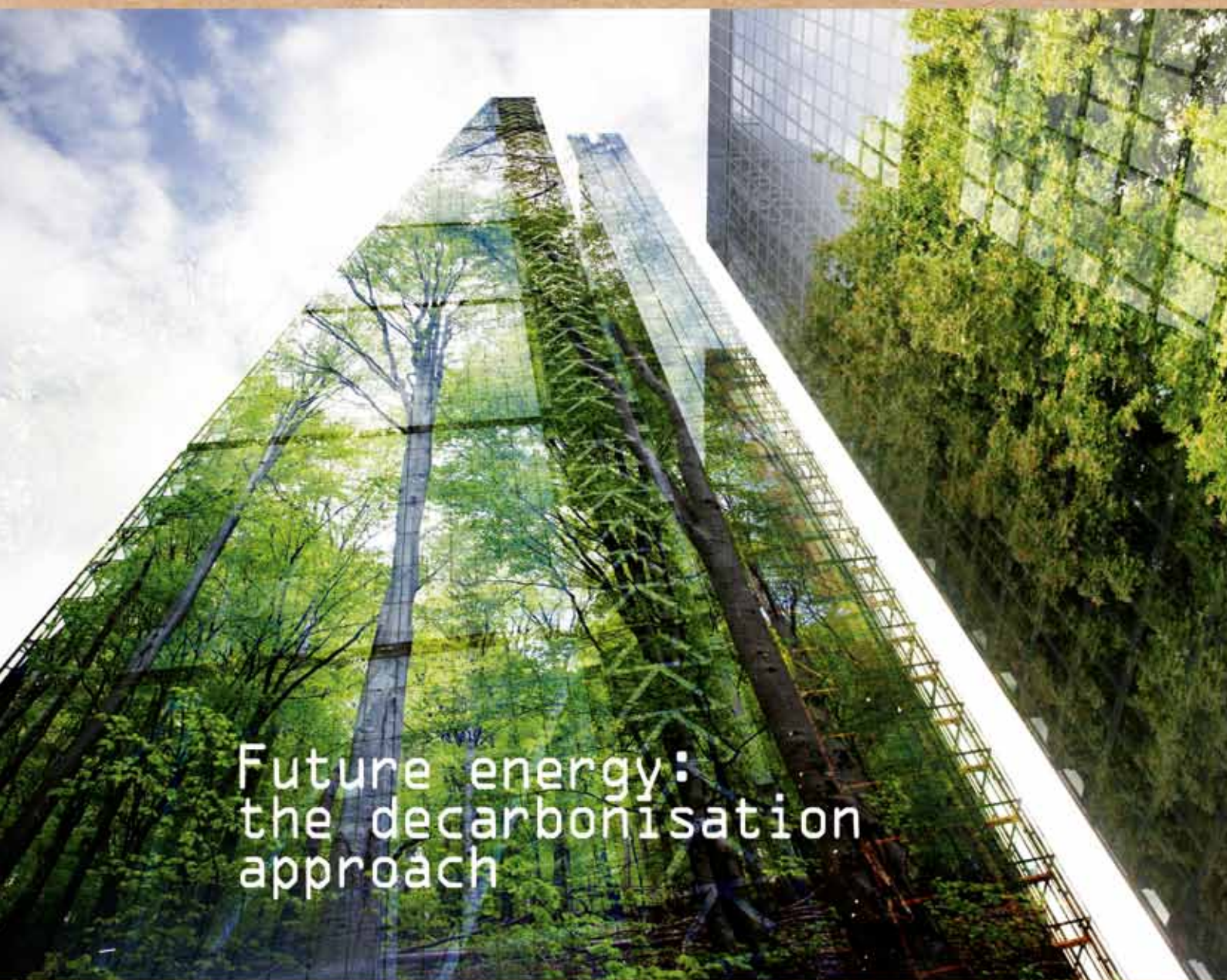


SM

Jun/Jul 2022 Vol.15 No.6
PP100007399

COUNCILS
MANUFACTURING
INDUSTRY
UTILITIES
INFRASTRUCTURE
CONSTRUCTION
RESOURCES

sustainability matters



Future energy:
the decarbonisation
approach

EVs soak up solar ■ Microgrids on the edge ■ Listen for water leaks ■ E-waste crunch

ARBS 2022

AIR CONDITIONING, REFRIGERATION BUILDING SERVICES EXHIBITION

16-18 August 2022 | Melbourne Convention & Exhibition Centre



Source: Explore cutting-edge products

Share: Unrivalled expertise and solutions

Connect: Network with industry leaders

A must-attend event, ARBS 2022 features an outstanding line-up of 200+ national and international manufacturers and distributors. Don't miss your chance to explore the largest range of HVAC+R and building services suppliers, products and solutions under the one roof.

Held over three massive days ARBS 2022 includes access to the highly regarded Seminar Series, now expanded to include the new Intelligent Buildings Technology (IBTech) seminars. The event also incorporates the celebrated ARBS Industry Awards program and gala dinner.

Register online now at arbs.com.au

CONTENTS



6

6 Separating fact from fiction in the EV debate

opinion



8

8 Green hydrogen – critical to global decarbonisation but a challenging investment

sustainable fuel

10 Leading ISC design rating for sustainability outcomes on Pacific Motorway (M1) project

sustainable infrastructure



42

18 MyTown Microgrid – helping edge-of-grid towns in Australia

opinion

21 Sustainability in technology

renewables

25 Major plastics recycling facility benefits from innovative wastewater treatment system

wastewater treatment

26 Could energy-as-a-service be the answer to reduce emissions?

renewable energy

30 The e-waste crunch – why Australian organisations need to move away from a discard mentality

e-waste management

35 Energy Next clean energy expo in Sydney this July

event

42 Australia can help lower carbon emissions in APAC: study

zero-carbon energy

Cover image ©stock.adobe.com/au/Melinda Nagy

Westwick-Farrow Media is committed to using environmentally responsible print services to produce our publications.

This edition is printed on paper 30% recycled and made up from elemental chlorine free bleached pulp which is PEFC™ certified from sustainably managed sources.

It is delivered in a totally degradable plastic wrapper.



FREE TO SUBSCRIBE!

This issue is available to read and download

www.sustainabilitymatters.net.au/subscribe



WORDS FROM THE EDITOR

Australia requires ambitious action to tackle climate change and decarbonise our future energy. After Labor's recent win, Australia's new Prime Minister of Australia, Anthony Albanese (Albo), hit the ground running with his attendance at the Quad meeting in Japan.

At the Quad he confirmed that Australia has committed to a 43% emissions reduction target by 2030 (from 2005 levels) and has a net zero by 2050 target. This is a good start but more work is needed to drive action to incorporate large-scale renewable technologies into the grid and encourage the growth of electric vehicles.

By comparison, the three other Quad states' climate targets are: the US is cutting its emissions 50–52% by 2030 (from 2005 levels), is on track for 100% clean electricity by 2035 and has a 2050 net zero target; Japan has a 46% emissions reductions target for 2030 (from 2005 levels) and is committed to net zero by 2050; and India has a net zero by 2070 target and is committed to a 30–35% emissions intensity cut by 2030 (from 2005 levels).

In this issue, we separate fact from fiction in the EV debate and take a closer look at the benefits and challenges of vehicle-to-grid adoption. Also under discussion is a community-first, data-driven approach to microgrid feasibility and the critical role green hydrogen could play in the global decarbonisation.

Carolyn Jackson

sm@wfmedia.com.au



This magazine is

FREE

to industry and business professionals

www.WFMedia.com.au/subscribe



Westwick-Farrow Media
A.B.N. 22 152 305 336
www.wfmedia.com.au

Head Office
Unit 7, 6-8 Byfield Street,
(Locked Bag 2226)
North Ryde BC NSW 1670,
AUSTRALIA
Ph: +61 2 9168 2500

**If you have any queries regarding
our privacy policy please email**

privacy@wfmedia.com.au

Editor
Carolyn Jackson
sm@wfmedia.com.au

Publishing Director / MD
Geoff Hird

Art Director/Production Manager
Julie Wright

Art/Production
Colleen Sam, Linda Klobusiak

Circulation
Dianna Alberry
circulation@wfmedia.com.au

Copy Control
Mitchie Mullins
copy@wfmedia.com.au

Advertising Sales
Industrial Group Sales Manager
Nicola Fender-Fox
Ph: 0414 703 780
nfender-fox@wfmedia.com.au

Sandra Romanin
Ph: 0414 558 464
sromanin@westwick-farrow.com.au

Tim Thompson
Ph: 0421 623 958
tthompson@wfmedia.com.au

Subscriptions

For unregistered readers price on application.

Printed and bound by Bluestar Print

Print Post Approved PP 100007399
ISSN No. 1834-917X

All material published in this magazine is published in good faith and every care is taken to accurately relay information provided to us. Readers are advised by the publishers to ensure that all necessary safety devices and precautions are installed and safe working procedures adopted before the use of any equipment found or purchased through the information we provide. Further, all performance criteria was provided by the representative company concerned and any dispute should be referred to them. Information indicating that products are made in Australia or New Zealand is supplied by the source company. Westwick-Farrow Pty Ltd does not quantify the amount of local content or the accuracy of the statement made by the source.

BIG AIR POWER



**ENERGY SAVING
PERMANENT MAGNET
TECHNOLOGY**

UP TO 50% ENERGY SAVINGS for sustainable Australian Industry

Kaishan's revolutionary range of PMV Rotary Screw Compressors deliver up to 50% energy cost savings over conventional compressors with equal or greater output.

From 250 to 15kW, these advanced machines utilise systematic optimisation of the airends through permanent magnet drive motors and variable speed drive technology to achieve higher efficiency at all operating speeds.

Advanced 2-Stage technology generates more air and ensures longer bearing life.

- Controlled air output to meet demand
- No start-up spikes and cost penalties
- Reduced part load energy consumption
- Significantly lower noise levels
- Lower maintenance requirements

WE HAVE THE RIGHT COMPRESSED AIR SYSTEM FOR EVERY APPLICATION

From heavy industry to small workshop applications, we offer energy efficient compressors backed by 24/7 Australia wide support and service.

'Ask how you can upgrade to a cost saving, advanced compressed air supply'



KAISHAN COMPRESSORS
National Sales and Service

1300 098 901

www.kaishan.com.au

KAISHAN
COMPRESSORS

Separating fact from fiction in the EV debate

When it comes to electric vehicles (EVs), debates often abound on issues like electricity grid stability, vehicle reliability, infrastructure suitability and whether these vehicles are truly emissions-free. Some pundits claim there will be dire, widespread consequences of abandoning traditional combustion vehicles, claims which have so far been unsupported in other countries. Others discuss how the sooner we make the transition, the better positioned we are to meet our net zero ambitions. So, what's the truth behind all these claims?





EVs will soon be able to act as mobile energy storage units which will in turn prove to benefit the balancing of grid demands.

Nobody's buying them

It's true that battery EVs made up just 1.95% of the new car market in 2021 compared to the global average of 6.3%, but this number is rapidly growing. In 2021, in the midst of a global pandemic and with all states locked down, Australians purchased three times more EVs than they did in 2020.

Major automotive manufacturers are overwhelmingly moving to electric-only in the future, which will further push EVs to the forefront and limit the ability in the long term to purchase an internal combustion engine (ICE) vehicle. They're setting the future agenda of vehicles, and it's overwhelmingly electric.

There's no government directive

Both sides of politics are now on board with electric vehicles. Labor's Chris Bowen, for one, took a 400 km road trip in a Tesla, showcasing the car's use as a weekend adventurer.

The Coalition was a recent convert to the EV revolution, investing \$250m into the 'Future Fuels and Vehicles Strategy', which includes funding for the installation of charging infrastructure Australia-wide. Australia hosts more than 3000 charging stations, and this number will continue to grow.

The Labor government is now planning to introduce an Electric Car Discount on 1 July 2022 to make EVs cheaper.

Petrol is reliable

The argument that traditional emissions-intensive fuel sources are more reliable, both in availability and price, was thrown into doubt. The recent sanctions and embargoes enforced upon Russia have increased the price of petrol around the world. Australian petrol prices going up 16.8% on the yearly average as a result.

The costs to charge an electric vehicle are tied to our electricity prices, however, and this remains relatively consistent and predictable. Furthermore, Australia's electricity market is largely homegrown with an increasing reliance on renewables as part

of the energy mix, meaning costs and availability are less prone to geopolitical turmoil.

Electric vehicles are powered by coal

Yes, coal still supplies the majority of Australia's electricity, but this won't last forever. Already, renewables provide nearly a quarter of the electricity mix across the country, and more projects are on the horizon. All Australian state and territory governments aim to deliver net zero by 2050, including a 55% renewables target by 2030. The ACT met its 100% renewable electricity supply in 2020. EVs are also more than three times as efficient as a gasoline engine — even if the current renewable/fossil fuel energy mix were to remain, EVs would still be better for the environment.

EVs will shut down the grid

Many will argue that, in a mass transition to electric vehicles, the grid cannot sustain the growth in power demand. The Labor Party believes 89% of new cars sold by 2030 will be EVs. This will result in a much higher electricity demand on the grid, and 'peak hour' charging is likely to be disruptive to the grid with no mitigations in place.

Furthermore, manufacturers continue to innovate with EV technologies in interesting ways. Intelligent charge management systems allow people to inject power from their EV back into the grid, to power their home, or workplace. Vehicle-to-grid (V2G) technology optimises grid usage, storage and battery life. As such, EVs will soon be able to act as mobile energy storage units which will in turn prove to benefit the balancing of grid demands. Cloud-based orchestration manages the grid burden by adapting

the timing and intensity of EV charging to balance the demand.

