undoubtedly caused the largest economic and societal shock the world has experienced this century. Yet it was not unforeseen.

As far back as 2006, the annual Global Risks Report from the World Economic Forum warned that a pandemic was an 'acute threat' across all industries globally. Meanwhile, the 2021 report from the Intergovernmental Panel on Climate Change sounded a 'code red for humanity' — setting out in the starkest terms that the risks of inaction on climate change are now irrefutable.

What all of these risks have in common is that they threaten or disrupt not only economies but, more importantly, the wellbeing and sustainability of humanity and the planet. It's logical, therefore, to conclude that they are challenges that demand global cooperation and societal cohesion to overcome.

Getting a grip on impacts

At the corporate level, effective, pre-emptive and dynamic enterprise risk management is more relevant than ever. That is why the role of risk manager is no longer confined to traditional financial risks and regulatory expectations but progressively is contributing more into how to support a sustainable business model. The GRI sustainability reporting standards enable organisations to assess and communicate their impacts, which is increasingly relevant from the perspective of risk management. The revised Universal Standards — launched in early October 2021 — re-emphasised the scope of impact needs to be inclusive of potential risk.

The World Business Council for Sustainable Development (WBCSD) describes sustainability risks as uncertain social or environmental conditions that could cause significant negative impacts on the company. As the pandemic has proven, these risks can pose existential threats to companies. Or, as former US Secretary of State Condoleeza Rice put it: "sustainability is a multiplier of risk", exponentially increasing volatility and uncertainty.

What this means is that, to be successful over the long term, businesses must not lose sight of their sustainability risks. Against this backdrop, a recent GRI webinar, 'Aligning Sustainability and Risk Management', explored the ways that the integration of sustainability was shaping the role of risk managers, increasingly their relevance to the organisational transformation process. Here we share some of the insights from the session.

Incentivising risk analysis

Constant Van Aerschot, Director of WBCSD Asia Pacific, pointed out that many companies tend to treat sustainability issues separately from risk issues. A recent WBCSD report on integrating sustainability and enterprise risk revealed that companies recognise that the material topics in their sustainability reports have a financial impact — yet these same companies often fail to address ESG-related risks in their annual risk filings.

Priya Bellino, Ernst and Young's ASEAN Head of Sustainability and ESG for Financial Services Consulting, emphasised the role of financial institutions in encouraging companies to manage sustainability risks. The example she shared was in the real estate sector. Climate change and extreme weather events are exposing physical assets to a much higher risk, which affects the value of real estate portfolios. As a consequence, we are seeing more incentivisation through green building financing and the adoption of green certifications.

To access new opportunities, companies need to measure and monitor 'investment-grade sustainability performance'. That cannot be achieved without reliable and comparable disclosure — with Bellino acknowledging that GRI reporting helps the company to deliver the required ESG data.

Yet — as Tony Rooke, Director of Climate Transition Risk at Willis Towers Watson, set out — determining the right ESG data points is a crucial step on the journey to understanding risks and achieving sustainable business outcomes. Rooke went on to share that, for companies to begin to understand their role in tackling global risks, such as climate change, the market needs to further develop or create a reward system for those who transition to zero carbon business models.

The future of risk management

According to the 2020 State of Risk Oversight report, from the Enterprise Risk Management Initiative, 54% of large organisations and 58% of public companies have appointed a chief risk officer (CRO). With the growth of the role, we have also seen increases in scope — helping organisations identify, analyse and mitigate their risk exposure. So, it is clear that many organisations are recognising effective risk management as a key ingredient to the long-term wellbeing of the business.

Where the CRO evolution can and must deepen is in the correlation between enterprise risk and sustainability risk. Having a CRO that leads on sustainability is a good sign that a company is resolute in its sustainability commitment. The CRO does not have to be a know-it-all; more important is that they have the competencies to lead and build a team, collaborate with external stakeholders such as investors and regulators, and bring the ESG and conventional risks strands together into a single, meaningful narrative.

Therefore, whatever is up next on the risk forecast — be it this pandemic, the climate crisis or a yet-to-be-defined new threat — having the expertise to assess the multiple and concurrent sustainability risks facing the business is more essential than ever before.

**Lany Harijanti is the Regional Program Manager of the GRI ASEAN Hub. She has been with GRI since 2018 and has a remit to build the capacity of sustainability reporting among first-time reporters and SMEs in Indonesia, the Philippines and Thailand. She has worked in international development for the last 20 years, including previous roles with the UN Development Program (UNDP) and the UN Population Fund (UNFPA).*

Cool roofs,

pavements to reduce heat island effects

Overpopulation and rapid urbanisation are driving up temperatures, transforming cities into urban heat islands.

"One of the major problems in the built environment is urban overheating, or regional climatic change," said Mattheos (Mat) Santamouris, Anita Lawrence Professor of High Performance Architecture at the University of New South Wales.

Human activity — waste heat from industry, cars and air conditioners — makes cities significantly warmer than surrounding areas. This affects more than 500 cities worldwide.

"As our cities heat up, heat-related morbidity and mortality rise," he said. In 2020, 593 and 391 people died from heat-related deaths in Melbourne and Sydney respectively, a substantial increase from 289 and 176 in 2007, according to the Australia State of Environment.

Radiative coolers

To combat this issue, UNSW Sydney and the University of Sydney have teamed up to create building materials — super cool roofs, pavements and coatings for buildings — that reflect rather than absorb solar energy.

They can reduce peak temperatures in our cities by up to four degrees, enough to save lives, Professor Santamouris said.

"The way we build [also] increases the temperature of our cities. We're using [heat-absorbing materials like] asphalt, we're using concrete," Professor Santamouris said.

Super cool roofs and pavements by contrast reduce the energy needed for cooling. This in turn decreases carbon dioxide emissions that increase the magnitude of climate change. This makes our cities more economical, environmentally friendly and livable, he said.

UNSW Sydney and the University of Sydney have teamed up to create building materials – super cool roofs, pavements and coatings for buildings – that reflect rather than absorb solar energy.

Banning dark coloured roofs in NSW

New South Wales Minister for Planning Rob Stokes plans to ban dark-coloured roofs as part of the NSW Government's climate action goal to reach net zero emissions by 2050. Dark roofs are already off limits in south-west Sydney in order to reduce the urban heat island effect. Lighter-coloured roofs attract no additional cost but can deliver savings on energy bills by lowering the inside temperature of houses by up to 10°C, according to UNSW research.

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The new-generation materials were tested as part of a study to reduce temperatures in Australian cities, mainly in the frame of an ARC Discovery Project.

The study found that introducing super cool materials with other heat-mitigating strategies, such as increased greenery and shade, could save around 10 lives per year per 100,000 residents.

"Under the sun, [with] 42 degrees ambient temperature, the [super cool] materials' surface temperature was 25. It's a natural air conditioner without expending any energy – super cool materials," the energy physicist said.

"And all these new technologies and new materials have been developed here in Australia."

Energy efficiency

Professor Santamouris and his team are partnering with the Department of Industry, Science, Enterprise and Research (DISER) on two projects to promote energy efficiency in the built environment.

The team will provide cost-benefit analyses and scientific documentation on the adoption of cool roofs in Australia, and ways to improve energy efficiency in new and existing commercial buildings, such as office buildings, aged-care facilities, hotels, childcare centres and shopping centres.

With around 40% of the total energy consumption in developed nations attributable to buildings, there is huge potential for impact, Professor Santamouris said.

"The reduction of energy use and associated greenhouse gas emissions through energy conservation measures is vital to achieving energy and climate goals in the cities," he said.

International application

Professor Santamouris is applying his research to reduce temperatures in Riyadh in Saudi Arabia, one of the world's hottest cities. The Royal Commission of Riyadh has engaged his team to develop an all-pervasive heat-mitigation plan, the largest of its kind.

The project uses computational tools empowered with rich urban datasets to model building performance at the urban scale, identify energy retrofits and inform urban planning.

Extensive aerial monitoring using airplanes and infrared technologies, performed by industry partner National Drones, will map the city's thermal conditions. Large-scale high-resolution simulations of the city will evaluate different scenarios to decipher optimal strategies.

The project also considers the city's vegetation, water, ventilation and introducing super cool materials.

The team is coordinating similar studies for the cities of Dubai, UAE; Kolkata, India; and Kuala Lumpur, Malaysia, in collaboration with local researchers.

Professor Santamouris is ranked the top most cited scientist for building and construction globally for 2019 and 2020 in the Meta-Research Innovation Center at Stanford. He and his team are involved with more than 200 large-scale heat-mitigation projects around the world in Europe, the Americas, Asia and Australia.