EVs are unreliable long-distance

The short-range EVs that we were originally warned about are now history. The median range on an EV has increased from 280% to 330% since 2011, from a range between 110 and 151 km in 2011 to between 420 and 650 km now — at the minimum a fully charged vehicle can now get you from Sydney to Merimbula or Tamworth on a single charge.

Apartment living makes EV charging at home impossible

As with all new technologies, adapting existing infrastructure to suit is necessary. New apartment constructions could fit garages with intelligent charging capabilities, and existing garages can be retrofitted to support.

But as private enterprise invests more heavily in green pursuits, and as chargers do not create emissions, we'll see more creative uses of charging infrastructure across Australia. People can and will charge their cars at work, at train stations, while shopping or while having dinner at a restaurant. A huge economic opportunity exists for companies hoping to modify existing unused parking spaces to capitalise on the rapid rise in EV popularity; they can bill customers for charging spaces or instead use the charging facilities as a beacon for drivers to charge while they shop or eat, as the Four Seasons Hotel has done in Ireland, for instance.

There's a lot of discussion around EVs, particularly in a nation where the EV era is still in its nascent stage. Sifting through the rhetoric to find the truth is always a challenge, but there are indeed facts to uncover when it comes to the electric vehicle debate.



Jamie Ayers is a Director, Australia and New Zealand, for ENGIE Impact, which brings together a wide range of strategic and technical capabilities, to provide a comprehensive offer to support clients in tackling their complex sustainability challenges from strategy to execution.

Nanuk Asset Management (Nanuk) has detailed in a recent webinar presentation to Australian financial advisers the challenges facing green hydrogen that limit its current investment potential.

Green hydrogen is hydrogen generated by renewable energy or from low-carbon power and is seen as being crucial to achieving net zero carbon emissions.

Australian asset manager Nanuk invests in industries related to global sustainability and resource efficiency. Green hydrogen is an area of focus for the company, but currently not an area of significant investment.

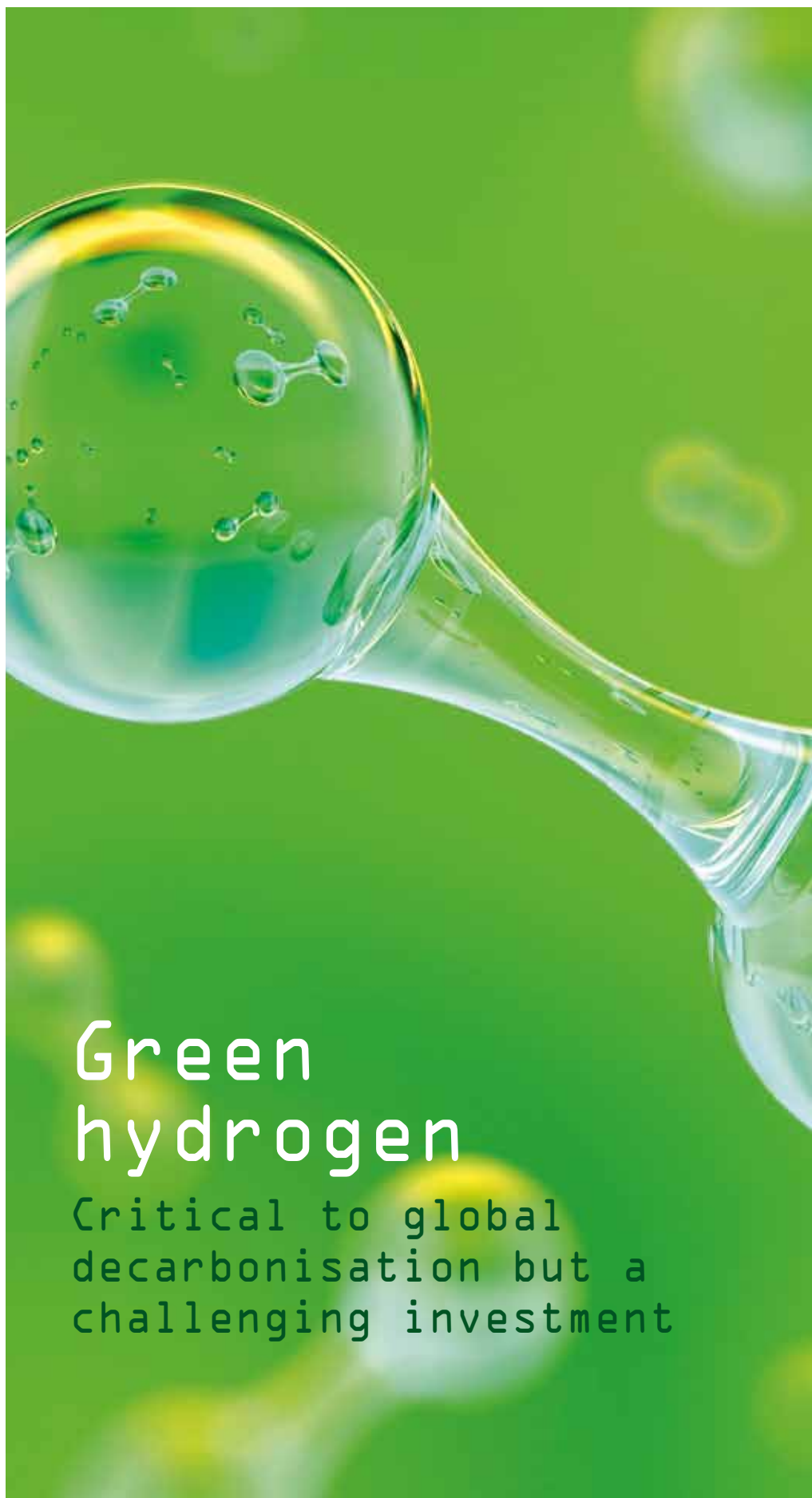
The Chief Investment Officer of Nanuk, Tom King, said his company's research is directed towards identifying sustainable businesses that are both benefiting from evolving industry trends and have attractive investment return potential.

"If the world is to reach net zero emissions, green hydrogen will eventually play a significant role, but similarities with other sustainable technologies suggest that it is unlikely to deliver strong investment returns," King said.

"While interest in green hydrogen has increased significantly, the high costs of producing and transporting green hydrogen and the lack of infrastructure render green hydrogen uneconomic today without significant subsidies."

According to King, "At present, green hydrogen is substantially more expensive when compared to hydrogen that is produced from fossil fuels, and substantially more expensive as a source of energy than natural gas. Achieving widespread adoption relies on very significant cost reduction over time.

"Furthermore, the capital intensity and relatively low barriers to entry mean that most companies involved in the hydrogen value chain are unlikely to live up to high expectations for future growth and profitability. In the short term the most likely beneficiaries of government funding programs for hydrogen projects are likely to



Green hydrogen

Critical to global decarbonisation but a challenging investment



To make green hydrogen an economically viable solution requires the industry to achieve massive economies of scale, requiring billions of dollars of investment in both production capacity and infrastructure.

be the developers of large-scale projects for on-site usage, a space dominated by the incumbent industrial gas leaders such as Air Products and Chemicals and Air Liquide, in which [Nanuk] currently holds a position.”

Intergovernmental Panel on Climate Change (IPCC) highlights challenges with hydrogen

The report by the Intergovernmental Panel on Climate Change (IPCC) released last month warns global warming is headed for dangerous levels. The IPCC says limiting global warming will require deploying alternative fuels such as hydrogen but the 2913-page report also highlights the significant challenges facing the production and use of hydrogen.

King said: “Hydrogen’s lower energy density and very low boiling point mean that it attracts significantly higher transport and storage costs, especially when compared to natural gas. The reality is that hydrogen will only be viable in applications where electrification is not possible. We are very unlikely to be using hydrogen to heat our homes or fuel our cars.

“That said, in the absence of cheap and scalable carbon capture and storage, there is no viable alternative to decarbonise many parts of the economy and hydrogen will inevitably play a significant role in decarbonising industrial processes and as a fuel or for making fuels for shipping and air transport. Governments across Australia have recognised this shortfall and their increased investments play an integral role in overcoming these economic challenges.”

King highlighted the significant need for capital investment by governments and industry to produce affordable green hydrogen.

“To make green hydrogen an economically viable solution requires the industry to achieve massive economies of scale, requiring billions of dollars of investment in

both production capacity and infrastructure. It will also require staggering levels of investment in renewable energy generation, over and above what is required to decarbonise existing electricity supply.

“In order to achieve the widespread adoption of green hydrogen in the multitude of applications necessary to reach net zero targets, we are eventually going to need a high carbon price.”

Potential sectors and industries for future growth

Alongside his assessments of the investment potential of green hydrogen, King has also highlighted other sectors and industries likely to experience significant growth.

“Green hydrogen is far from the only solution available to decarbonise industry. The use of gas for heating in both buildings and industrial processes will largely be replaced by electrified heating solutions rather than hydrogen, and the substitution of high carbon emission products and feedstocks with more sustainable alternatives will also play a significant role. Where that is not possible then carbon capture and storage will also be used on a widespread basis, and unless things take a significant turn for the better, inevitably we are also going to rely of carbon sequestration to limit and control the level of greenhouse gases in the atmosphere.

“In terms of capitalizing on the decarbonisation trend we see more attractive investment opportunities today in less hyped areas such as insulation and more energy-efficient heating and cooling technologies. This is consistent with our general approach over the past year or so which has been to focus on less prominent sustainable technologies and solutions where growth may be lower but is accelerating and valuations have been far more attractive — in areas like paper-based packaging.”

Leading ISC design rating for sustainability outcomes on Pacific Motorway (M1) project



©stock.adobe.com/au/Manu Nair

Integration of sustainable design and construction methodologies achieves the Queensland Department of Transport and Main Roads (TMR) first 'Leading' IS Design Rating for a road project.

The Pacific Motorway (M1) is a vital transport link between Queensland and the southern states, carrying interstate freight, tourist and commuter traffic. The 10 km section of the motorway between Varsity Lakes (Exit 85) and Tugun (Exit 95), known as VL2T, currently carries around 90,000 vehicles each day and is frequently congested during both weekday and weekend peak periods. Traffic demand for this section of motorway is growing and by 2026 is expected to exceed 100,000 vehicles each day. The Australian and Queensland Governments have been progressively upgrading the M1 in line with

the Pacific Motorway Nerang to Tugun Masterplan with this section being one of the highest priorities.

TMR awarded SMEC the design contract for the Varsity Lakes to Burleigh (VL2B) section including Burleigh Interchange (Exit 87). This two-kilometre section of the M1 upgrade included widening the motorway to a minimum of three lanes in both directions and upgrading Exit 87 to the Gold Coast's first Diverging Diamond Interchange.

With a commitment to sustainable infrastructure development, the SMEC team worked collaboratively with TMR to ensure sustainable practices were embedded within the project. SMEC undertook the preliminary and detailed design with consideration of two key principles.

Firstly, addressing the surrounding environmental values including Tallebudgera Creek and Reedy Creek, and the Burleigh to Springbrook bioregional environmental

corridor, and secondly, encompassing the Infrastructure Sustainability Council (ISC) Rating Scheme.

The project team's design sustainability initiatives for VL2B included:

- concrete fracturing — an ISC-verified Australian-first innovation;
- invertebrate sensitive road design — an ISC-verified Australian-first innovation;
- retention of Reedy Creek Flyover — significant reduction in material use resulting in environmental, social and economic benefits.

"These sustainability initiatives enabled the VL2B project to be awarded a 'Leading' IS Design rating from ISC," said Jo Davis, Manager – Environment QLD/NT, SMEC. "This is the first time a TMR road project has received the rating and this success was made possible by the integration of sustainable design and construction methodologies and collaboration between the SMEC team and TMR."

sulting in the practice being adopted across the VL2T project.

Utilising these techniques provides numerous benefits for the community and the environment. It led to the reduction of waste being sent to landfill and associated greenhouse gas emissions, a reduction in construction time and associated gas emissions, increased safety levels for the travelling public and it avoided the exposure of weaker sub-grades to elements such as inclement weather.

to be replaced with a new two-lane bridge. SMEC reviewed the traffic modelling and determined a single lane would be sufficient to service the ramp metering upstream, and the change to lane requirements introduced the potential to utilise the existing bridge structure. However, there were concerns regarding cracking in the pier head stocks which had restricted the load capacity for the structure. SMEC's material team sought to rehabilitate the existing bridge to significantly reduce construction costs and provide a sustainable outcome by reducing waste and the use of new materials.

The SMEC materials team undertook integrity inspections and analysis to determine the residual design life and load capacity, and determined the work required for rehabilitation of the structure. The carriageway alignment was redesigned for the M1 widening under the structure with the road barriers upgraded around the piers.

"The SMEC and TMR project team had the breadth of experience to challenge the design, and by utilising expert knowledge in SMEC's material team, retained a major piece of infrastructure with a significant sustainability outcome and cost savings," said Guy Porter Technical Principal – Roads and Highways Gold Coast.

Knowledge sharing ensures project consistency

Throughout the project, sustainable initiatives were integrated into design and construction methodologies by SMEC's team. To ensure consistency across the entire project, with a commitment to sustainable infrastructure development, SMEC's engineers and Infrastructure Sustainability Accredited Professionals (ISAPs) shared knowledge of design development of these first two packages with the other two design packages of the VL2T project.

"Knowledge sharing is critical to building relationships and fostering collaboration," said Kirryn Crossman, Team Leader – Roads & Highways Gold Coast. "Sharing expertise assists in aligning and achieving project goals, while ultimately delivering an efficient, sustainable and safe transport corridor for the ever-growing region."

SMEC

www.smec.com/en_au

Australian-first concrete fracturing technique

Typically, during road upgrade projects, existing concrete road base and sub-base materials are removed and taken to landfill to be disposed of or, in some cases, sent to a recycling facility before the new road is then constructed. During the design process for the VL2T project, the team considered and analysed concrete fracturing methods which enabled existing materials to remain in situ with the goal of reducing the amount of waste removal on the project.

"The techniques we considered included pavement rubblisation and 'crack and seat'," said Pablo Balmaceda, Technical Principal – Pavements, SMEC. "Although these techniques had previously been utilised overseas, they were yet to be adopted in Australia."

The project team trialled the process on sections of the corridor, confirming the feasibility of the fracturing processes, re-

Design targets remediation of vulnerable butterflies' habitat

A road design sensitive to threatened species was a key aspect of the project. Two butterfly species were identified as being rare and vulnerable to this area of the Gold Coast — the Richmond Birdwing Butterfly and the Swordgrass Brown Butterfly.

The Queensland Department of Environment and Science identified the decreased presence of the Richmond Birdwing Butterfly due to habitat loss and fragmentation, and that permanent populations of the species no longer exist in the Brisbane area. The Swordgrass Brown Butterfly, which was once common in the Gold Coast region, was almost extinct in Queensland and listed as vulnerable in New South Wales.

The project team sought to mitigate the threat to these species by targeting the remediation of habitat loss of threatened butterfly species through landscape design. Host plants were included in the landscape design to facilitate the reintroduction of these vulnerable species. Design for invertebrate habitat enhancement was assessed as an Australian first as part of the IS Design Rating submission and verified by ISC.

Retaining the Reedy Creek Flyover

The reference design proposed the demolition of the existing Reedy Creek Flyover bridge



Soaking up solar: EV Grid trial underway



One of the challenges with managing an electricity network these days is high volumes of solar energy during the day. In April, the EV Grid trial commenced to look at the role EVs can play in soaking up this excess energy and improving the stability of the grid.

According to Jemena Networks Executive General Manager Shaun Reardon, electricity networks are working to prepare for increasing amounts of renewable energy coming into the grid, as well as a rapid influx of EVs.

"As part of the EV Grid trial, we're running the first of what we're calling 'solar soak' events, where we're asking more than 170 households across Victoria, Tasmania and the ACT to charge their vehicles during the day," Reardon said.

"We're doing this both to understand the impact of EV charging in absorbing surplus electricity and helping manage grid voltage, and to test what works in engaging with customers to make this happen."

Australia has the highest uptake of solar technology in the world, with about 30% of homes having rooftop solar photovoltaic (PV) systems.

"While increasing numbers of homes with rooftop solar is a great thing for reaching Australia's emissions reduction targets and reducing household electricity bills, it can pose a challenge for network operators managing the energy grid at the local level," Reardon said.

"As a network operator, we're concerned about managing two main technical issues with large amounts of solar coming into the grid during the day: voltage spikes and overloading substations."

As part of helping Australia shift to renewables and lower emissions, Jemena and other electricity networks are working

to manage this in a way that minimises the amount of time they need to restrict individual customers from being able to export energy to the grid.

"What we're trying to see through this trial is how we can work with our customers to marry up the time they charge their EV with a time when there's a surplus of energy coming into the grid, and what the impact will be," Reardon said.

"EVs need a significant amount of electricity to charge over a number of hours, in comparison to household appliances like ovens or clothes dryers which can be more intermittent in use.

"Charging EVs during a sunny day could potentially both benefit the customer when it comes to their energy bill, as well as improve grid stability."

The EV Grid trial links to a broader suite of solar energy initiatives for Jemena, which includes substation upgrades and improving grid management through increased use of near real-time data from smart meters.

It will include several 'solar soak' days, as well as trialling smart charger technology which enables a driver to plug their car in when convenient, but defers charging to when there's more capacity in the network.

Jemena's partners in the \$3.4 million, 12-month EV Grid trial are Ausnet and United Energy in Victoria, TasNetworks in Tasmania, Evoenergy in the ACT and EV charging infrastructure company JetCharge. The trial is co-funded by the Australian Renewable Energy Agency (ARENA) under the Advancing Renewables Program.

Jemena

www.jemena.com.au

FINANCIAL REVIEW

— Corporate Subscriptions —

Every carbon challenge comes with opportunity.

The transition to net zero will have enormous impacts on every sector. Keep your business informed as the dynamic shifts with our new section, Carbon Challenge. It's the essential guide to Australia's energy transition.

Save 20% off the standard price with a Corporate Subscription.



Team licence

Access for teams of 5 or more

\$559

per person billed annually*

Benefits

- ✓ Unlimited Premium Digital access
- ✓ Annual invoicing
- ✓ Sydney-based customer service team
- ✓ Subscriber discounts and benefits

*Minimum of 5 people



Enterprise licence

Access for everyone within
your organisation

\$440

per person billed annually**

Benefits

- ✓ Everything you get from a Team licence
- ✓ Entire company access
- ✓ Volume discounts
- ✓ Easily add a revoke users
- ✓ Launching soon: user reporting

**Minimum of 20 people

» Contact our team to learn more.
corporatesubscriptions.com.au





Sustainable cities are constantly evolving

Stephen Taylor, Australian Cities Director, Arcadis

What makes a sustainable city? And I don't mean sustainable as in green — I mean sustainable in the longevity, futureproofed sense. The kind of city people want to live in and would move states or countries to make their home. The kind of city where people can prosper and indulge in everything that life has to offer.

Set your scepticism to the side for one moment. There are cities that are well on their way to achieving this — and those that aren't have something to aspire to. We should all be able to live in a sustainable city.

To this end, since 2015 Arcadis has looked at 100 cities around the world through the lens of people, planet and profit to inform our Sustainable Cities Index.

Cities are absolutely vital. More than half of the global population lives in cities and this is projected to grow to two-thirds by 2050. By ensuring the sustainability of our cities, we can focus effort to benefit the greatest number of people.

In Australia, around half of the population lives in the east coast cities of Sydney, Melbourne and Brisbane. It's no coincidence that these are the three cities that feature in our index. It's also no surprise — at least to urban planners and urbanists — that the

Australian cities largely sit in the middle of the pack of the 100 assessed.

Overall, Sydney came in at number 33, followed by Melbourne at 60 and Brisbane at 64. I can hear you ask, how can this possibly be? Australian cities are amongst the most beautiful and clean in the world. Other indexes proclaim Adelaide and Melbourne as amongst the most livable. However, the Sustainable Cities Index looks at a more complex matrix of 28 indices to reveal a more holistic measure of what makes a city sustainable.

Amongst the many, we look at air pollution, green spaces, energy consumption and renewable energy share, and access to sustainable transport. There is the cost of broadband and Wi-Fi, rates of education, access to health care, income inequality. We factor in ease of doing business, economic development, employment rates, green finance and job quality.

International cities in competition with each other for the best talent in the world continually improve on these metrics.

The fact of the matter is, we've been trading on our natural assets for such a long time, that we've failed to keep up. The OECD has a tool that allows you to check how OECD countries rate on different factors of attractiveness for migrants. Unsurprisingly, Australia rates highly for quality of life. We don't rank

quite as well in other areas including quality of opportunities or income and tax.

However, just focusing on those two areas won't necessarily shift the dial on the attractiveness or sustainability of our cities. What our Index clearly demonstrates is that there's no "one thing" that makes a city great because our cities are continually evolving in response to tests, challenges and demands from our people. For all the hard infrastructure, our cities need to be malleable.

Take COVID for example. During our hard lockdowns, all of our cities — and perhaps Sydney in particular — identified a significant inequality dependent on where someone lived. Not everyone had access to a home office. Many worked from their kitchen tables or bedrooms for months on end. Others didn't live near green spaces or beaches and so recreational activities were limited to their surrounding concrete jungles. Access to reliable internet was a challenge for some. The ability to work COVID safely was an issue for others.

The investments we've made over the years towards 30-minute cities are now ramping up as we finally recognise that our cities are more than our CBDs. The experience of living in Sydney or Melbourne or Brisbane should be consistent no matter which part of the city you live in. The indelible march towards hybrid work ar-



sustainable cities

employment and job quality. Surrounded by natural beauty, the city came in at 34 for people and 31 for planet.

Once again, sustainable cities are a complex mix of different factors and all the levers need to be pulled if we're to compete on the world stage as one of the best places in the world to live.

The next time we conduct the Sustainable Cities Index, the results may be very different again. As we speak, our cities are already changing and adapting.

The City of Sydney has released concept designs for a revitalised and much greener Sydney CBD, with more parklands, fewer cars and even a harbourside pool as part of the city's 2050 vision. More broadly, the vision for Greater Sydney includes the Eastern Harbour City (Sydney CBD as we know it), the Central River City (Parramatta and Liverpool) and Western Parkland City (Penrith and Campbelltown Macarthur). A real step change in how we think about our most populous capital city.

Melbourne has a 2026 vision to be more sustainable, inventive and inclusive. This is only four years away. Collaborating with universities, the City of Melbourne is creating an innovation district north of the CBD to attract more small businesses, startups and social enterprises to the area. Connecting the city is also a priority with the rapidly growing Southbank set to be connected to the Yarra River and Arts Precinct with improved pedestrian access, footpaths, cycling routes, tree planting and more community spaces.

Brisbane is also working on its vision for 2032 to coincide with the city hosting the Olympic and Paralympic Games. While there is no detail yet, the City of Brisbane is working with stakeholders, local communities and businesses to create a new masterplan for a city that is more connected, more welcoming, more green and more animated.

I am excited by this Index and what it says about the evolution of our cities to be real drivers of innovation and change. By looking at our cities through the lens of people, planet and profit, we can continue to push ourselves to deliver experiences to our communities that foster inclusivity, sustainability and prosperity for all.

Arcadis Pty Ltd
www.arcadis.com

Top 10 sustainable cities

	Overall	People	Planet	Profit
1	Oslo	Glasgow	Oslo	Seattle
2	Stockholm	Zurich	Paris	Atlanta
3	Tokyo	Copenhagen	Stockholm	Boston
4	Copenhagen	Seoul	Copenhagen	San Francisco
5	Berlin	Singapore	Berlin	Pittsburgh
6	London	Vienna	London	Tampa
7	Seattle	Tokyo	Tokyo	Dallas
8	Paris	Rotterdam	Antwerp	Chicago
9	San Francisco	Madrid	Zurich	Baltimore
10	Amsterdam	Amsterdam	Rotterdam	Miami

rangements forces us to look at our cities through new eyes. Are we fit for purpose? And if not, what do we need to change?

The beauty of the Sustainable Cities Index, at least from my perspective, is not that it pits our cities against each other — that isn't the intention. It's that we can take something from our international peers. There is no pinnacle of success — no one city that trumps them all. We can all learn from each other.

European cities consistently come out ahead in the Sustainable Cities Index, but no city ranks in the top 10 across all three pillars.

Oslo takes the overall top spot in 2022, ranking first in planet, 17 in people and 39 in prosperity. Oslo's city centre is increasingly car-free and easy to explore by foot or bike. More than half of the municipality is covered by forests and parks. You can

swim or kayak in the fjord that extends into the city centre or visit the urban farms.

Tokyo comes in at number three overall and is the only Asian city in the overall top 25. Tokyo ranks in the top 10 for both people and planet, coming in seventh for both. Tokyo has the world's most sophisticated railway. With 13 subway lines and more than 100 surface routes, most of the metropolitan area can be reached with a train ride and short walk. High employment rates, clean streets and low crime rates are all hallmarks of this international city.

Seattle is number 7 overall and number 1 for prosperity. Washington State's largest city is home to the headquarters of Microsoft and Amazon and topped the prosperity list for ease of doing business, economic development, green finance, transport infrastructure,



Sustainable construction: Webuild at Forrestfield-Airport Link



It is not simply what is built that matters, but how it is built. This is the mantra becoming more prevalent on construction sites across Australia, as companies become more attentive to the impact that their building methods have on the environment. If a project is to be truly sustainable, the way it is built counts equally as much as the contribution made by the project to sustainable development.

A case in point is the METRONET Forrestfield-Airport Link, which comes into service in Perth in the coming months. To be known as the Airport Line, the rail project being completed by Italian civil engineering group Webuild and a Western Australia partner will connect the city's eastern suburbs with the airport and central business district. It is 8.5 km long, of which 8 km are underground, with three new stations. By serving 20,000 passengers a day, the line stands to remove up to 15,000 vehicles from the road every day, leading to a reduction of up to 2000 tonnes of CO₂ emissions every year.

Practices undertaken by Webuild throughout the build were always with sustainability in mind. One area of focus was the concrete, arguably the most important building material of any construction site. Webuild worked closely with a local supplier to develop two sustainable concrete blends, one of which was for the production of the segments that line the tunnel walls. Known as Triple Blend 60 MPa concrete, it is a low-cement concrete blend containing 65% supplementary cementitious materials, such as ground-granulated blast-furnace slag, which is itself a recycled material. This meant that it had only 195 kg of cement per cubic metre of concrete, compared with more than 550 kg in typical 60 MPa concrete. By using this blend rather than the concrete made with Portland Cement — which requires a lot of energy to produce — a total of 21,848 tonnes of CO₂ emissions were avoided in the production of the 54,000 tunnel segments that line the walls of 15 km of tunnels.

It is a practice that Webuild has been applying on construction sites across the globe to notable effect. In the last three years, it

has been able to reduce the amount of CO₂ emissions produced by activities related to the production and use of concrete by over 20%.