Water scarcity may spur improvements at manufacturing facilities

Water is often consumed in large amounts and is a vital ingredient for making many common products, ranging from cars to smartphones and computer chips.

Now a new study from Penn State and UCLA has discovered that companies that use water in their manufacturing processes may actually pivot to become efficient and more eco-friendly when water becomes increasingly scarce during times of drought.

The researchers — including Suvrat Dhanorkar and Suresh Muthulingam from Penn State and Charles Corbett from UCLA — found in their study that subsequent to periods of water scarcity, manufacturing facilities that use water extensively streamlined their processes to lower their toxic emissions into water, like lakes and rivers.

An added benefit the researchers found was that the changes in the processes also resulted in reduced toxic emissions into land and air. On average, the estimated reductions in toxic emissions were more than 2.5%.

Dhanorkar, an associate professor of supply chain and information systems, said the study — recently published in the journal *Management Science* — is one of the first to flip the question of how industry is contributing to climate change and instead ask how industry is responding to climate-change-induced events, like droughts.

"Most of the prior research has been focused on how companies are negatively affecting the environment," Dhanorkar said. "We wanted to flip it and see how companies respond to climate change. It opens a new area of research that can, in the future, start to look at not just manufacturing, but also how these climate-change-induced events affect innovation and other economic factors like unemployment."

For the study, the researchers gathered data from 3092 manufacturing facilities in Texas from 2000 to 2016. The researchers focused their study on Texas because the state frequently experiences droughts and periods of water scarcity, as well as producing many types of products including food, petroleum, coal, chemicals and metal.

The data included information on the weeks of drought experienced by each facility and the total amount of toxic emissions recorded at each facility.

"We found that water scarcity can induce manufacturing facilities that rely heavily on water to improve their environmental performance by lowering toxic releases, but only when they face persistent drought," said Muthulingam, an associate professor of supply chain management. "These effects also extended into the facilities reducing emissions in other ways, such as into the land and air, too."

The researchers said one explanation for the results could be that water scarcity prompts companies to become more careful about how they use water. But, because water is used across processes, companies become aware of other areas where they can improve as well.

"A lot of these industries use water at different points in their processes," Dhanorkar said. "So, when there's water shortage and you're investigating how to improve water usage, it may also reveal shortcomings in other aspects of the processes that aren't related to water as well. These companies might be learning a lot about their processes not just from a water standpoint, but more broadly."

Dhanorkar and Muthulingam said they hope that in addition to spurring additional research on the topic, policymakers could also use the findings to inform future policies around climate change.

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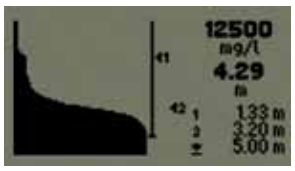

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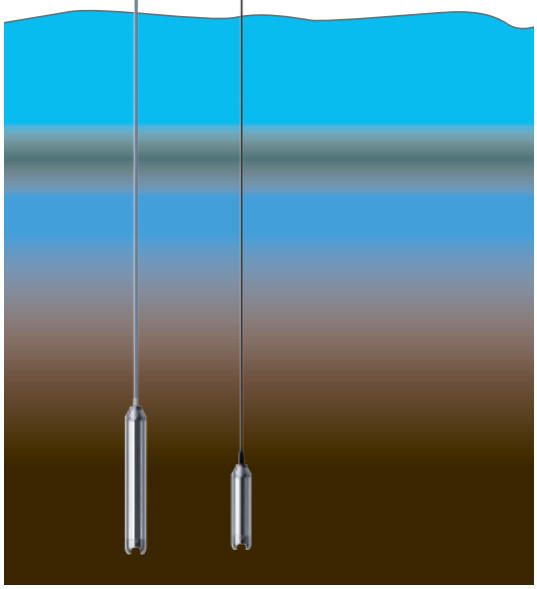

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Lighting up Montevideo with smart streetlights

National Narrowband Network Company (NNNCo), a Sydney-based LoRaWAN operator and IoT solutions provider, has partnered with Spanish company Wellness TechGroup to provide IoT network coverage to 70,000 smart streetlights in the Uruguayan capital, Montevideo.

The project will cover 200 km^2 and provide smart street lighting to more than 1.3 million people, reducing carbon emissions by 80% and establishing an infrastructure-based network that can accommodate other smart city initiatives.

> **"The project will cover 200 km^2 and provide smart street lighting to more than 1.3 million people, reducing carbon emissions by 80% and establishing an infrastructure-based network that can accommodate other smart city initiatives.**

The project will see the deployment of new streetlights with LED technology using Wellness TechGroup's WeLight technology, LoRaWAN Actis Nema 7 nodes and NNNCo's LoRaWAN network. The installation will help improve public safety and energy efficiency with the use of network and application management software and the integration of smart applications for waste management and water conservation.

By replacing the older lights with LED technology and a new remote management system, the system will help reduce carbon emissions by 31,500 tons of CO_2 per year, a decrease of approximately 80%. The project will also improve the quality of the public lighting service, benefiting the whole population of the city with greater efficiency and operations management.

Rob Zagarella, NNNCo CEO and co-founder, said, "This is a milestone contract in the establishment of NNNCo's LoRaWAN network as one of the world's leading networks for smart streetlight use cases and we hope to facilitate similar projects in Australia in the near future.

"This is technology that makes cities greener, smarter and better to live in."

The 10-year contract signed with the City of Montevideo includes the opportunity for Wellness and NNNCo to bring third-party customers across the same gateways into the LoRaWAN network. The Australian network provider will be able to service customers across the whole city, using the NNNCo N2N-DL data aggregation layer and the NNNCo N-Tick device interoperability program.

Wellness TechGroup will roll out 70,000 smart streetlights with Actis Plus Nema 7, the node for remote control of light points, equipped with Nema 7 fast connection, a network analyser, data input from external sensors and adaptive lighting capacity.

The Actis Plus Nema 7 nodes will connect with WeLight Manager, a software that will provide real-time information on all the data from the intelligent public lighting service. The systems become a data-enabled lighting server, true central nodes and form part of a smart city IoT ecosystem, beyond lighting.

David Garcia, Wellness TechGroup CEO, said, "We have deployed more than 300 smart lighting projects worldwide, where we are already managing almost 1 million points of lights in municipalities remotely."

NNNCo and Wellness Techgroup are investee companies of Enzen, a global knowledge practice. This contract shows the synergies of both companies in the areas of IoT, smart cities and sustainability.

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Smart water system solution pilot in the US

Applying an emerging digital solution for water utilities, WaterStart and the Southern Nevada Water Authority (SNWA) have partnered with Xylem in the US to pilot test Xylem's Water Network Optimization solution, part of the Xylem Vue digital portfolio, which is designed to help increase efficiencies and optimise the water system operations.

Through the joint test project, SNWA will evaluate the capabilities of the solution to improve energy management strategies, enhance system performance, and reduce operating and maintenance costs of Southern Nevada's regional water system.

"Southern Nevada's regional water system is multifaceted and highly advanced with complex infrastructure networks and system controls that help ensure safe and reliable distribution of high-quality water throughout our community," said Dave Johnson, SNWA Deputy General Manager of Operations. "While our system is quite efficient, this pilot project will enhance our operations through water system modelling, allowing us to increase operational efficiencies that benefit local water users and ratepayers."

Through this partnership, Xylem will develop a real-time, accurate model of SNWA's water system that integrates operational data to help SNWA optimise operational processes, reduce energy use, assess water infrastructure condition and/or address complex operational challenges in a safe and controlled environment. The Xylem system will help guide existing SNWA operations staff with timely recommendations.

"Xylem's Water Network Optimization solution uses operational systems, GIS and sensor data combined with hydraulic modelling to study and manage the water system as a whole. Up until now, there hasn't been anything overarching for complex water systems like that operated by SNWA," said WaterStart Executive

Director Nathan Allen. "If successful, this joint test project may help revolutionise how the water industry manages its operations."

The solution is also designed to help water utilities improve water demand forecasting and perform real-time water quality optimisation throughout a utility's water delivery system.

"We are delivering an intelligent technology solution that helps water utilities like SNWA make informed decisions about their operations," said Rocio Echeverria, Vice President and General Manager at Xylem. "This provides water utilities with greater certainty about their system operations and increases the reliability of water service for customers. We look forward to leveraging our solution in new ways that will benefit SNWA as well as other utilities around the world."

The SNWA expects the intelligent water system joint test project to be completed in 2022.