For the production of track slabs on which the rails are positioned along the Airport Line, Webuild used concrete reinforced with macro synthetic fibres rather than steel. This solution helped avoid the need to use 6.96 million kg of steel, preventing approximately 13,224 tonnes of CO₂ being emitted for its production.

In addition to concrete, there have been a number of other sustainable initiatives pursued by Webuild during the construction of the line in Perth, including specific tunnel-boring methods and the use of solar power.

Webuild had the tunnel-boring machines reuse the water they needed to function properly by having a slurry treatment plant installed on site. The plant used a filter press and centrifuge to process the slurry generated by the TBMs, separating the spoil from the water. It would then send the water back to the TBMs. This practice saved 2740 megalitres of water.

Another focus for the project is the use of solar power. One of the line's three stations, High Wycombe, has what is claimed to be the largest solar panel system to be installed by a state government department in Western Australia. The 275 kW system will be sufficient to meet the average summertime daylight electricity demand of Airport Central Station and Redcliffe Station, in addition to the High Wycombe Station where the system is installed.

Thanks to technological innovation, this shift towards greener construction methods is making sustainable development truly sustainable, and is aligned with Webuild's sustainability goals for the 2021–2023 period. One of its priorities is to reduce by 35% greenhouse gas emissions from fossil fuels and the production of electricity in 2022 compared with 2017.

Webuild

www.webuild-group.com.au/en



Trenchless tech trialled in Qld for water pipe rehabilitation

Urban Utilities has trialled a new robot-delivered trenchless technology, which is designed to make water main renewal more efficient and to benefit customers and the environment.

Urban Utilities completed the trial with project partners Downer, WSP and Wilsons Pipeline Solutions, rehabilitating an 80 m section of underground pipe in Somerset in South East Queensland.

Urban Utilities' Maintenance Innovation Lead, Senthil Kumar, said the Resiline technology sprayed a rapid-curing lining inside the pipe, relining it underground and removing the need for a traditional 'lift and lay' pipe excavation.

"With this new trenchless technology, works that would have traditionally taken weeks can be completed in just a few days," he said.

"This helps reduce our overall carbon footprint and can make essential works more cost-efficient.

"The technology also has great potential to benefit our customers, particularly those in busy CBD or popular community areas, by allowing us to upgrade vital infrastructure underground without a need to excavate large sections of footpaths or roads."

Urban Utilities Water Program Manager Jonathan Farrell said the organisation would investigate how the technology could be used as part of its existing pipeline renewal program following the successful trial.



Downer Water Services Delivery Manager Gordon Lynch with Urban Utilities Water Program Manager Jonathan Farrell.

"We're responsible for maintaining a network of 9000 km of water pipes that supply water to more than 1.5 million people across South East Queensland and we're always looking at ways we can improve outcomes for our environment and our customers," he said.

"This technology is a great example of Urban Utilities' commitment to innovation and we're proud to be part of this Australian-first trial."

Urban Utilities

www.urbanutilities.com.au

"Don't be fooled by cheap imitations. Insist on genuine, rugged, dependable Gorman-Rupp brand"

GR
GORMAN-RUPP
PUMPS

RUGGED & RELIABLE **WASTEWATER PUMPS**

Designed, cast, machined, assembled & tested in the US

- Self Priming Pumps are mounted above ground for easy access and maintenance
- Designed to minimise blockages
- Pumps rags and stringy materials with 'eradicator' technology
- Does not require multiple personnel to maintain.



HYDRO
INNOVATIONS

(02) 9898 1800

sales@HydroInnovations.com.au
www.HydroInnovations.com.au

MyTown Microgrid – helping edge-of-grid towns in Australia

More and more communities are looking to make energy work better for them, spurred by a desire to use their local resources more sustainably for the greater benefit of those who live there.

While there is already substantial momentum building with local energy projects, determining a viable path is challenging. What resources can be developed? Which technologies and partners should they choose? What business models will be financially viable? How can the benefits be equally shared among the community?

MyTown Microgrid aims to answer these questions for the Victorian town of Heyfield, while also seeking to develop a replicable model that can also bring benefits to the surrounding region, as well as other edge-of-grid towns around Australia.

Over the next three years, MyTown will test the viability of microgrids as a local energy solution for Heyfield.

A 'microgrid' can be defined as a group of homes or businesses that generate, use and share electricity. With the ability to be controlled as a single entity, microgrids are able to connect and disconnect from the main electricity grid as required.

Microgrids have the potential to enhance the integration of renewable energy, draw on local resources, drive deep carbon reductions and overcome local grid constraints. They can also support the decarbonisation of the wider energy system while also improving overall system resilience.

However, there are many options for communities looking to understand whether a microgrid makes sense for them and determining a viable path can be difficult to navigate.



©stock.adobe.com/au/petovanga

The Heyfield community

Heyfield is a town of around 2000 people located in Wellington Shire, Victoria. With a long track record in sustainability initiatives and considerable potential for low-cost and local energy, Heyfield is an ideal location to pilot a new approach with a community at the helm.

Using Heyfield as the model community, the project will bring together progressive industry, community and research partners to pilot an innovative microgrid approach.

As well as understanding the feasibility of a microgrid for Heyfield, the project will also develop the knowledge and tools to

make it faster, easier and cheaper for other fringe-of-grid towns in regional Australia to do the same for their communities.

Dr Scott Dwyer will be speaking further about MyTown Microgrid Heyfield at the upcoming Energy Next free-to-attend B2B exhibition, which is showcasing the latest clean energy innovation and technologies. The event is being held alongside Clean Energy Council's Australian Clean Energy Summit at the International Convention Centre (ICC) in Sydney from 19–20 July.

For more information about how to register for the event, visit www.energynext.com.au.



**Dr Scott Dwyer is a Research Director at the Institute for Sustainable Futures (ISF) at the University of Technology Sydney, working on issues relating to the transitioning energy system. His research interests revolve around the opportunities and challenges posed by disruption in the energy sector, especially those linked to customers, technologies, policy, markets and business models. Dwyer has over 15 years' experience of leading transdisciplinary teams as part of complex, energy-related research projects for the public and private sectors. Over this time he has worked closely with a range of international organisations, including many of the world's leading energy utilities and energy product manufacturers, start-ups, industry associations and governments. He leads the institute's work on customer energy innovation and advises on a wide range of sustainable energy technologies, including solar, storage, microgrids, fuel cell, hydrogen and electric vehicles.*

AVEVA PLANT SCADA 2020 R2 TAPS INTO THE FULL POTENTIAL OF THE AVEVA PORTFOLIO

As global industry accelerates plans for digital transformation and seeks reliable and flexible SCADA solutions, many companies are shifting to tightly integrated stacks of solutions to solve increasingly interconnected operational challenges.

As HMI/SCADA software continues to evolve, AVEVA™ Plant SCADA has grown as well. You'll find it easier than ever to explore solutions that deliver collaboration, skills management, deep analytics, and artificial intelligence. Industrial operations must reimagine traditional HMI/SCADA to support the future potential of operations control.

AVEVA Plant SCADA unlocks the full potential of integrated operations control

AVEVA is already exploring ways to bring the familiarity of traditional HMI/SCADA software to a more integrated style of operations, centered around common information platforms and unified operations. AVEVA Plant SCADA represents an example of the way legacy SCADA software can be updated to play a powerful role in unified operations while maintaining features that customers have come to rely on over decades.

AVEVA Plant SCADA began its development lifecycle as a part of Citect, and quickly gained dominance of the SCADA market in the Asia Pacific region. When Citect became part of Schneider Electric and then AVEVA, Citect SCADA was integrated with the AVEVA portfolio.

Now, the same team who brought you Citect SCADA brings you AVEVA Plant SCADA. They've kept the features customers have come to rely on like legacy image libraries and graphics editors, but they've infused Plant SCADA with common tools shared across AVEVA's rich portfolio, like industrial graphics and a powerful read/write web client based on HTML5.

Comprehensive operations with AVEVA

AVEVA hasn't just made this trusted SCADA software better, it has made it a full part of AVEVA operations capabilities. Operations control is a framework of information and teams that allow organizations to break down operational silos and show one unified vision of operations that managers and operators can use to make better decisions and improve processes.

Plant SCADA serves an important role within operations control, and organizations using Plant SCADA can already take advantage of other powerful AVEVA solutions designed to unify systems and teams. For example, Plant SCADA supports industrial graphics, which allows users to import and export rich graphics libraries to other systems.

AVEVA Connect is another important piece of the AVEVA operations control portfolio. Within AVEVA connect, Plant SCADA users can centralize their data with AVEVA Data Hub or use AVEVA Insight to understand their asset health and performance.

AVEVA Plant SCADA is also a part of AVEVA Flex, a subscription credits system that allows customers to use the entire AVEVA operations portfolio with much lower upfront costs. Want to use FLEX to augment Plant SCADA with the edge management solutions of AVEVA Edge? Now you can! Want to bring Plant SCADA data directly into a Unified Operations Center? AVEVA Flex makes it possible and cost-effective to start experimenting with more complex system architectures and take advantage of powerful automation tools.

AVEVA Select Distributors offer a personal touch

As an AVEVA Select Distributor, Schneider Electric offers the full AVEVA portfolio. This allows them to provide a personal touchpoint for companies executing their digital transformation plans as they explore new ways to structure their teams and break down information silos for a more unified experience of operations.

Schneider Electric's partnership with AVEVA provides a rich set of solutions that help organizations optimize operations and asset performance, and more easily adopt technologies like artificial intelligence, industrial IoT, big data, cloud, and hybrid-cloud capabilities.

Upgrading to AVEVA Plant SCADA

AVEVA and Schneider Electric always recommend that you use the most recent versions of software to mitigate security risks and implement the latest features and capabilities. If you're currently using a legacy edition of Citect SCADA, updating to AVEVA Plant SCADA will bring you the future-ready technology you need to stay competitive.

Never used AVEVA Plant SCADA? Contact our team to request a demo so we can demonstrate how to reduce your operating costs and improve productivity and product quality.



Schneider Electric
www.se.com/au



UNSW to lead decarbonisation hub



The University of New South Wales, Sydney (UNSW) has been chosen as the academic lead — alongside the University of Newcastle — and headquarters for the NSW Decarbonisation Innovation Hub.

The hub is due to serve as an important part of the state's Net Zero Industry and Innovation Program and will see different groups coming together, including members of government, industry and researchers, to develop technologies that can help to decarbonise the state. The \$15 million project is funded with a grant from the NSW Environmental Trust, alongside contributions from industry and university partners.

"UNSW's selection to lead the new Decarbonisation Innovation Hub in NSW reflects our vision of being a catalyst for an

environmentally sustainable future through collaborative research, partnership and innovation," said UNSW Vice-Chancellor and President Professor Attila Brungs.

"The opportunity to slow down the existential threat of climate change is shrinking, and we need to act now. The Hub will enable world-class researchers to work together in tackling these threats, providing concrete solutions and developing technologies that will be used not only in NSW but across the world."

UNSW will be leading a consortium of partners that includes University of Newcastle, University of Wollongong, Western Sydney University, University of Technology Sydney, Charles Sturt University, the NSW Department of Primary Industries and Climate-KIC.

The hub will be based at UNSW but three networks will operate outside of the location: the Electrification and Energy Systems network will tackle renewable energy and the uptake of electrification; the Land and Primary Industries network will work to develop sustainable primary industry practices; and the Power Fuels including Hydrogen network will grow a sustainable hydrogen industry in NSW and will address decarbonisation opportunities for sectors struggling to reduce emissions.

"The new Hub will showcase UNSW's world-class capabilities in decarbonisation and serve as a centrepiece for our work in this area," said UNSW Scientia Professor Deo Prasad, who will serve as Chief Executive Officer of the Hub. "Not only will it meet key metrics in decarbonisation, but there is also enormous potential in the job creation and capacity building we can achieve."

The Office of the NSW Chief Scientist & Engineer will oversee the hub and its research.

Waste-to-energy facility ramps up in Melbourne

Two Melbourne companies have teamed up to develop a modern waste-to-energy (WtE) and integrated resource recovery processing plant. The plant will deliver baseload renewable energy while recovering recyclable materials from waste.

Great Southern Waste Technology (GSWT) will be working with Repurpose It, which already runs a waste processing and recycling facility in Victoria, to develop the technology.

"We saw a terrific opportunity to combine the world-leading WtE technology exclusive we hold at GSWT with the local recovered waste success story, Repurpose It, to ensure even greater success in diverting waste from landfill while also removing over 240,000 tonnes of greenhouse gas



emissions from the atmosphere," said GSWT owner Craig Gilbert.

The waste processing plant will pre-sort commercial, industrial, household and other waste for recyclables, with any remaining end-of-life waste being processed through WtE gasification technology to produce electricity.

GSWT's Chief Operating Officer, Lukas McVey, said the partnership will develop

a fully enclosed WtE facility that will be able to process up to 200,000 tonnes of waste per year and generate about 130,000 MWh renewable baseload power to the grid. This is enough electricity to power over 15,000 homes for a year. The plant will use ENERGOS technology, having licensed it from Norway.

"By using this technology at our Epping plant, we're confident we can reduce

greenhouse emissions by about 240,000 tonnes per year while ensuring minimal waste goes to landfill," McVey said.

"The small footprint and fully enclosed nature of Great Southern's facilities means local communities can deliver tangible benefits to the environment and generate energy while maintaining the current amenity of the local area."