Xylem Water Solutions Australia Ltd
www.xylem.com/en-au/

Aussie tech accelerating the electrification of UK homes

Australian technology startup Gridcognition has announced a partnership with its first UK-based customer to accelerate the electrification of UK homes.

SNRG will be using the Gridcognition simulation platform to design and optimise microgrids for fully electric residential housing developments, a trend that's gaining significant momentum in response to ambitious climate targets put in place by the UK government.

SNRG is a UK-based, end-to-end smart energy solutions provider to new electric housing, mixed-use developments and the transport sector.

The partnership will allow SNRG to simulate a range of different physical and commercial options for the design of these microgrids, assessing the impact of distributed energy assets such as solar, battery storage, electric vehicle charging and load flexibility to create housing developments that deliver the best possible outcomes for house builders, residents and the environment.

Recent UK policy announcements see a change in rules for new housing to mandate electric vehicle charging infrastructure and prevent residential gas boilers; and ban internal combustion engine vehicle sales by 2030.

Dan Nicholls, Managing Director of SNRG SmartGrids, said: "Our work is all about reducing cost, complexity and carbon for all, and the more accurately we can plan and design these projects to deliver that, the better.

"Our partnership with Gridcognition allows us to quickly and accurately simulate multiple complex objectives and parameters to identify the optimal technical and operational strategy for our projects."

With a shared purpose to accelerate the transition away from fossil fuels to an all-electric future, both companies are excited about the impact of applying this technology to residential housing developments in England.

"Australia is a great testing ground for the future of energy — operating a wholesale energy market on the east coast and a capacity market on the west — so it is the perfect place to learn what works and then apply those learnings to the UK market," said Pete Tickler, Co-founder of Gridcognition.

Work to adapt the modelling engine to service the UK's energy environment and enabling the modelling of physical and environmental constraints of the energy system in the United Kingdom is already underway, and these projects will be ready in 2022.

Gridcognition
gridcognition.com

AUTOMATED WASTE/CARBON REPORTING

Smart meters are playing a crucial role in the rapid digitisation and decarbonisation of energy markets. Meanwhile, blockchain water-trading systems will be going live in Australia this year. There is, however, one utility that we use daily that has not been measurable — until now.

In a world first, Australian tech company, **Matter** is bringing app-based waste management to our homes and offices providing real-time data and waste/carbon monitoring. It's simple to use and, for the office, will help with sustainability reporting. And it's that extra thing we can all do towards net zero.

You can't manage what you don't measure

There are many waste streams but food waste is one of our biggest challenges.

Rabobank Australia has reported that:

- $10.3b of food is binned each year (enough to feed 1.1 million households);
- 7.6m tonnes of food was wasted across the farm-to-fork supply chain; and
- around 50% of that was wasted by consumers.

As a result, the Australian Government has set — and committed to — halving our food waste by 2030. Urgent action is required in reaching this target and reversing current trends. This will require broad-scale behaviour change — but we'll never manage without the measurement.

With its patented sensor and software combination, Matter has made it possible to do just this — measure household waste patterns so that we can all make better decisions.

Why is recording carbon important?

Reducing food waste is not just important for economic reasons.

Wasting food wastes everything, including valuable natural resources — water, land, energy — and is responsible for a large part of Australia's carbon footprint. Waste accounts for 15% of the world's methane, and methane is a potent greenhouse gas, with a warming potential 56 times that of carbon dioxide over twenty years.

That means methane from waste is a very big deal.

How do we tackle this?

With a smart system we can not only save hundreds of dollars but we can measure our individual and collective efforts in helping solve the problem.

According to the UK's Centre for Social Innovation (Keep Britain Tidy) feedback loops are essential to changing behaviour.

'This includes direct feedback to the household on their specific behaviour, as well as general feedback on recycling performance and issues.'

Matter's ground-breaking sensor technology is totally sealed. The patented technology has three unique advantages:

- It's invisible ... small enough to be 'embedded' in a standard wheelie bin lid
- Has incredible long life (no moving parts & a 12-year battery — no fuss exchange guaranteed)
- It's easy to use

For the office & council — Automated sustainability reporting

The system becomes even more powerful when connected to CarbonFX. This blockchain* inventory provides an immutable record of waste carbon and will provide resilience to a global shift to net-zero emissions.

Here's how it works:

- Each time a bin is emptied the volume is recorded.
- This is sent to a smart contract in the blockchain using a patented algorithm, which then
- Estimates the masses of two greenhouse gases: carbon dioxide and methane.

The entire system is automated — no manual auditing — resulting in real-time sustainable reports according to ISO standards.

Ask us for a demo

CarbonFX and Capture are the platforms. They're running now, right here in Australia.

And they're ready to help our communities take on the planet's biggest challenge.

Please contact us and we'll be happy to show you more.

matter.

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www.matter.city

Smart windows block up to 70% heat, without blocking views

New energy-saving material, developed by researchers from the Nanyang Technological University, Singapore (NTU Singapore), helps control heat transmission without blocking views.

The material for electrochromic (EC) windows operates at the flick of a switch and is said to help block up to 70% of infrared radiation, a major component of sunlight that emits heat, while allowing up to 90% of visible light to pass through, according to the researchers.

It features nanostructure and comprises advanced materials like titanium dioxide (TiO_2), tungsten trioxide (WO_3), neodymium-niobium (Nd-Nb), and tin (IV) oxide (SnO_2), and can be coated onto glass window panels. When activated by electricity, users would be able to 'switch on and off' the infrared radiation transmission through the window.

The invention is claimed to be 30% more effective in regulating heat than commercially available electrochromic windows and is cheaper to make due to its durability.

Light, heat and durability

Electrochromic windows currently available on the market are only effective in blocking visible light, not the infrared radiation, which means heat continues to pass through the window, warming up the room, according to NTU researchers. These windows work by becoming tinted when in use, reducing light from entering the room. The performance of the electrochromic component in these windows tends to degrade in three to five years.

Commercially available electrochromic windows usually have a layer of tungsten trioxide (WO_3) coated on one side of the glass panel, and the other, without. When the window is switched on, an electric current moves lithium ions to the side containing WO_3, and the window darkens or turns opaque. Once switched off, the ions migrate away from the coated glass, and the window becomes clear again.

NTU's technology went through rigorous on-off cycles in lab tests to evaluate the material's durability. The properties of the window retained stability, blocking more than 65% and demonstrating potential for long-term use in sustainable buildings, according to the researchers.

"By incorporating the specially designed nanostructure, we enabled the material to react in a 'selective' manner, blocking near infrared radiation while still allowing most of the visible light to pass through whenever our electrochromic window is switched on. The choice of advanced materials also helped improve the performance, stability and durability of the smart window," said lead author of the electrochromic window study, Associate Professor Alfred Tok of the NTU School of Materials Science and Engineering.

The new electrochromic technology may help conserve energy that would be used for the heating and cooling of buildings and could contribute to the future design of sustainable green buildings, according to the research team.

Next generation smart windows

With an aim to improve their smart window technology, the NTU team created a switch system that helps to control conducted heat, which is the heat from the external environment.

The patented NTU switch comprises magnetic carbon-based particles and thin films that are good conductors of heat. When the switch is turned off, conducted heat cannot transfer through the window. When switched on, the heat will be allowed to pass through the glass window.

When integrated with the newly developed electrochromic material, the team's smart window can control two types of heat transmission: infrared radiation and conduction heat, which is the main mode of heat transfer through matter.

'Environmentally positive' waste collection vehicles

now service residents of Whyalla City Council

The newly launched vehicle fleet driving around Whyalla City Council boasts environmentally positive messages as part of a joint initiative between Veolia and Whyalla City Council. The vehicle slogans and designs were thanks to contributions from the local community, reminding residents to look after their local environment and practise sustainable waste behaviours.

Some of Whyalla's most beautiful landmarks feature on the four new trucks, alongside slogans that encourage people to ensure their household recycling and waste ends up in the right bin, and not in the local environment. The initiative was supported by local residents on Facebook, who rallied around the idea and submitted the messages to accompany the images.

Veolia was awarded the kerbside collection contract with Whyalla City Council in October 2021, which will last for up to seven years. As part of the collaboration, the council and Veolia are working together to improve recycling rates and protect local biodiversity. City of Whyalla Mayor Clare McLaughlin said the initiative is just one way the council will work with Veolia to drive a cleaner and greener city.

"We know residents are proud to live in our beautiful city and care about protecting it, which was evident in the number of environmentally focused slogans we received from the community for these vehicles.

"There's no better motivator to continue this focus than seeing pictures of our very own town — accompanied by this positive messaging — throughout local streets every day.

"I'm thrilled to see the new vehicles in operation, and hope they remind people to really think about what they're putting in their bins," she said.

Veolia's State Manager, Ben Flanagan, said the campaign signified the collective efforts needed to drive positive environmental change.

"Keeping the community clean and protecting the environment is everyone's responsibility and we all need to do our bit. This means ensuring that our at-home waste behaviours are consistently correct.

"Where residents can't avoid or reuse their waste, we ask them to ensure that all of their household recycling is put in the yellow-lidded bin, so that we can collect it and turn it into something new," he said.

Residents can also make use of the Whyalla Waste and Resources Transfer Station (WRTS) for items that can't be placed in their household bins.

"Over the past year, residents have been making good use of the WRTS and this is supporting a more sustainable outcome for waste management in Whyalla.

"We hope this continues long into the future," he said.

The below slogans and imagery are being displayed on the collection vehicles:

Whyalla jetty: 'Keep Whyalla Beautiful' (photo by Ben – The Drone Way; slogan by Rachel Coles) — red bin collection vehicle

Wild Dog Hill: 'Keep our space free of waste' (photo by Gail Caveides; slogan by Melanie Westbrook) — red bin collection vehicle

Cuttlefish: 'Educate, Participate, Co-Habitate' (photo by Carl Charter; slogan by Alex Robins) — yellow bin collection vehicle

Point Lowly: 'Keep our ocean blue and our Eyre green' (photo by Mark McInnes; slogan by Ryan Wake) — green bin collection vehicle

New collection vehicles launched by Veolia and Whyalla City Council are set to do more than pick up the towns' recycling and waste.

Veolia Australia and New Zealand

www.veolia.com.au

Decarbonisation technology converts CO_2 to solid carbon

Australian researchers have developed a way of capturing carbon dioxide and converting it to solid carbon, to help advance the decarbonisation of heavy industries.

Above: PhD researcher Karma Zuraiqi holding a test tube of liquid metal, used as a catalyst to instantly convert carbon dioxide into solid carbon. Credit: RMIT University

The carbon dioxide utilisation technology from RMIT University is designed to be integrated into existing industrial processes.

Decarbonisation is a technical challenge for heavy industries like cement and steel, which are not only energy-intensive but also directly emit CO_2 as part of the production process. The new technology offers a pathway for instantly converting carbon dioxide as it is produced and locking it permanently in a solid state, keeping CO_2 out of the atmosphere.

The research is published in the journal *Energy & Environmental Science*.

Co-lead researcher Associate Professor Torben Daeneke said the work built on an earlier experimental approach that used liquid metals as a catalyst.

"Our new method still harnesses the power of liquid metals but the design has been modified for smoother integration into standard industrial processes," he said.

"As well as being simpler to scale up, the new tech is radically more efficient and can break down CO_2 to carbon in an instant.

"We hope this could be a significant new tool in the push towards decarbonisation, to help industries and governments deliver on their climate commitments and bring us radically closer to net zero."

A provisional patent application has been filed for the technology and researchers have recently signed a $2.6 million agreement with Australian environmental technology company ABR, which is commercialising technologies to decarbonise the cement and steel manufacturing industries.

Co-lead researcher Dr Ken Chiang said the team is keen to hear from other companies to understand the challenges in difficult-to-decarbonise industries and identify other potential applications of the technology.

"To accelerate the sustainable industrial revolution and the zero-carbon economy, we need smart technical solutions and effective research–industry collaborations," Dr Chiang said.

The steel and cement industries are each responsible for about 7% of total global CO_2 emissions (International Energy Agency), with both sectors expected to continue growing over coming decades as demand is fuelled by population growth and urbanisation.

Technologies for carbon capture and storage (CCS) have largely focused on compressing the gas into a liquid and injecting it underground, but this comes with significant engineering challenges and environmental concerns. CCS has also drawn criticism for

PhD researcher Karma Zuraiqi with the experimental technology, designed for smooth integration into standard industrial processes. Credit: RMIT University

PhD researcher Karma Zuraiqi with Dr Ken Chiang and Associate Professor Torben Daeneke. Image credit: RMIT University.

being too expensive and energy-intensive for widespread use.

Assoc Prof Daeneke, an Australian Research Council DECRA Fellow, said the new approach offers a sustainable alternative, with the aim of both preventing CO_2 emissions and delivering value-added reutilisation of carbon.

"Turning CO_2 into a solid avoids potential issues of leakage and locks it away securely and indefinitely," he said.

"And because our process does not use very high temperatures, it would be feasible to power the reaction with renewable energy."

The Australian Government has highlighted CCS as a priority technology for investment in its net zero plan, announcing a $1 billion fund for the development of new low-emissions technologies.

How the tech works

The RMIT team, with lead author and PhD researcher Karma Zuraiqi, employed thermal chemistry methods widely used by industry in their development of the new CCS tech.

The 'bubble column' method starts with liquid metal being heated to about 100–120°C.

Carbon dioxide is injected into the liquid metal, with the gas bubbles rising up just like bubbles in a champagne glass. As the bubbles move through the liquid metal, the gas molecule splits up to form flakes of solid carbon, with the reaction taking just a split second.

"It's the extraordinary speed of the chemical reaction we have achieved that makes our technology commercially viable, where so many alternative approaches have struggled," Dr Chiang said.

The next stage in the research is scaling up the proof of concept to a modularised prototype the size of a shipping container, in collaboration with industry partner ABR. ABR Project Director David Ngo said the RMIT process turns a waste product into a core ingredient in the next generation of cement blends.

"Climate change will not be solved by one single solution; however, the collaboration between ABR and RMIT will yield an efficient and effective technology for our net zero goals," Ngo said.

The team is also investigating potential applications for the converted carbon, including in construction materials.

"Ideally the carbon we make could be turned into a value-added product, contributing to the circular economy and enabling the CCS technology to pay for itself over time," Assoc Prof Daeneke said.

The research involved a multidisciplinary collaboration across engineering and science, with RMIT co-authors Jonathan Clarke-Hannaford, Billy James Murdoch, Associate Professor Kalpit Shah and Professor Michelle Spencer.

'Direct Conversion of CO_2 to Solid Carbon by Liquid Metals', with collaborators from The University of Melbourne and Deakin University, is published in Energy & Environmental Science *(DOI: 10.1039/d1ee03283f).*

RMIT University

www.rmit.edu.au

METAL RECYCLING DATA COLLECTION SYSTEM

The Metso Outotec Index operating and production data collection system from its metal recycling business transfers relevant data from the recycling machine directly to the user's equipment.

Index offers an intelligent way to increase machine productivity, optimise the cost-benefit ratio and identify limiting parameters at an early stage.

Accessible via mobile app or from the dashboard any time, one click is all it takes to find out immediately how high the current capacity utilisation is, which material is currently being processed, how many operating hours the equipment has already been running or what the general condition of the metal recycling machine is.

All the equipment data can be visualised, displayed and analysed in the Index web portal and, if necessary, transferred to programs and systems designed for controlling purposes. The server used to back up data is currently one of the most secure servers on the market, according to the company.

The server is located in Europe and is therefore subject to European data protection regulations.

Index will be available as standard equipment in these Lindemann shears: EtaCut II, EtaCut, PowerCut/LUC as well as PowerCut Wings/LIS and LU. In addition, users have the option of retrofitting their current stock shears of the previously mentioned machine types with Index. It will soon be available for presses and shredder systems.

Metso Australia Limited
www.metso.com

ULTRASONIC FLOWMETER

The KATflow 200 is a fully portable instrument with a power which is belied by its small size.

The lightweight flowmeter is easy to use and can be operated one-handed, which makes it suitable for use in confined spaces or when working at height. The tool provides measurement performance normally associated with more complex and expensive devices and is complemented by the robust Katronic transducers.

The flowmeter is available with a choice of robust stainless steel transducers to cover a temperature range of -30 to +250°C and provides an autonomy of 24 hours using NiMH AA batteries.

It can be supplied with three different transport case options to suit user requirements, has a large internal data logger and has an optional wall thickness gauge.

Applications include various industries, building services, pharmaceuticals, food production, water and wastewater, power generation and general industries.

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

ENERGY STORAGE SYSTEM

Tesvolt energy storage systems have a total capacity of up to 40 MWh. The intelligent battery storage solutions offer hydrogen electrolysers a reliable power supply when solar or wind systems fail to produce sufficient energy.

Even if the public power grid fails, these storage systems provide an uninterruptible power supply for all users.