Sustainability in technology

renewables

©stock.adobe.com/au/adrian_11e825

As businesses set ever more ambitious environmental, social and governance (ESG) goals, their sustainability and technology strategies need to become more tightly aligned. Chief information officers can play a critical role in supporting chief sustainability officers and ESG leads to achieve their company's transformation to a sustainable organisation. An effective sustainable technology strategy helps drive business growth and ESG performance by delivering on three imperatives:

1. Using the power of technology to enable and accelerate sustainability efforts across the organisation.
2. Protecting people and the planet by making technology itself progressively more sustainable.
3. Pursuing breakthrough innovation with ecosystem partners to develop radically different and more sustainable ways of doing business in the future.

Sustainability has moved swiftly up the executive agenda in recent years. Even at the height of the COVID-19 pandemic, most CEOs interviewed for an Accenture study¹ said that "becoming a truly sustainable and responsible business" was a top priority. And with good reason. Beyond the great promise of protecting people and the planet, companies with a higher sustainability performance across ESG indicators perform better financially than their peers². Just as digital transformation required every company to become a technology company, with technology at its heart, now every business needs to become sustainable —

and technology is again taking centre stage.

Technology is — and will continue to be — the fundamental driver of sustainability for organisations, and their supply chains, customers and broader business ecosystems. Ninety-two per cent of companies in Accenture's 'Uniting Technology and Sustainability' survey aim to achieve net zero targets by 2030, which will require deployment of advanced technologies to measure, reduce and remove an organisation's carbon footprint.



Ninety-two per cent of companies in Accenture's Uniting Technology and Sustainability survey aim to achieve net zero targets by 2030, which will require deployment of advanced technologies to measure, reduce and remove an organisation's carbon footprint.

Shining a light on solar panels for Origin

Accenture and Google Cloud have teamed up to develop a technology solution that can be used by energy retailers to streamline solar panel assessment and installation, making it easier for consumers and enabling energy companies to improve service delivery.

The innovative solution was designed by Accenture data scientists and deployed for Origin Energy solar panel customers. Built on Google Cloud, which has been carbon neutral since 2007 and is on target to be 100% carbon-free by 2030, it leverages a broad cross-section of Google Cloud tools and technologies. The artificial intelligence (AI) tool provides analytics on how solar will perform on customers' rooftops and their potential savings within 10 minutes.

In addition, the platform uses 3D data, machine learning and advanced analytics to determine the optimal solar set-up for a household based on inputs like roof pitch, available space and shading from obstructions, alongside insights on household energy consumption. It provides solar power generation forecasts, system and installation costs, potential energy and bill savings and details on the investment break-even point.

Looking ahead, Accenture and Google Cloud intend to advance the system by creating recommendation tools that help consumers take advantage of the benefits their new solar systems can offer. For example, by predicting the amount of excess energy produced by the solar array, the tool will be able to help consumers make decisions about how they might be able to power an electric vehicle or what benefit they can gain from a home battery system.

Learn more about how Accenture Google Cloud Business Group are creating sustainable technology solutions at scale.

1. Accenture Shaping the Sustainable Organisation <https://www.accenture.com/ca-en/insights/sustainability/sustainable-organization>

2. UN Global Compact-Accenture CEO Study on Sustainability <https://www.accenture.com/gb-en/insights/sustainability/ungc>

Accenture Australia Ltd
www.accenture.com

INVESTING IN AUSTRALIAN RECYCLING INNOVATION

Adelaide Southern Materials Recovery Facility (SMRF)

As the world works towards net zero emissions by 2050, the recycling sector continues to play an important role by improving the recovery of valuable resources. Resources that can contribute to the productive economy, rather than being disposed of as waste while new virgin resources are dug out of the earth. Through innovation and investment, by engaging deeply with the community, and by working with those who manufacture the items that end up in our waste streams, we can rapidly multiply the positive impacts our sector already has.

Re.Group is at the forefront of investment and innovation in this space. The Re.Group approach focuses on continuous improvement, rather than a set-and-forget method. New opportunities are emerging all the time, and by seizing them we can mitigate many issues that impact on our communities and the health of our environment.

Return-It is the part of Re.Group that operates modern container refund networks. As well as recovering used beverage containers, one way Return-It aims to improve recovery of the earth's resources is through the utilisation of existing collection networks to recover additional materials. For example, one of the biggest issues facing the recycling sector is fire risk from batteries incorrectly placed into kerbside bins. Return-It is combating this — and helping recover finite resources — by drawing on existing collection systems to provide customers with an opportunity to safely recycle batteries and mobile phones through deposit bins on site.

Return-It currently operates in the ACT, Qld, WA and NSW, and provides a variety of container return point options, from depots to reverse vending machines, all with the idea to provide equitable access to container collection networks for the community and encourage consumer behaviour change. The community focus doesn't stop there, with Return-It's pioneering

partnerships with community organisations and charities. We are constantly curious, and looking for ways to go beyond the obvious to add more value. We don't just count containers and hand out 10c pieces, we work with community groups to help maximise the positive impacts of our activities.

Re.Group's commitment to innovation and exploring new approaches extends to each partner we engage with. Our recently launched Adelaide Southern Materials Recovery Facility (SMRF) was established under a long-term Joint Venture (JV) approach between Re.Group and the three participating Councils of the Southern Region Waste Resource Authority (SRWRA). While Re.Group is 100% responsible for the day-to-day operations and maintenance, the JV approach with strategic input from all parties gives strong community ownership over the SMRF outcomes.

The largest MRF in South Australia, the SMRF also demonstrates advances in technology that allow us to meet new quality standards. An array of optical sorting and robotic quality control technology is deployed to improve the quality of the products recovered, and prepare them for future use. It is exciting to see what is possible now, that wasn't possible just a few years ago — and we know that these innovations and advances will continue.

Re.Group is committed to continue investing in developing, operating and maintaining recycling facilities that our communities can be proud of. As we move into a busy period of building new infrastructure, and upgrading existing infrastructure, it is exciting to think of the enhanced positive impacts we can deliver on behalf of our clients and communities.

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





MACHINEX

The only Australian company
that **designs, builds, owns and
operates** recycling systems.

Re.Group is an Australian company focused on providing
high quality services for recycling and the recovery of resources.

Discover more at: re-group.com

Our services include:



Maximising the social & environmental
benefits of container return schemes
returnit.com.au



Combining world's best technology
with Australian know-how
rdtaust.com

Organic, sustainable batteries may be on the horizon

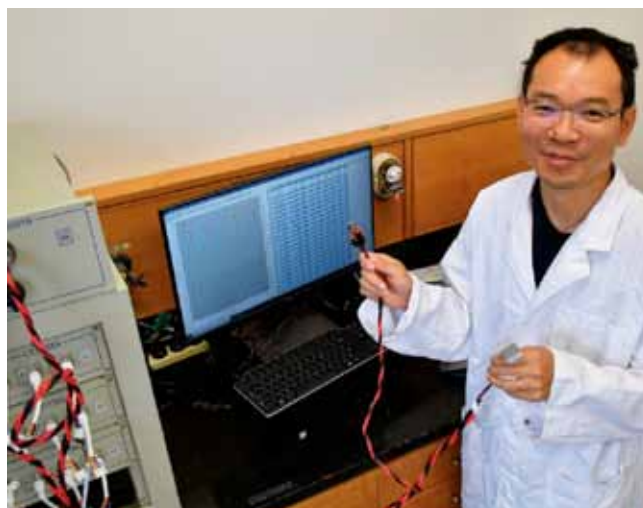
An international team of researchers from Flinders University along with scientific collaborators in China have produced an 'organic' polymer-based rechargeable battery with double the energy capacity of previous models.

The researchers have used a catalysis strategy to produce two-electron storage in organic radical batteries, or ORBs. ORBs are made of sustainable organic compounds that can reduce the reliance on lithium and cobalt mining. The metals in traditional batteries can often go unrecycled and eventually make their way into landfill — a situation that the researchers wanted to help avoid.

ORBs are claimed to be more environmentally friendly as they forgo metals and instead use polymer compounds — in this case something called 2,2,6,6-Tetramethylpiperidine-1-oxyl (conveniently shortened to TEMPO). Unfortunately, the usefulness of this class of battery was hindered by its lower capacity, with previous research suggesting the maximum capacity would only be 110 mAh/g.

The newly published study uses catalysis to circumvent this issue and doubles the storage capacity of the researchers' previous battery developments, making them suitable for a range of applications.

"Catalysis has been widely used in lithium-based batteries such as lithium-oxygen batteries and lithium-sulphur batteries to improve their energy and power performance," said Dr Zhongfan Jia, a research leader at Flinders University's Institute for Nanoscale Science and Technology, who pointed out that the higher capacity for ORBs will potentially be more useful for real-world applications.



Dr Zhongfan Jia developing better battery storage capability for electroactive polymer 'organic radical batteries' at his Flinders University laboratory.

"This battery can deliver a capacity of 175 mAh/g, which is comparable to the commercialised lithium-ion battery, making a step closer to the practical use of ORBs."

The researchers are now looking at the possibility of developing the organic batteries such that they can be implemented at a wider scale and, ideally, for them to eventually make their way into consumer electronics.

The study was published in the journal *ACS Energy Letters*.

Flinders University
www.flinders.edu.au

Scientists upcycle polystyrene with sunlight



Sipping a cup of coffee in the sun might take on a new meaning thanks to research from Cornell University, which has discovered polystyrene can be upcycled to useful benzoic acid with just some oxygen and light.

Around a third of the world's landfill waste consists of polystyrene (PS) plastic. From soft Styrofoam packaging and hard CD cases to malleable drinking cups, the plastic is ubiquitous in waste streams.

The upcycling technique uses light and oxygen with the help of an iron-based catalyst to break down the PS into benzoic acid,

a substance that is used in a multitude of different applications including fragrances and food preservatives.

One of the researchers, Erin Stache, assistant professor of chemistry and chemical biology in the Cornell College of Arts and Sciences, pointed out that typically processing a polymer such as polystyrene would rely on fossil-fuel provided heat and energy whereas this method is able to use sunlight.

"The advantage of using light is you can get exquisite control over the chemical

process based on some of the catalysts we've developed to harness the white light. If we can use sunlight to drive the process, that's a win-win," Stache said.

Research is continuing to develop scaled-up versions, with initial tests suggesting that there is realistic potential for upcycling the polystyrene at larger scales.

"If we can make the process even more efficient, we can think about how to commercialise it and use it to address waste streams."

The findings from the research were published in the *Journal of the American Chemical Society*.

Major plastics recycling facility

benefits from innovative wastewater treatment system

Circular Plastics Australia's latest success story in regional New South Wales saw the company working with Australian wastewater expert Aerofloat to ensure a sustainable solution that offers large water savings.

Aerofloat's innovative design enables the facility to either reuse cleaned wash water within the plastics recycling facility or discharge the water to sewer, making it an environmentally sound solution.

The Circular Plastics plant is a joint venture between Asahi Beverages and Coca Cola Europacific Partners, Pact Group Holdings Ltd and Cleanaway Waste Management Ltd. This is the third venture that Astron Sustainability, a subsidiary of Pact Group, and Aerofloat have worked on together.

Aerofloat's General Manager, Michael Anderson, said the design for the site needed to meet key environmental regulations that echoed the regional council's commitment to a small environmental footprint.

"Our design needed to ensure a long-term solution for Circular Plastics and allow for potential expansion of the business in time. Council guidelines were strict for this project, so we wanted to ensure that we capitalised on every opportunity to reuse

clean wastewater as wash water within the plant. The resulting system is our most sophisticated for the industry to date."

Aerofloat installed its circular dissolved air flotation unit to treat the anticipated high flow volumes of wash water. Its design ensures any suspended solids and soluble contaminants such as sugars are removed effectively. In addition, a biological treatment system, clarification process and sludge dewatering technology ensure the facility meets the firm trade waste obligations.

"The Albury/Wodonga area has numerous inland waterways, including the Murray River and its tributaries. Managing microplastics in the wastewater was therefore critical to the design. We therefore worked very closely with Council to engineer a solution that would meet its strict requirements around this."

Aerofloat is an Australian, family-owned company that has been awarded for its innovative approach to tackling plastics recycling wastewater issues.

"We offer unique, patented designs that ensure economical and environmentally sustainable solutions for the industry. Aerofloat has come to be recognised for this by the rapidly growing plastics recycling industry," Anderson said.

"Plastics recycling is fast becoming a booming industry with both government and private businesses turning their eyes towards fulfilling the promises Australia has made to improving its recycling practices," he added.

The Circular Plastics facility in Albury/Wodonga is claimed to be Australia's biggest end-to-end recycled polyethylene terephthalate (PET) plant, recycling up to one billion 600 mL PET plastic bottles annually.

The project was delivered on time and on budget, despite the issues created by the COVID-19 pandemic.

Aerofloat continues to work closely with the Circular Plastics operations team by supporting key services onsite. Its ongoing commitment to the venture ensures the plant runs at optimum levels with minimal chemical consumption. Aerofloat's design is complemented by its fully automated PLC control system that allows its engineers to anticipate and prevent potential issues even when offsite. The system also accommodates future integration of additional Aerofloat technology if the business expands.

Aerofloat's innovative technology is designed to reduce costs while ensuring a strong, sustainable solution.

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

Could energy-as-a-service be the answer to reduce emissions?

©stock.adobe.com/au/metamorworks

Now more than ever, businesses are making the commitment to reduce their emissions and meet sustainability targets to achieve net zero. Reports by the United Nations IPCC show that the world is not on track to limit global warming to 1.5°C, and the pressure is mounting on organisations to electrify their energy systems fast. Verdia explains how energy-as-a-service (EaaS) could be the answer companies are looking for to reduce their emissions in the long term and on a large scale, without having to incur upfront capital expenditure.

Renewable energy-as-a-service and power purchase agreements

EaaS shifts the perspective of renewable energy and storage at a customer's site from an upfront capital investment to instead a fully managed and 'pay-as-you-go' offering, including end-to-end management of onsite energy assets and services.