Tesvolt Australia
www.tesvolt.com.au

Council controls wastewater storage levels

Even in our drought-ravaged country, torrential rainfall may not be welcome. That's certainly the case for a large regional area in Western Australia. The local council built a wastewater pond that is so enormous, it's reportedly visible from space.

The purpose of the pond is to collect water to prevent minor flooding when those enormous rainfalls hit. But it's not a dam; therefore, the local council management team needed a way to dispose of all that water.

The equipment already in place did not quite achieve the evaporation rates, efficiency and reliability the council engineering team were after. Hence, they were looking for another solution. After some initial research, the council engineers contacted Tecpro Australia and asked for advice. They got it by the bucket load, so to speak.

Tecpro's technical team suggested the E46 Floating Evaporator from EMiControls. This evaporator uses specially designed and patented nozzles to draw air into the water stream to produce water droplets which evaporate more readily. The design of the nozzles also minimises drift of potentially contaminated water droplets outside the perimeter of the wastewater pond.

The floating evaporator is modular, so multiple units can be used in the same pond to achieve more rapid evaporation. In the case of the WA wastewater pond, three floating evaporators are in use. While this may seem like a lot of evaporators, the wastewater pond holds over 60 million litres of water. That makes

the evaporators look tiny by comparison, and each evaporator is removing approximately 100 m^3/day.

When it comes to operation, each E46 system can be regulated from its own control panel or multiple evaporators can be run from one single control panel. The council decided to use individual controls for each evaporator to safeguard the system and ensure it was always operational.

The E46 Floating Evaporators have four HDPE UV-stabilised pontoons. The nozzles also use HDPE to cope with hazardous or corrosive liquids. Each unit also has a stainless steel lifting frame.

Everything needed to assemble the evaporator comes in a single crate.

Tecpro Australia

www.tecpro.com.au

BATTERY RECYCLING SCHEME

The Battery Stewardship Council Australia's public program B-cycle Scheme has been designed to ensure the responsible recycling of used batteries.

90% of Australia's handheld batteries brought into the country end up in landfill. Any used batteries not recycled properly and safely can leach toxic chemicals into the environment, or even cause fires in the home when stored.

The B-cycle Scheme will lead Australia's efforts to responsibly manage the recycling of batteries and is set to be fully operational with a network of drop-off locations in retail spaces by January 2022.

B-cycle will be actively pursuing new industry participants such as household battery importers, manufacturers, recyclers and retailers to join the scheme.

It has been developed under the government's $26 million Product Stewardship Investment Fund.

Battery Stewardship Council
bsc.org.au

MULTIPURPOSE VEHICLE RANGE

Multihog specialises in high-quality, multipurpose vehicles and sweepers for the local government, airport and facilities maintenance markets. Designed to prioritise safety, operator comfort and manoeuvrability, the machines can be fitted with various attachments to carry out a wide range of tasks, including sweeping, mowing, street cleaning and even solar panel cleaning.

Originally designed as a machine for cutting grass on slopes, the Multihog has evolved into a range of multipurpose sweepers and tractors used by airports, municipalities and contractors around the world.

Triking
www.triking.com.au

IoT SOFTWARE PLATFORM

The PACEdge IoT software platform package from Emerson provides all aspects of edge processing to simplify IIoT application development, deployment and administration. It helps to maximise the value of data to generate real insights and improve operation in reliability, safety and energy optimisation.

All components necessary in the IIoT application life cycle are brought together in this single package to provide a unified and secure interface to decrease development time and increase deployable footprint.

Drag-and-drop programming simplifies the process of 'wiring' software and hardware interfaces, to allow system connection from the shop floor to user dashboards using a single centralised application platform.

PACEdge includes web interfaces for device administration, application development and scalability, with no need for command line configuration.

The PACEdge platform has been built for a dynamically evolving cloud-agnostic development strategy and allows easy connection to multiple cloud vendors. Data can be pulled from a cloud vendor, combined with control system data and pushed to a different cloud vendor.

PACEdge is available on Emerson's range of Industrial RXi2 PCs, including its PAC Controller 'CPL410'.

Control Logic Pty Ltd
www.controllogic.com.au

KELLER AG, Tobias und Mike Keller

KELLER SHORT FILM

KELLER. More than just a company

The name KELLER has been synonymous with high-precision pressure measurement technology since 1974. Boasting a wealth of experience built up over almost half a century, KELLER AG für Druckmesstechnik is now presenting a new short film that offers some very personal insights into the heart of the company.

Brothers Tobias and Mike Keller, who took joint charge of the family business in 2019, are the second generation to run the Swiss company founded by their father, the physicist Hannes W. Keller.

For them, life is not just about development, but also about finding sustainable ways of adapting to constant changes in market conditions. The focus here is on topical issues such as Industry 4.0, the Internet of Things (IoT) and custom solutions.

The most important factor in producing top-quality products with maximum functionality is the workforce, who pour their heart and soul and plenty of initiative into their work day after day — after all, it takes more than just one person to create a success story.

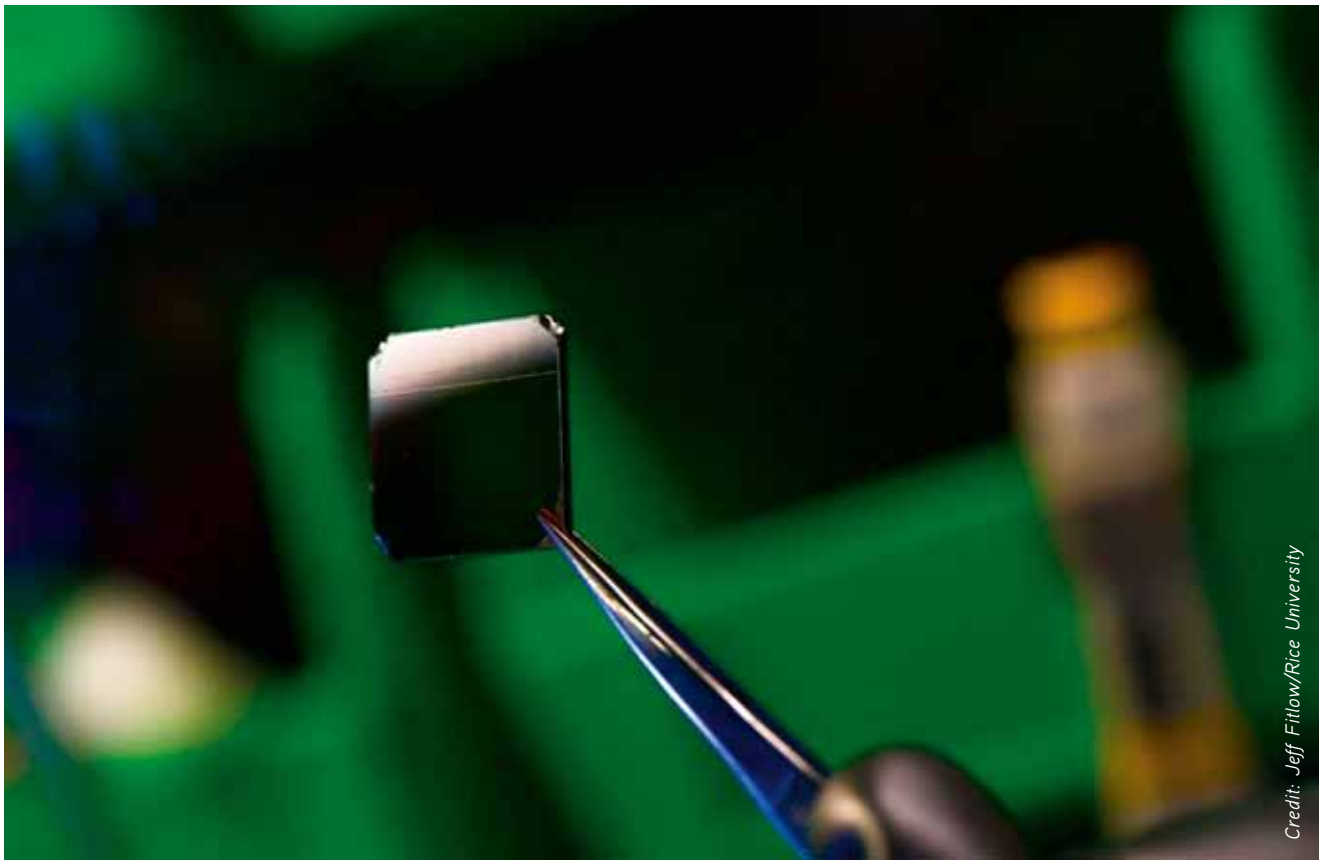
With its strong roots and open-minded ethos, KELLER is looking to the future with the aim of tackling the challenges it faces as a team.

Watch the KELLER short film here:
www.keller-druck.com

BESTECH
Sensors & Teaching Equipment

Bestech Australia Pty Ltd
www.bestech.com.au

Solar cells get thinner, tougher and more efficient



Rice University engineers have achieved a new benchmark in the design of atomically thin solar cells made of semiconducting perovskites, boosting their efficiency while retaining their ability to stand up to the environment.

The lab of Aditya Mohite of Rice's George R. Brown School of Engineering discovered that sunlight itself contracts the space between atomic layers in 2D perovskites enough to improve the material's photovoltaic efficiency by up to 18%.

Perovskites are compounds that have cubelike crystal lattices and are highly efficient light harvesters. Their potential has been known for years, but they present a conundrum: they're good at converting sunlight into energy, but sunlight and moisture degrade them.

"A solar cell technology is expected to work for 20 to 25 years," said Mohite, an associate professor of chemical and biomolecular engineering and of materials science and nanoengineering. "We've been working for many years and continue to work with bulk perovskites that are very efficient but not as stable. In contrast, 2D perovskites have tremendous stability but are not efficient enough to put on a roof.

"The big issue has been to make them efficient without compromising the stability," he said.

The Rice engineers and their collaborators discovered that in certain 2D perovskites, sunlight effectively shrinks the space between the atoms, improving their ability to carry a current.

"We find that as you light the material, you kind of squeeze it like a sponge and bring the layers together to enhance the charge transport in that direction," Mohite said. The researchers found placing a layer of organic cations between the iodide on top and lead on the bottom enhanced interactions between the layers.

Rice University graduate student Wenbin Li, chemical and biomolecular engineer Aditya Mohite and graduate student Siraj Sidhik led the project to produce toughened 2D perovskites for efficient solar cells. (Credit: Jeff Fitlow/Rice University)

The results showed that after 10 minutes under a solar simulator at one-sun intensity, the 2D perovskites contracted by 0.4% along their length and about 1% top to bottom. They demonstrated the effect can be seen in 1 minute under five-sun intensity.

At the same time, the nature of the lattice made the material less prone to degrading, even when heated to 80°C. The researchers also found the lattice quickly relaxed back to its normal configuration once the light was turned off.

They found the perovskite shows promise for efficient, robust solar cells.

The research appears in *Nature Nanotechnology*.

Solar films used for e-bike charging 'tree'

In the community of Löchgau in Germany, ASCA has designed and implemented a 'solar tree' for construction company STRENGER Bauen und Wohnen.

The solar tree produces electricity for the e-bike charging stations of three apartment buildings in a senior-friendly living residential complex. The project demonstrates the flexibility of ASCA's organic solar films.

"With conventional technology, the individual shapes of the solar modules would not have been feasible," said Hermann Issa, ASCA Senior Vice President of Business Development & Project Management, who also designed the solar tree.

The 2.5 m-long solar modules of the 6 m-high installation are made of organic solar films. ASCA laminated these with polycarbonate in cooperation with BGT Bischoff Glastechnik.

ASCA prints the organic photovoltaic cells (OPV) onto thin films using a special process. Green-coloured OPV films were used for the solar tree but the films can also be produced in blue, red and grey. The flat steel components of the solar tree were manufactured by the Kirchknopf metalworking shop, which also handled the onsite installation.

"The overall design of solar modules and steel elements takes up the formal language of the surrounding buildings' design and reflects the innovative character of the residential complex," said Issa.

In addition to designing the system, ASCA also planned the system integration. The solar tree stands on the ceiling slab of an underground parking garage, where the other system components, such as the inverter, are located. If no e-bike is connected to the charging station, the electricity is used for the general power of the underground garage and the outdoor area.

The energy tree was created as part of a competition held by Löchgau.

Image credit ©ASCA

"To implement a tree that provides energy, we found an excellent partner in ASCA, who had already created a concept proposal for us after only two meetings," said Maren Gerhäusser, who was in charge of the solar tree at STRENGER. "Our cooperation with ASCA was excellent as it also was with the Kirchknopf metalworking shop, which supplied the 'trunk' and the 'branches' of the tree."

Recyclables facility opens in SA

Claimed as South Australia's largest household recyclables facility, the Southern Materials Recovery Facility (SMRF) was officially opened today (8 November) by Senator Andrew McLachlan during National Recycling Week.

The 6000 m^2 facility is able to process 60,000 tonnes of yellow bin recyclables every year and deploys advanced screening and optical sorting technologies.

Processing 25,000 kg of recyclables every hour including cardboard, plastic and glass, the facility is designed to meet the Council of Australian Government's Export Ban requirements, which ensure waste is processed and reused in Australia rather than being shipped overseas.

Developed as a public-private partnership, the SMRF is a joint initiative of Australian recycling and resource recovery specialist Re.Group and the Southern Region Waste Recycling Authority (SRWRA), which is a joint subsidiary of three South Australian Councils — City of Holdfast Bay, City of Marion and City of Onkaparinga.

The project has been partly funded by the Australian Government through a $5.3 million Community Development Grant allowing the facility to expand beyond processing the recyclables of the three partner councils to also service other regional councils and commercial businesses.

Re.Group Pty Ltd
www.re-group.com

Construction complete on $30m Ipswich wastewater upgrade

Urban Utilities' Vedran Maric and Ipswich Mayor Teresa Harding.

Urban Utilities' major upgrade of the Bundamba Wastewater Treatment Plant in Ipswich, Queensland, has reached a significant milestone, with construction complete on the $30 million project.

Ipswich is considered one of Australia's fastest-growing cities, with the Bundamba plant servicing the wastewater of more than 133,000 people every day.

Urban Utilities Delivery Manager Vedran Maric said the investment in the Bundamba wastewater treatment plant would help futureproof the region.

"As the population grows so does the number of people taking showers, washing dishes, doing the laundry and flushing the loo — that all generates wastewater that needs to be treated once it goes down the drain to protect our environment," he said.

"We have been busy maintaining the 3400 km pipe network in Ipswich, but it's also important we lay the foundations down for the future.

"The Bundamba wastewater treatment plant upgrade is an essential part of supporting the region as it grows."

Maric said the project involved renewing and upgrading several important pieces of infrastructure at the plant, including the inlet works where solids are screened out of wastewater.

"The inlet works are a vital part of the treatment process. The upgrade also included raising our critical equipment above the 2011 flood level to protect against future flooding," he said.

"Around 16 million litres — or six Olympic swimming pools — of wastewater is treated at our Bundamba plant every day, so it took a lot of careful planning to ensure the plant remained operational while we completed this significant upgrade."

Maric added that the project, delivered by partner Ventia, also included the installation of a new 50 tonne switchroom.

"To make the process as safe and efficient as possible, we built the pre-fabricated switchroom — which weighs the same as about 10 elephants — off site and moved it into position with a 350 tonne crane," he said.

"Supporting local businesses and jobs, especially during the ongoing pandemic, was also a really important part of the project.

"We spent around $1.2 million at Ipswich businesses on materials alone, with everything from our pipes and concrete to our sand and gravel purchased locally."

Ipswich Mayor Teresa Harding said she was pleased to see Urban Utilities supporting the local economy through the upgrade.

"Major projects like this are important economic drivers for the city as they support development and jobs," Cr Harding said.

"With approximately 325,000 additional residents set to join Ipswich by 2041, now is the time to invest in our city's infrastructure."

Urban Utilities

www.urbanutilities.com.au

2022 Victorian Water Industry Operations Conference & Exhibition

© Stock.Adobe.com/au/Pixel-Shot

Organised by the Water Industry Operators Association of Australia (WIOA), the 2022 Victorian Water Industry Operations Conference & Exhibition is an operationally focused 'must see' annual event for the water industry.

Being held from 23–24 June at the Bendigo Exhibition Centre, the conference aims to promote best practice in water management by building the knowledge, skills and networks of operators.

Features include:

- More than 20 speakers over two days on a range of topics relating to the water industry.
- Latest solutions for the water industry on display including many from the world's leading companies.
- Ixom 2022 Best Tasting Tap Water in Victoria competition.
- Victorian Main Tapping competition.
- Listen to the experience of others through the latest operational, technical and research through presentations.
- View and discuss the latest advances in technical equipment, products and services with suppliers and trade consultants.
- Update knowledge and skills through interaction with fellow water industry employees.

WIOA Conferences and Exhibitions provide a platform for attendees to meet and liaise with leading figures in the water industry and gain insights in the latest technological developments.