Also referred to as a power purchase agreement (PPA), an EaaS agreement provides a corporation access to renewable onsite electricity without upfront capital expenditure. An energy services provider, such as Verdia, develops, delivers, owns, operates and maintains a range of these distributed energy assets for clients at their sites and makes the upfront capital investment.

EaaS aims to satisfy client needs by identifying the solutions that better suit their specific energy requirements and generate

long-term value, as opposed to traditional grid-supplied electricity.

The service itself includes the deployment of a range of renewable energy generation assets such as: solar PV, microgrids, energy storage or sustainable transport infrastructure. The EaaS agreement then shifts the responsibility of development, delivery, financing, ownership and operation from an organisation to an asset owner such as Verdia, through a long-term agreement. For clients who do not wish to invest CapEx upfront or take on long-term operational risks, EaaS can be a game changer.

What are the benefits?

EaaS agreements offer the benefits of renewable energy without requiring companies to invest in a new system themselves. Choosing EaaS can mean:

- lower grid energy consumption and reduce energy cost
- transferring operational and performance risks
- transferring ongoing maintenance costs
- ensuring long-term price certainty for a portion of site electricity (ie, energy price hedge)
- enjoying future flexibility for storage and other distributed assets to be incorporated at no capital cost.

Why are companies choosing EaaS?

Achieving net zero: The economy is rapidly becoming decarbonised. Onsite renewable

energy creates no emissions compared to fossil fuel-driven grid electricity. This has led to an increased demand from large companies looking to reach their net zero targets. Access to more sustainable energy sources is driving growth in the electrification of energy systems.

Seeking energy savings without spending capital: The cost of grid energy is increasingly volatile. Onsite renewables are in many cases the cheapest form of electricity available to a business. The benefit of EaaS is that it can deliver energy savings and reduce costs by stabilising energy prices at a fixed, predictable price, independent of market fluctuations. Under the EaaS model, companies can achieve these benefits without spending/allocating capital to non-core business assets.

Increasing operations resilience in the digital age: Digitalisation has become a crucial aspect of business. It has led to a fourth industrial revolution, based on machine-to-machine interconnection, with the objective of optimising systems rather than single points. EaaS is a prime example of energy turned digital. EaaS can help upgrade critical infrastructure to enhance competitiveness, and optimise assets through energy storage, EV chargers and any other flexible assets.

Verdia's EaaS solutions are designed to help users achieve their sustainability targets, reduce emissions and provide long-term cost savings.

Verdia
verdia.com.au

Stored solar energy on demand

Researchers at Chalmers University of Technology in Sweden have developed a system to capture and store solar energy for up to 18 years and then release it when needed to produce usable electricity. Eventually, the research could lead to self-charging electronics using stored solar energy on demand.

Based on Chalmers' Molecular Solar Thermal Energy Storage system, or MOST, the technology relies on the principle of a special kind of molecule that changes shape to become an energy-rich isomer when exposed to sunlight, which can then be stored in a liquid form for later use.

A catalyst causes the molecule to return to its original shape, releasing its energy as heat in the process — that heat can be used by an attached thermal generator to produce electricity. The MOST system had previously used flammable chemicals but recent advances have replaced this with less volatile substances.

"This is a radically new way of generating electricity from solar energy. It means that we can use solar energy to produce electricity regardless of weather, time of day, season or geographical location. It is a closed system that can operate without causing carbon dioxide emissions," said research leader Kasper Moth-Poulsen, Professor at the Department of Chemistry and Chemical Engineering at Chalmers.

The researchers suggest that the system can be used to capture the sun's power and then release it at night or during the darker periods of winter to generate power on demand. At

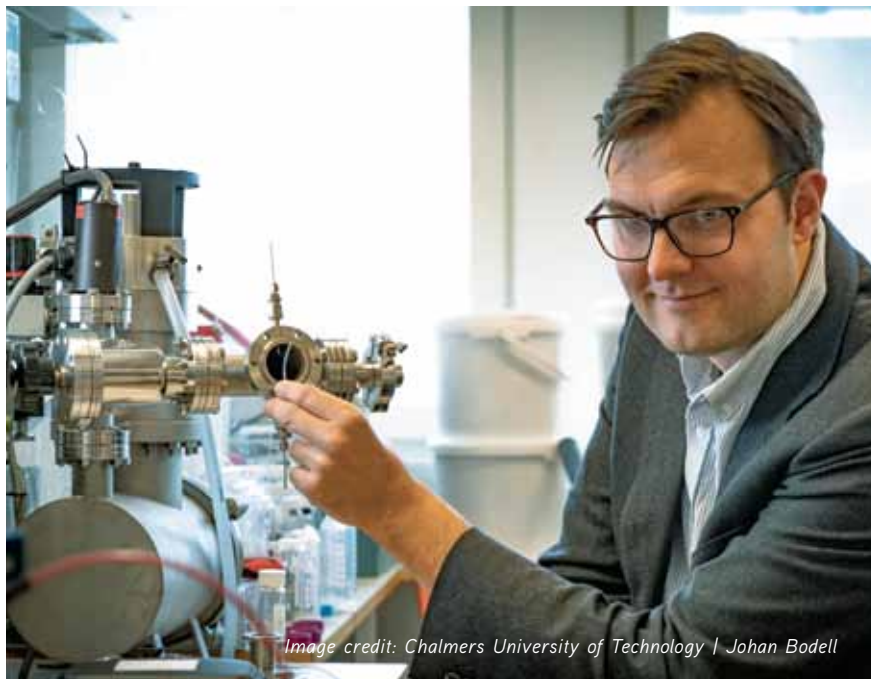


Image credit: Chalmers University of Technology | Johan Bodell

the moment the liquid can store energy for up to 18 years and although current levels of power production are relatively low, the scientists are working to produce a higher amount.

"Together with the various research groups included in the project, we are now working to streamline the system. The amount of electricity or heat it can extract needs to be increased. Even if the energy system is based on simple basic materials, it needs to be adapted to be sufficiently cost-effective to produce, and thus possible to launch more broadly," said Moth-Poulsen.

The study outlining the MOST system has been published in *Cell Reports Physical Science*.

AMS

INSTRUMENTATION & CALIBRATION PTY LTD SPECIALISTS

AMS have been suppliers of instrumentation and calibration equipment to all industries since 1973 representing some of the world's leading manufacturers of the equipment in their field.

McCROMETER

McMENON

**FCI FLUID COMPONENTS
INTERNATIONAL LLC**

**TRIMEC
FLOW PRODUCTS**



azbil
Azbil Corporation

Bronkhorst

katronic

Flow Measurement Specialists



www.ams-ic.com.au

sales@ams-ic.com.au



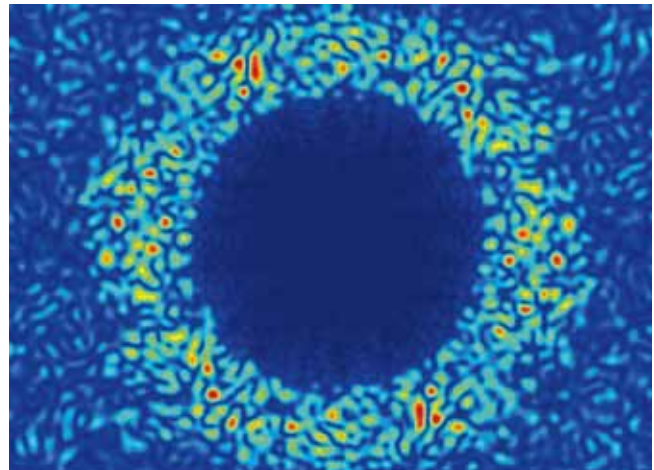
Honeycomb design increases ultrathin solar panel efficiency

Researchers from the UK and the Netherlands have successfully increased the levels of energy absorbed by wafer-thin photovoltaic panels by 25%. Their solar panels, measuring just 1 μm thick, are claimed to convert light into electricity more efficiently than others as thin, which should make it easier to generate cleaner, greener energy.

Writing in the journal *Photonics*, the team detailed how they used characteristics of sunlight to design a disordered honeycomb layer which lies on top of a wafer of silicon. Their approach is echoed in nature in the design of butterfly wings and bird eyes; the innovative honeycomb design enables light absorption from any angle and traps light inside the solar cell, enabling more energy to be generated.

"One of the challenges of working with silicon is that nearly a third of light bounces straight off it without being absorbed and the energy harnessed," said Dr Marian Florescu, from the University of Surrey's Advanced Technology Institute (ATI). "A textured layer across the silicon helps tackle this, and our disordered yet hyperuniform honeycomb design is particularly successful."

Researchers from the University of Surrey and Imperial College London worked with experimental collaborators at AMOLF in Amsterdam to design, model and create the new ultrathin photovoltaic. In the laboratory, they achieved absorption rates of 26.3 mA/cm^2 — a 25% increase on the previous record of 19.72 mA/cm^2 achieved in 2017. They secured an efficiency of 21% but anticipate that further improvements will push the figure higher, resulting in efficiencies that are significantly better than many commercially available photovoltaics.



Light scattering from a thin silicon membrane absorbing 65% of sunlight.

"There's enormous potential for using ultrathin photovoltaics," Dr Florescu said. "For example, given how light they are, they will be particularly useful in space and could make new extra-terrestrial projects viable. Since they use so much less silicon, we are hoping there will be cost savings here on Earth as well, plus there could be potential to bring more benefits from the Internet of Things and to create zero-energy buildings powered locally."

As well as benefiting solar power generation, the findings could also benefit other industries where light management and surface engineering are crucial, such as photo-electrochemistry, solid-state light emission and photodetectors. The next steps for the team will include investigating commercial partners and developing manufacturing techniques.



UNIVERSAL FLOW SWITCH

The FS10A is a universal flow switch and monitor specifically designed for gas and liquid process analyser sampling systems. It is a fast responding, highly repeatable sensor which installs easily into a standard tube tee fitting or new SP76 (NeSSI) modular manifold.

The product utilises thermal dispersion flow measurement technology with FCI proprietary equal mass sensing for sensitivity and repeatability. The instrument's wetted parts are corrosion-resistant 316L stainless steel with Hastelloy C-22 sensor tips. The sensor element has no moving parts to foul, clog or maintain to boost reliability and reduce maintenance costs. There are no cavities, orifices or dead-legs to trap or contaminate samples, which preserves sample integrity and allows for faster system sampling times.

The electronics are packaged in a rugged, fully sealed, aluminium housing which provides protection and a long product life under all process conditions. The electronics can be integral mounted with the sensor element resulting in a unibody, self-contained unit or the electronics can be separated from the sensor for remote mounting. The remote configuration is useful when the sensor installation area is subjected to high temperatures or to mount the front panel and display in a more convenient location.

The instrument provides a top-mounted, flow rate monitoring LED array for at-a-glance visual indication of proper flow rate to the analyser or sampling system, that an alarm/trip has been reached and as indication the unit is powered and operating. The flow switch's setpoint is conveniently user-settable via two push-buttons accessible at the top of the unit or via the RS232C I/O port.

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

Australasian Waste & Recycling Expo

AWRE | 24 – 25 August 2022 | ICC Sydney | awre.com.au

The Australasian Waste & Recycling Expo (AWRE) for the waste, recycling and resource recovery sector returns to Sydney in 2022, providing a platform for the industry to reconnect and join forces for a world of solutions towards a cleaner, more sustainable future.

Running from 24–25 August at the ICC Sydney, visitors will be able to explore a showcase of full-circle innovative products and sustainable solutions to collect, process and recycle waste more smartly. Expect to see some leading brands including Isuzu Trucks, Mercedes-Benz Trucks, Steinart Australia, HYVA and Liebherr-Australia.

Visitors can look forward to a newly imagined show floor reflecting the changing and developing market, featuring three new zones — the recycled zone, innovation zone and organics zone, sponsored by the Australian Organics Recycling Association. Plus, two free-to-attend education theatres, covering an array of topics across key industry actions and insights from policy and regulation, trends and insights to practical and tangible solutions from innovators shaping the future direction for Australia.

New to the show will be the 'Resource Recovery Summit — Getting to 80%', a half-day event designed for collaboration between industry, government and waste generators.

The summit will feature keynote sessions on commercial & industrial, construction & demolition and municipal solid waste, and is supported by the NSW EPA, the National Waste and Recycling Industry Council and the Waste Contractors and Recyclers Association of NSW.

Attendees to the summit will also be able to enjoy the Resource Recovery Reception following the conference, which provides them with a chance to network and connect with speakers, exhibitors, sponsors and partners, plus celebrate the Innovation Award participants and announcement of winners.

Registration is now open, to find out more visit awre.com.au.



Weidmüller 

PV Next combiner boxes Easy. Fast. Safe.

Weidmüller's PV Next optimises your PV installation to its maximum potential. The advantages of the combiner box are simplicity, safety, time savings, and cost reduction. The innovative concept covers approximately 75 % of today's standard requirements, enabling PV installers to work faster and more cost-effectively. The integrated PUSH IN technology and cable glands reduces assembly times and minimises the risk of errors and the resulting consequences.

www.weidmuller.com.au/pvnext



The e-waste crunch

Why Australian organisations need to move away from a discard mentality

Michael Dyson, VP of Sales, APAC at SOTI

In today's workforce the use of technology and mobile devices has become essential to managing mobile workers and increasing productivity. However, the increased use of mobile devices is also leading to higher levels of e-waste, which has a direct impact on the environment.