The event is suitable for anyone working in the water industry, such as an operator, manager, engineer, consultant or professional, or anyone who has an interest in water.

The exhibition is free to attend for anyone with an interest in the water industry, such as plumbers, miners, food and beverage employees and contractors.

For further information about the 2022 Victorian Water Industry Operations Conference & Exhibition, visit: wioaconferences.org.au/vic-2022/.

Mornington battery project a step closer

Renewables company Maoneng has received development approval for its proposed 240 MWp/480 MWh Battery Energy Storage System (BESS) in Mornington Peninsula.

The $190 million, standalone facility to be located adjacent to AusNet's existing Tyabb substation is scheduled for completion in mid-2023.

Mornington Peninsula is subject to fluctuations in demand for electricity, primarily as a result of seasonal tourism, according to Maoneng. "Battery storage is one form of demand response and while this project cannot guarantee outage prevention alone, it will contribute to improving regional electricity reliability."

The Mornington BESS project aims to improve electricity grid reliability and network stability by drawing energy from the grid during off-peak periods for battery storage and dispatching energy to the grid during peak periods, generating power for the equivalent of 40,000 average Australian homes.

An engineering, procurement and construction contractor is scheduled to be announced in the coming weeks, and the project is expected to generate up to 160 full-time equivalent jobs during its 12-month construction phase, supporting local businesses and the economy. It will also provide ongoing employment for a small team required to provide ongoing maintenance after the project is built.

The facility includes a range of components including but not limited to: batteries housed within fully enclosed battery containers, with associated inverters and transformers and an underground cable network; medium voltage (MV) switchroom; a control and operation room; onsite 220/33 kilovolt (kV) substation; an overhead transmission line (comprising up to 7 lattice towers, 40 m high) connecting the substation to the adjacent Tyabb substation; internal 4 m noise (acoustic) barriers; security infrastructure; and fire safety equipment.

Maoneng Co-founder and CEO Morris Zhou said, "The Mornington BESS will be a vital piece of local infrastructure that will benefit the local economy in several ways.

"It will help stabilise the network and manage periods of peak demand when local companies and households really need reliable electricity.

"There are also commercial opportunities during construction, and more work on the supply chain will begin soon as our contractor comes on board and begins the process of hiring individuals, companies and equipment suppliers as the project gets up to speed."

The project will support the Victorian Government's objectives of improving the reliability of regional electricity in an area that is particularly exposed to fluctuations in demand, and supporting renewable energy projects.

Tyrecycle launches $10m tyre recycling plant

Federal Minister for the Environment Sussan Ley has unveiled a new $10 million state-of-the-art tyre recycling facility at Erskine Park in Western Sydney.

Tyrecycle CEO Jim Fairweather said the plant will be able to sustainably process the tens of thousands of tonnes of tyre waste that were previously being sent offshore to poor environmental outcomes.

"It represents a massive win for the environment and for Australia's circular economy, in that end-of-life tyres will now be given a new lease on life," Fairweather said.

The plant will transform the waste tyres into quality products for re-use, including tyre-derived fuel and rubber crumb for use in roads, tile adhesive and sporting surfaces.

The plant has the capacity to produce 10,000 tonnes of rubber crumb and generate 40,000 tonnes of tyre derived fuel (TDF).

"It reflects a significant step forward in Australia responsibly dealing with its own tyre waste, driving strong environmental and economic outcomes."

Construction of the plant was supported by a $1.5 million grant for phase 1 and a further $2.9 million for phase 2 from the Recycling Modernisation Fund, as part of the transformation of Australia's waste and recycling capacity.

"The Morrison government's $190 million commitment is being matched by states and territories, and business is backing it in with unprecedented spending," Minister Ley said.

"Australians are doing their bit through domestic recycling, but as a nation we need to create more opportunity for recycled content and better ways of processing.

"Tyrecycle's new plant will process some of the 56 million tyres that reach their end of life on Australian roads each year.

"The Morrison government is sending a clear signal for change with the third tranche of our waste export ban last week closing the door on the shipping of seven million baled tyres to overseas markets each year."

Tyrecycle

www.tyrecycle.com.au

SMART SOLUTIONS ENABLING SMARTER OPERATIONS

Milad Mostowfivala, Digital Lead, ABB Australia

It's no secret — all operational managers are intensely aware of the urgent need for smarter efficiency. As complexity of managing electrical assets increases across facilities of every size, ensuring reliability of such equipment in the long term becomes crucial both in terms of health of this equipment and in terms of consistent cost saving that this equipment would require while running and in service.

A forward-thinking approach in conducting maintenance practices and optimisation strategies must be adopted to meet such requirements.

When it comes to meeting operational complexity head on, your facility's data is your greatest ally. By transforming data into actionable insights, you can uncover opportunities for improvement, mitigate risk and create more sustainable processes.

Though many are wary of introducing more complexity into operations, the fact is that it's never been easier to harness data that supports your expertise.

How can data help me prioritise maintenance actions?

By clearly communicating asset performance and identifying what needs most urgent attention.

- **Deep dive**: Explore each asset's diagnostics and prognostics and view condition indicators for relevant components eg, environmental, electrical, dielectric, mechanical and thermal.
- **Check condition labels**: Diagnostic algorithms clearly designate each asset's condition, labelling assets from 'Very poor' (mostly failed, urgent action required) to 'Very good'.
- **Prioritise**: Based on condition indications, you can efficiently assign maintenance where there is a higher probability of failure and criticality.

How can data help me predict faults?

By letting you combine historic information with real-time analytics.

- **Continuous condition monitoring**: Sensors constantly monitor for the possible failure causes in your assets. It means you can track things like electro-mechanical performance in circuit breakers and monitor temperature/environmental parameters without having to regularly halt production.
- **Actionable insights**: Used in combination with sensor data, analytics can highlight potential abnormal conditions before failure occurs, eg, alerting operators if trends indicate temperature could rise above a safe threshold. Moving towards predictive maintenance means you're always one step ahead, avoiding high-cost unplanned labour and maintenance and extending asset lifetimes by up to 15%.

How can data empower my team and keep them safe?

By letting you communicate real-time insights to your people, wherever they are.

- **Real-time updates**: Keep operators safe from anywhere with up-to-the-minute insights and data notifications. This allows them to plan in advance, take appropriate action faster and observe the right safety precautions.
- **Remote scheduling**: Analytics and insights allow you to streamline maintenance planning, assign field service and track activities/reporting, so everyone can see exactly what they're doing.

Without your knowledge and expertise, data and insights are nothing but figures on a screen. Data is undeniably powerful but it's your asset management strategy that determines whether assets boost or create a drag on business results.

By placing data at the foundation of your strategy, an asset management solution brings tangible benefits to operations. Its functionality actively extends your insight, acting as your eyes and ears across your entire facility.

Through digital asset management technologies, such as ABB Ability™ Energy & Asset Manager, giving you access to data across asset health, events and alerts, maintenance prescription and documentation, it's truly never been easier to unlock your site's potential and power a more sustainable future.

ABB Australia Pty Ltd
www.abbaustralia.com.au

TWO-SHAFT SHREDDER

The UNTHA ZR two-shaft shredder is designed for waste, wood and metal shredding. The shredder has been engineered for multishift, continuous pre-shredding, even when handling difficult materials some would consider economically unshreddable.

The machine's low-speed, high-torque drive means it can process severe duty applications with ease, for a high level of plant availability. The modular, quick-change cutting table design offers versatility.

The ZR2400H has been engineered for the high-throughput, rough shredding of bulky waste, C&I waste, waste wood, MSW, mattresses, carpets, railway sleepers, bales and rolled goods. Available as a static or mobile machine with crawler tracks, the goal for this model is volume reduction (90% <300 mm), material breakdown for further treatment and alternative fuel production. The cutting system is suitable for cement plants, operators in the biomass and energy recovery industries, MRFs, sorting and waste disposal firms.

The ZR2400W is suitable for metal scrap shredding, and also excels in the processing of WEEE and large domestic appliances. Again, the goal is to achieve a rough material breakdown for downstream sorting, making the machine suited to metal processors, recyclers, and aluminium and metal manufacturers.

Both pre-shredders are also supplied with the UNTHA Eco Power Drive with water-cooled synchronous motors — an energy-efficient concept.

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SINGLE BOARD COMPUTER

The iBase IBR215 2.5″ single board computer has an NXP ARM Cortex-A53 i.MX 8M Plus Quad 1.6 GHz Processor.

Measuring 105 x 72 mm in a compact footprint, the SBC offers good computing performance, advanced multimedia, flexible connectivity and a variety of interfaces, making it suitable for industrial automation, smart home and buildings, smart cities and factories, retail environment, machine learning and industrial IoT applications.