Globally, it's estimated that 44 million tons of electronic goods are wasted each year — a number that only continues to rise. And in Australia, e-waste is the fastest-growing component of the municipal solid waste stream. While much is said about how we as individuals and consumers can recycle more effectively, attention also needs to focus on the management and disposal of enterprise-level technology devices.

Despite there being significant information around the functional operating lifespan of mobile devices and the benefits of extended usage, many businesses are prematurely disposing of devices. Organisations are focusing on new upgrades and fresh hardware, as opposed to maintaining, updating, diagnosing and fixing the devices they already have. So, why are companies not prioritising the reusability of their mobile devices, and how is this impacting their business and its ability to achieve sustainability goals in the long run?

Does digital transformation overshadow sustainability intentions?

For companies looking to advance their operations through digital transformation projects, it is important to consider how moving to new technologies will impact current or legacy systems or devices. After all, organisations that publicly commit to strong action around sustainability might find they are not living up to their ambitions if they routinely discard electronic devices prematurely.

SOTI's latest research report, *Reduce, Re-use, Rethink: From Discard Mentality to Tech Sustainability*, highlights the premature disposal of devices in enterprise settings. In this report, it was found that 62% of Australian organisations agree the management and replacement of workplace technology and mobile devices is an important environmental issue for their business. However, in the same focus group over half (52%) said that increasing the lifespan of the hardware used within the organisation was not a priority. This has highlighted a clear gap between Australian organisations' sustainability ambitions and what they are actually prioritising when it comes to reducing e-waste. So, while there does seem to be at least some acknowledgement of this sustainability issue, many organisations aren't currently willing to commit to action in this area.

Balancing productivity with sustainability

It's very common for mobile devices to be discarded as a preventive, precautionary measure or because the latest and greatest version is now available. Somewhere along the line, a mindset shift took place. Before, the focus was on having smartphones, tablets and other mobile devices last longer. Now, the focus is on how to get the newest device as quickly as possible.

All of this raises a few questions:

1. Does having the latest device, at the expense of older devices which still perform as expected, help with end-user productivity and bottom line performance? Maybe.
2. Does having the latest hardware devices help with organisational prestige and perception? According to the report, 63% of Australian respondents say it does make their company more attractive to workers.
3. Is constantly replacing and discarding mobile devices good for the environment and helping with green IT initiatives? Absolutely not.

The challenge is how to balance productivity with sustainability without defaulting to a discard mentality.



Despite there being significant information around the functional operating lifespan of mobile devices and the benefits of extended usage, many businesses are prematurely disposing of devices.

Actionable steps to better maintain workplace devices

To reduce e-waste and improve mobile device recycling habits in the enterprise, it's critical to first move away from pre-conceived notions regarding device lifecycle and deployments.

One option organisations can explore are OpEx models, where organisations rent devices and return them in exchange for newer ones. The business no longer mindlessly disposes of used mobile devices, which allows the organisation to develop more sustainable habits for their business and the environment.

Other actionable steps could include adopting an enterprise mobility management (EMM) solution as part of an equation that serves to prolong digital lifecycles, with the help of digital solutions. Instead of investing in new hardware prematurely, invest in an outsourced solution that encourages the monitoring, diagnosis and repair of existing devices to extend their functional lifespan.

Battery life doesn't equate to device life

While the financial resources for the replacement of devices are considerable, for many companies very little budget is dedicated to extending the lifespan of devices. For exam-

ple, organisations commonly tend to relate the end of a battery's life to the end life of the device. In many cases, the batteries of rugged devices such as handhelds, scanners and barcode readers are changeable and the hardware can live on. Almost all (91%) of the devices used by Australian organisations have replaceable batteries, yet only 35% of IT leaders' annual budget is earmarked for battery replacement.

Many organisations today default to the mindset that device battery failure automatically means the device itself needs to be replaced or the batteries in all devices are on the verge of failure and, as such, should be discarded. This should not be the case.

Battery failure is a common issue among enterprise IT and mobile device users. Nearly 80% of businesses experience mid-shift battery failure, and when it does happen, workers lose an average of 50 minutes of productivity. Keeping batteries healthy and devices online is a top priority, but it shouldn't be done at the expense of the environment.

An eco-friendly mindset is to look into all deployed and in-use batteries and replace and discard only those which need to be replaced and discarded. Shifting from blanket generalisations to accessing specific,

pinpoint data can help organisations reduce, reuse and rethink how they manage e-waste and mobile device recycling.

Reassess current strategies to benefit the environment

By reassessing the extent of your digital footprint and how expensive it is to retain current strategies, better environmental outcomes can be achieved. Enterprise devices aren't just mobiles, laptops and tablets — they are now also new innovations such as wearables, and old stalwarts like printers and a whole host of rugged handheld devices in between. Every time these operational devices are replaced, time and money are spent integrating and training staff to get up to speed while the old devices are discarded into landfill.

It's time for Australian organisations to find out which devices need replacing and which devices simply need better care to move into the next stage of their operational lives. With a renewed understanding around device lifecycles, a greater focus on fit-for-purpose devices and a better implementation of measures to extend device performance, enterprises can reduce their e-waste footprints and benefit the environment.

SOTI Inc. Australia
www.soti.net

Renewable fuel generation plant uses digital solution

Emerson and Toyota Australia have collaborated to transform part of Toyota Australia's operations into a commercial-grade hydrogen production, storage and refuelling plant. The project, supported by the Australian Renewable Energy Agency (ARENA), has enlisted Emerson to provide the control system that helps Toyota Australia demonstrate the technical and economic feasibility of manufacturing hydrogen fuels, including the use of renewable solar energy.

As low- and zero-emission vehicles capture a greater share of the market, countries around the globe need to expand access to renewable fuels such as hydrogen. Sustainable hydrogen projects are challenging because they need to integrate many data sources into one balance-of-plant system — a process that's critical for a facility's success.



For the Toyota Australia Hydrogen Centre, Emerson's DeltaV distributed control system gathers data from the plant's equipment, making it easier to monitor production and storage of hydrogen gas and to document and validate the sustainability of operations.

"By incorporating a digital automation foundation to eliminate data silos, Toyota Australia can not only significantly reduce costs, but also gain greater visibility into system performance, making it easier to maintain and report sustainability performance and increase productivity," said Mark

Bulanda, Executive President of Emerson's Automation Solutions business. "The data foundation Toyota has built will make it faster and easier for like-minded companies to replicate success as hydrogen refuelling networks continue to expand across the continent and the globe."

Edge control technology from Emerson's PACSystems will also be used to reduce the cost and complexity of integrating third-party systems, while Rosemount flame detectors will be used to help keep personnel and operations safe. The Toyota Australia team took advantage of pre-existing configuration libraries to reduce set-up time. Emerson says its technologies also create a platform to add future remote operations and data analytics more easily and cost-effectively.

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

Wastewater pump for Junee Prime Lamb

Junee Prime Lamb is one of the leading producers of premium quality lamb in Australia. A family-owned and -operated business since 1997, the company specialises exclusively in prime Australian lamb, and supplies its products to many parts of the world.

Its lamb processing facility, which is located on the outskirts of Junee, occupies 182,000 m² and employs nearly 300 highly trained staff. The production line is equipped with the latest technology to maintain strict hygiene standards and the business regularly reviews its processes to ensure they meet the highest quality standards for the industry.

When Operations Manager Scott Newton needed a wastewater pump for the facility, he wanted to source the best and most reliable product for the job. Newton already had quite a lot of experience with Gorman Rupp self-priming pumps at another large NSW abattoir and because of their history of reliability, ease of maintenance and long service life [even when operating in very harsh conditions], he opted for Gorman Rupp pumps again in the Junee upgrade.

The team at Hydro Innovations offered a Gorman-Rupp T3A60S-B "Super T Series" self-priming solids handling pump. It is capable of handling solids up to 63 mm and also stringy materials because of its "self-cleaning wear plate system". The pump also has a lightweight inspection cover-plate to allow quick access for operators to inspect pump internals or remove large pieces of debris. Being self-priming, it could be located at surface level, up to 7.5 m above the wastewater level.



The result

Newton has been very happy with his investment and firmly believes that buying quality equipment provides not only tangible returns in operational efficiency, but also intangible returns in peace of mind.

The Gorman-Rupp Super T Series range is available in sizes from 2" [50 mm] through to 10" [250 mm], with flows from 3 L/s through to 200 L/s. The range is also available in various materials of construction to suit specific applications, such as stainless steel components for corrosive wastewater and hardened components for abrasive fluids.

Hydro Innovations
www.hydroinnovations.com.au

INTERNATIONAL CLEANUP CONFERENCE

ADELAIDE 2022

ENVIRONMENTAL POLLUTION: *THE HIDDEN PANDEMIC*

INNOVATIVE SOLUTIONS FOR A SAFER,
CLEANER PLANET

11 - 15 SEPTEMBER 2022, ADELAIDE, AUSTRALIA.



Your only opportunity to network, collaborate and learn in the one location this year, with over 700 global contamination and remediation professionals merging science with industry.

Registration includes International PFAS Conference.

www.adelaide2022.cleanupconference.com

HANDHELD VIBRATION METER

The VM25 portable handheld vibration meter from Metra (MMF) measures acceleration, velocity and displacement. It comes with an external, magnetically mounted accelerometer, built-in infrared thermometer and rpm sensor for machine condition monitoring applications. The handheld meter can display the true RMS and peak value for vibration analysis assessment. It can also display the trend in graphical format with capability to perform spectral analysis. The vibration meter can interface with the PC software via USB connection for data management and archiving. The device can store up to 16,000 measurement points in its internal memory. It is easy to use, battery powered and offers low-power OLED coloured display for data visualisation.

The accelerometers come with the electronic VMID measuring points to allow automatic detection of measurement sites via the sensor's base. It has been used for machine monitoring applications according to ISO 10816 and roller bearing monitoring to VDI 3832. The product is also suitable for general-purpose vibration monitoring applications in laboratory and industry due to its simple configuration.

This pocket-sized measurement system is suitable for measuring acceleration up to 240 m/s², velocity up to 1 m/s and displacement up to 60 mm with 10 kHz frequency response.

Bestech Australia Pty Ltd
www.bestech.com.au



EV CHARGER

As part of the New South Wales (NSW) Government's strategy to encourage the uptake of electric vehicles (EVs), it recently announced a \$20 million grant program to deliver up to 3500 EV chargers in regional NSW. The co-funded grants can range from \$2000 to \$40,000 per site for EV chargers across regional NSW, with up to 75% of the grant available to go towards the cost of the charger and installation costs.

The FIMER FLEXA AC Wallbox Future Net EV charger has been listed on the approved charger list for organisations looking to receive a grant from the NSW Government to install and manage a public EV charger.

Designed and manufactured in Italy, the charger is available in either single phase or three phase, with power ratings of 3.7, 7.4, 11 and 22 kW, with a Type 2 cord or socket version.

The Future Net model's case is made from 100% recycled plastic and has advanced communication functionality, including 3G/4G, Bluetooth, Wi-Fi, RS485 and ethernet connectivity.

The charger is compatible with OCPP, 1.6 Json communication protocol, enabling integration into third-party payment management software such as Evertly and Chargefox.

Installation is easy as wall-mounted or mounted on a dedicated stand. If the site has multiple charging points, they can be configured to a master/slave arrangement and manage the load protocols to ensure the system is performing at its best 24/7.

The system has been designed to meet IK08 and IP55 standards, and constructed to be tamper-proof with backup functionality via SuperCap in case of a power loss.

FIMER Australia
www.fimer.com



FCAS METERING

SATEC's PRO Metering series provides solutions for FCAS metering. With continued expansion of solar, wind and other forms of renewable energy platforms, the monitoring of frequency and loads becomes critical. SATEC's solution provides monitoring of frequency with high resolution with four (4) decimals 0.0001 Hz, readings every 1 cycle (20 ms) and communications via Modbus, IEC 61850 and DNP. Furthermore, waveform capture, sags and swells power quality information can be provided as additional forensic data for analysis.

The series formats are DIN or panel mounted, providing multiple communications RS485, USB, dual Ethernet or daisy chain and expansion modules.

SATEC (Australia) Pty Ltd
www.satec-global.com.au



Energy Next clean energy expo in Sydney this July



© Stock-Adobe.com/au/Surasak

Sustainable, local energy sources and energy management are a focus for all communities and countries, and, with recent developments creating politically unstable global energy resources, this focus has become even more of a priority.

The free-to-attend exhibition, Energy Next, will be showcasing the latest clean energy innovation and technologies, connecting thought leaders, businesses and organisations to explore what Australia's clean energy future could look like.

The event will be held alongside Clean Energy Council's Australian Clean Energy Summit at the International Convention Centre (ICC) in Sydney on 19–20 July.

Energy Next will not only showcase the latest products and innovations on the exhibition floor, but there will be a packed schedule of presentations and talks from the country's top renewable energy experts, stimulating conversations and hopefully action around clean energy.

The areas to be discussed will include decarbonisation and green steel, traceability technology, energy management including the latest in energy storage such as the aluminium ion battery and microgrids, and the latest in PV and EV technologies.

Speakers include doctors and professors from the country's leading universities and leaders from the country's most innovative sustainable energy companies.

The addition of Energy Next to the Australian Clean Energy Summit will form a comprehensive clean energy event in NSW, generating even further conversations and connections to improve clean energy generation and adoption in the country.

"The combination of Energy Next with the Australian Clean Energy Summit offers significant added value by giving attendees first-hand exposure to the technologies and innovations driving Australia's clean energy transition. It will also help to increase collaboration across the industry, giving technology suppliers the opportunity to create connections and explore opportunities with the industry's most senior executives and decision-makers. The Clean Energy Council is delighted to welcome Energy Next to the Australian Clean Energy Summit and is looking forward to a fantastic event in July," said Kane Thornton, Chief Executive, Clean Energy Council.