The IBR215 features multiple display interface (HDMI and dual-channel LVDS), a 5G-compatible M.2 3052 socket, 3 GB LPDDR4 system memory, up to 64 GB eMMC flash memory, external I/O including one HDMI 2.0a, two USB 3.0, two GbE RJ45, one USB OTG and an SD socket, as well as internal headers for two I²C and DC power. Three 2 x 20 headers onboard connect communication and GPIO signals to the IBR215-IO expansion board to provide interfaces for an M.2 E-key socket, a mPCIe socket, one RS232/422/485 port, two USB 3.0, dual-channel LVDS with backlight control, two CAN bus and two MIPI camera serial interface.

The IBR215 also has a wide operating temperature range of -40~85°C when built with a heat sink or housing with efficient heat dissipation.

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From waste to worth for Australian mushroom growers

The Growth Drivers (TGD) is an Australian design consultancy firm solving some of Australia's complex problems, and on 11 October it received an award from Good Design Awards in recognition of its strategies to solve a mushroom waste issue.

Australians are wasting around 20,000 tonnes of fresh mushrooms and 250,000 tonnes of mushroom compost every year. The fresh mushroom waste is created when stems are cut in preparation for retail sale, and for every 1 kg of mushrooms harvested, up to 3 kg of unusable spent compost is left behind.

Spent compost is reported to have zero to minimal value to growers while the cost of producing virgin mushroom compost is rising annually.

The solution

Working side by side with mushroom growers and Horticulture Innovation Australia, TGD was able to devise a Mushroom Waste Strategy, which included four unique solutions that have a direct and measurable impact on business performance and convert waste into worth for Australian mushroom growers.

According to TGD Managing Director Dr Scott Needham, the first step on the project was to organise a focus group activity to define the objectives.

"We asked growers what they meant by 'waste', and waste to them was two things: actual edible mushroom waste — what they call subprime or imperfect mushrooms — and what they were throwing away as compost."

The strategy solutions devised included a mushroom compost recycling plan; a compost pelletiser system for allowing easy storage and use of spent compost as an energy source; nutritious mushroom powder product using waste mushrooms; and edible shelf-life extender for fresh mushrooms.

Valuing results over reports, TGD continually tested and iterated the suitability of these solutions to the needs of Australian growers at each step of the development process, from on-farm trials to detailed financial models assessing the ROI of capital expenditure.

For example, this project produced successful results for the recycling of spent mushroom compost back into the production process, a method of production never previously trialled in Australia.

"Scott Needham and the team were really adept at very quickly gaining an understanding of the waste stream challenges facing the industry and producing some really innovative ideas for adding some real value," Australian Mushroom Growers Association (AMGA) Chair and Director Geoff Martin said.

"I'm sure that in the future when some of the economic drivers change that several of the more promising proposals will be taken up by industry."

Good Design Awards celebrate innovative design projects from around the world in all areas of design, architecture, engineering, research and social innovation. During October, it was also announced that The Growth Drivers received another four Good Design Awards for four different projects in addition to the mushroom project — thus winning five Australian Good Design Awards for five nominated projects.

Dr Needham said being recognised by the Good Design Awards for five projects, two of which were awarded Gold, is confirmation of the company's methods and systematic approach to designing real solutions that work.

"I'm really proud of our team and the work we have done with these incredible clients and partners[, and] that we deeply care about making an impact by delivering a result, not just writing an interesting strategy and moving on to the next project; their problem becomes our problem, and we work hard to deliver a result that helps them achieve the growth they are after."

Kerbside waste to be recycled to make tram stops

Recycled plastics from kerbside waste will be used to create modular tram stops in Melbourne as a part of the Development of Next Generation Tram Stop Platforms Using Recycled Materials project.

The project is a partnership between Monash University's Institute of Railway Technology, Yarra Trams, Integrated Recycling and Advanced Circular Polymers.

Director of the Monash Institute of Railway Technology Professor Ravi Ravitharan said the project will identify how reinforced recycled plastics can be used effectively to construct a modular platform that can be rolled out on a large scale.

"Our team of researchers will look at a number of suitable options of recycled materials that can be manufactured into a prototype which will then be trial assembled and load tested at the Institute of Railway Technology laboratories," Professor Ravitharan said.

"The development will consider recycled rubber for damping components as well as reinforcement options to achieve the intended design concept."

The project was recently awarded $300,000 by the Recycling Victoria Research and Development Fund — Materials and is delivered by Sustainability Victoria on behalf of the Victorian Government, as part of Recycling Victoria.

The project is an interdisciplinary collaboration between Monash University researchers from the Faculty of Engineering, Faculty of Arts, Monash University Accident Research Centre and Monash Art, Design and Architecture with Monash Institute of Railway Technology.

"This partnership with the Monash University Institute of Railway Technology is just one example of how Yarra Trams is working to make our operations more environmentally friendly. From all our trams being powered by one of Victoria's largest solar farms, to recycled materials being utilised in infrastructure projects across the network, to the ongoing installation of solar panels and energy efficient lighting in our depots, we're playing our part to create a greener and more sustainable Melbourne," said Yarra Trams' Chief Executive Julien Dehornoy.

Integrated Recycling, creators of the Duratrack railway sleeper, will manufacture and trial modular elements of tram stop platforms for testing and prototyping purposes.

"By incorporating waste plastics into the concept design we hope to achieve maximum benefits," said General Manager Stephen Webster.

Plastics recycling technology provider Advanced Circular Polymers will supply the recycled plastic mix recovered from kerbside waste collections that will be used for the production of the base material in the tram stop platforms.

"This collaboration will explore new research and development to add value to recycled plastics through new product innovations. Developing new value-added recycled products with advanced manufacturing is essential for the recycling sector to create demand and secure the supply chain for recycled plastics," said Advanced Circular Polymers Managing Director Harry Wang.

The project outcome will be to deliver a circular economy framework involving a complete supply chain of recycled materials. It hopes to not only offer alternative solutions for tram stop platforms, but also create an awareness of the application of these materials into other industries such as railway platforms, bridges, domestic decking and level crossing panels.

Driving sustainability with eco-friendly asphalt

Stockland Evergreen in the south-east Melbourne suburb of Clyde is set to use more than 19,000 tonnes of Downer Group's road surfacing material known as Reconophalt — a type of asphalt that is designed to be environmentally friendly and not exude harmful fumes.

Similar in look, feel and durability to standard asphalt, the material contains high levels of recycled content derived from waste streams, such as soft plastics, toner, glass and reclaimed road that would otherwise be sent to landfill or stockpiled. In total, the Evergreen project will see 16.9 million plastic bags, 493,000 printer cartridges, 7600 tonnes of recycled asphalt and 2380 glass bottles diverted from landfill — saving the equivalent of 218 tonnes of carbon dioxide and taking 90 cars off the road for one year.

The use of Reconophalt at Stockland Evergreen follows its adoption at stages of Stockland Minta in Berwick and Stockland Katalia in Donnybrook, and builds on the company's commitment to achieve net zero carbon emissions by 2028. The Evergreen Reconophalt project is a collaboration between Stockland, the City of Casey, Downer and Winslow Constructors Australia.

"Downer has invested heavily over the past 10 years to create economic, social and environmental benefits for our customers and their communities by pulling products and not pushing waste," said Downer's General Manager Pavements, Stuart Billing. "We're proud to be partnering with Stockland again and the latest project at Evergreen, which will see yet another community use materials in their roads that would otherwise go to landfill."

Located approximately 59 km south-east of the Melbourne CBD, Stockland Evergreen is planned to support a residential community of approximately 1500 families, providing proximity to existing shops, schools and childcare in the local Clyde and Cranbourne areas. The community also has a connection to the Peninsula and Monash freeways, the Mornington Peninsula golf courses, off-road walking and riding paths, as well as the planned future Clyde Regional Park and Sporting Precinct.

"Reconophalt is one of many projects we will be introducing at Stockland Evergreen to ensure we're being as kind to the environment as possible while also setting up our families for a bright future," said Stockland Project Director Kerry Balci.

"The new community will also feature shadeways on the main thoroughfares to absorb and reduce heat retained by the pavement, and drainage reserves throughout the community will be used to store and reuse drain water. We're also encouraging residents to install cool roofs in their homes to improve natural heating and cooling in their homes.

"We continue to see growing demand for residents to create their future home in the booming area of Clyde. We're looking forward to providing our future residents with a variety of different lifestyle options to grow in a community that is carefully designed to meet their needs."

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