Energy Next is organised by RX Global, the same people behind All-Energy Australia, one of the largest renewable energy events in the country. Across two days, Energy Next will bring a quality exhibition to New South Wales and provide workshops and

networking opportunities for those working in the clean energy industry.

"With NSW's exciting plans to shift to renewables, Energy Next's inaugural edition arrives on the industry's calendar at an important time and is well positioned to cater to the NSW clean energy market. The event is set to be the destination in NSW for the industry to connect with suppliers face to face, collaborate with peers and learn from industry experts about the latest industry developments. We're proud to be partnering with the Clean Energy Council in delivering an event that can help build the future of NSW's clean energy industry," said Robby Clark, Portfolio Director at Energy Next.

Energy Next is proudly supported by the NSW Government. Their support coincides with the state's Electricity Infrastructure Roadmap and \$750 million Net Zero Industry and Innovation Program, demonstrating the NSW Government's commitment to Australia's clean energy transition.

Event details

What: Energy Next

When: 19–20 July 2022

Where: ICC Sydney

Web: To access the program and register for free, visit www.energynext.com.au

SA's record biosolid yield a poo-tential win for farmers

A record-breaking 90,000 tonnes of biosolids are forecast to be collected in South Australia this financial year according to SA Water. If this amount is collected it will neatly surmount the yearly average of biosolids and will provide farmers with a free boost of soil nutrition.

Biosolids are created as a by-product wastewater treatment and are effectively human faeces that have been bacterially processed into a useful slurry. The ones collected by SA Water will be used to improve the soil quality for dry land crops like cereals or irrigated permanent crops such as citrus or vines. Producers and farmers are able to pick them up free of charge from the Bolivar Wastewater Treatment Plant.

"Biosolids are an increasingly popular method of improving soil quality by the state's primary producers, and by tapping into our accrued stocks of biosolids we've been able to significantly grow in our ability to meet this increasing demand," said SA Water's Senior Manager Production and Treatment Lisa Hannant.

"We have also been able to increase the amount of biosolids available for farmers by collecting more supply from our regional treatment plants located in Port Pirie, Port Augusta, Murray Bridge and the Adelaide Hills."

The biosolids are produced according to strict guidelines and regulatory requirements, with wastewater being run through a series of processes to convert it into a useful product. The previous record of over 86,000 tonnes of biosolid was set in



the 2007-08 financial year and the average amount in a year is about 55,000 tonnes.

"The production of biosolids is just one of the positive reuse benefits delivered through the wastewater treatment process, with one in every three litres of wastewater going on to be reused as recycled water in public parks and to supply dual-reticulation systems in housing developments across metropolitan Adelaide," Hannant said.

The biogas generated in the processing of wastewater is able to be used too, with about 15 gigawatts per hour being created per year, which was able to meet about 80% of the electricity needs of Adelaide's wastewater treatment plants.

SA Water

www.sawater.com.au

New research eats through plastic waste

Scientists in Texas are working on a variant of an enzyme that can break down plastic in mere days. The discovery of this enzyme by researchers at the University of Texas at Austin could help with environmental pollution by converting plastics waste into usable material, thus helping to clear out packed landfills and oceanic waste.

The enzymatic process is a circular one and focuses on breaking down polyethylene terephthalate (PET) plastic to its constituent parts and then putting them back together again into new material. Some plastics were broken down using the enzyme in only 24 hours, compared to the many hundreds of days it would take without the enzyme, which the researchers are calling FAST-PETase (functional, active, stable and tolerant PETase).

"The possibilities are endless across industries to leverage this leading-edge recycling process," said Hal Alper, professor in the McKetta Department of Chemical Engineering at UT Austin and one of the paper's authors. "Beyond the obvious waste management industry, this also provides corporations from every sector the opportunity to take a lead in recycling their products.



Through these more sustainable enzyme approaches, we can begin to envision a true circular plastics economy."

Only about 10% of all plastic has been recycled and it mostly ends up in landfill or being burnt. This enzyme, and others similar to it, would see plastics processed at low temperatures and in a circular fashion. The scientists were helped in the development of the enzyme

through the use of machine learning.

The research is due to be expanded on in the future as the team works to scale up production of the enzyme to allow for industrial and environmental applications and a patent application is in the works. There is a possibility of using the enzyme to break down plastics in landfills and waste-producing industries, as well as cleaning up polluted sites.

"When considering environmental clean-up applications, you need an enzyme that can work in the environment at ambient temperature. This requirement is where our tech has a huge advantage in the future," Alper said.

The study was published in *Nature*.



POWER OF CHOICE COMPLIANT SOLUTIONS

- > Accuracy Class 0.5S per IEC/AS 62053-22
- > 5-Minute Market Settlement Data Ready
- > MV90xi - Ethernet, WiFi, 4G, RS485
- > Dual communication options
- > Remote Disconnect Relay
- > RESTful API (JSON) - SaaS



Take control of your utilities from any device anywhere

SCALABLE ARCHITECTURE

MODEL	Power of Choice Ready		
	EM133XM	BFM136	BFM-II
INSTALLATION TYPE	SMALL	MEDIUM	LARGE
*ELECTRICITIES	Up to 3	Up to 36	Up to 54
UTILITIES	Up to 14	*Up to 72 With BFM utility module	Up to 72



Listening out for water leaks

A two-year trial to detect hidden leaks using acoustic listening technology has saved Sydney Water \$20 million worth of water.

Developed in collaboration with University of Technology Sydney (UTS), Detection Services, WaterGroup and Ovarro, the sensors — which are designed to target non-surfacing leaks up to 200 m away — have helped saved 9000 megalitres of water.

Sydney Water's Head of Customer Hub, Darren Cash, said this technology has enhanced Sydney Water's existing leak prevention efforts and reduced customer disruption and water loss.

"We have embedded 600 devices into Sydney Water's water-main network, and as a result, we've discovered 160 hidden leaks by identifying the sound of water rushing through a break in the pipe," Cash said.

"This has allowed us to demonstrate world-leading capability in adapting acoustic sensing to target non-surfacing leaks, some of which may have been active for an estimated five to ten years.

"It also allows us to forecast and plan water main renewals with more confidence. Currently, prediction accuracy using one model of sensor is approximately 95%," Cash said.

The sensors are set to record in the early hours of the morning when surrounding noises are lower and more accurate recording can be picked up. These devices can be easily shifted to another area once they have served their purpose in one area.

Logger locations and leak alarms are visible in a web portal developed by UTS, which consolidates all acoustic sensor data from various sensor manufacturers. Changes in the water network are monitored so that work crews can quickly be on the scene



to localise and repair the faulty pipe, minimising disruption to motorists and the water utility's customers.

The sensors will now be integrated into Sydney Water's business-as-usual approach, which will result in planned and scheduled maintenance works, reducing the need for reactive maintenance in those areas covered by sensors.

Sydney Water Corporation

www.sydneywater.com.au



ELECTRIFYING VEHICLES IN UNDERGROUND MINE SITES

Currently, there are no battery electric vehicles (BEVs) commercially available or certified for use in an Australian underground (UG) coalmine.

DriftEx has been designed as a conversion package, engineered specifically for the Driftrunner personnel carrier vehicles that are widely used in the UG coal sector. The solution involves replacing the diesel engine with an explosion protected electrical powertrain for use in an UG coalmine. The concept here is that mine sites can perform this electric vehicle conversion while performing the scheduled overhaul of their diesel vehicle.

The solution is designed to support decarbonisation initiatives in the Australian UG coal sector and remove a harmful substance (diesel particulates) from the underground working environment.

Intrinsic Safety (I.S.) protection employed in the battery pack is the main element that allows it to be safely used in a UG coalmine. Furthermore, the battery system has been designed and engineered so that it has the capability for fast charging. Provided an EV charger with the right power capacity is used, it is possible to charge the battery from flat to full in 10–15 min.

The design and engineering of DriftEx enables business sustainability intent within the UG coalmining industry through health benefits of the site and the site's health in relation to energy use.

Ampcontrol Pty Ltd

www.ampcontrolgroup.com

Underground hydrogen storage study launched

CO2CRC and its research partners CSIRO and Geoscience Australia are conducting a study into the development of geological storage of hydrogen — that is, storing hydrogen underground — to make it possible to store more hydrogen in the future.

Australia's hydrogen industry is expected to increase 40% come 2030 and its export value could be \$5.7 billion by 2040. However, in order to facilitate this and the expected large supply chain that would support it, different storage options need to be developed.

Underground Hydrogen Storage (UHS) would be a means of increasing hydrogen storage capacity, which in turn would allow for the alternative energy source to be better mobilised in response to supply and demand and seasonal fluctuations. Current surface hydrogen storage facilities will be inadequate to meet future projected demand.

"Australia has the technical knowledge and natural resources to become a global leader in hydrogen production and export,"



said Dr Matthias Raab, Chief Executive, CO2CRC.

"Key to the successful implementation of a full-scale hydrogen economy [is] large-scale storage, and geological formations present an ideal solution. This Underground Hydrogen Storage Project will fortify Australia's position as a technical leader in the global transition to a hydrogen economy and net-zero future."

The study, run by CO2CRC and CSIRO, is aiming to respond to potential technical issues including fundamental hydrogen storage processes, hydrogen withdrawal effectiveness and integration of UHS between hydrogen production and downstream distribution. It is being funded by Beyond H2, a member of the NERA Clayton Hydrogen Technology Cluster, which is pursuing the development of Australia's hydrogen economy.

The study will develop a pathway for a field demonstration of UHS as well as a site development methodology for a site that can operate at commercial scale. CO2CRC has provided a webpage for the project.

ENERGY
NEXT

EXHIBITION • TRAINING • NETWORKING

IN PARTNERSHIP WITH

CLEAN
ENERGY
COUNCIL

19-20 JULY •
ICC SYDNEY


REGISTER FOR THIS
FREE-TO-ATTEND EVENT

- DISCOVER
new products and technologies
- LEARN
about new industry trends
- ATTEND
business and educational sessions

LEARN MORE AT [ENERGYNEXT.COM.AU](https://energynext.com.au)

Native plants can passively remove PFAS-contaminated water

Newly published research has demonstrated that native Australian plants can be used to remediate PFAS pollutants floating in wetlands.

Conducted by the University of South Australia, CSIRO and the University of Western Australia, the research used three native plants, *Phragmites australis*, *Baumea articulata* and *Juncus kraussii*, to remove PFAS. *Phragmites australis* was able to reduce legacy PFAS contaminants by 42–53%.

PFASs — or per- and polyfluoroalkyl substances — have been associated with health effects such as a decline in fertility, developmental delays in children and an increased risk of cancers. The chemicals have been used in non-stick cookware, fire-extinguishing medium and stain-resistant coatings, among other applications, but their health impacts have caused some obvious consternation about their presence in water systems. This research offers the ability to remove the chemicals from the environment in a green, sustainable and cost-effective way by simply cultivating native plants.



“PFASs are often referred to as ‘forever chemicals’ because they don’t break down, instead accumulating in the environment and in our bodies where they can cause adverse health effects,” said Dr John Awad from the University of South Australia and the CSIRO.

“In Australia, PFAS concerns often relate to the use of firefighting foam — especially legacy firefighting foam — which accumulates in the surface water of our waterways.


“Our research tested the effectiveness of Australian rushes to remove PFAS chemicals from stormwater, finding that *Phragmites australis* was the most effective at absorbing chemicals through its roots and shoots.”

The study used floating structures called constructed floating wetlands which can be moved about and placed in various bodies of water to be flexibly adapted to remove PFASs by providing a location for the native plants to grow and work their magic.

The research was published in the *Journal of Hazardous Materials*.



2022 Water Industry Operations Conference & Exhibitions




VIC
22 & 23 JUNE

QLD
3 & 4 AUG

SA
9 & 10 NOV

WIOA stages annual conferences in NSW, Victoria, Queensland and South Australia providing a forum for individuals involved in water operations to:

- Listen and learn from the experience of others through the latest “operational” technical and research based information provided in platform and poster presentations.
- View and discuss the latest advances in technical equipment, products and services with equipment manufacturers, suppliers and industry consultants.
- Update their knowledge and skills through interaction with fellow water industry employees.

Prime Sponsors


Media Partners


REGISTER NOW **W** wioaconferences.org.au **E** info@wioa.org.au **P** 03 5821 6744

Researchers build electrical device from household waste

Researchers from the University of Surrey have developed a wearable device that has been made from simple household garbage and that charges itself through movement.

Made from discarded paper wipes and plastic cups, the device is able to harness the static electricity that is brought about by regular movement through the principle of electrostatic induction and the use of triboelectric nanogenerators. It is not especially functional, only serving to process Morse code, but stands as a basis for further development.

"It won't be long until we have to ask ourselves which of the items we own are not connected to the internet," said Dr Bhaskar Dudem, project lead and Research Fellow at the University of Surrey's Advanced Technology Institute.

"However, the current Internet of Things (IoT) revolution highlights the simple fact that our planet doesn't have the raw resources to continue to make these devices which are in such high demand.

"Our research demonstrates that there is a path to creating sustainable technology that runs on electricity powered by us, the users of that technology."

The full paper detailing the device was published in *ACS Applied Materials & Interfaces* and the researchers are assessing how to utilise the technology in smart watches and IoT systems.



AUSTRALASIAN Waste & Recycling Expo



REUNITING THE WASTE & RECYCLING INDUSTRY IN AUGUST 2022.

The waste, recycling and resource recovery industry has continued to boom with the increased attention, not only at a consumer level, but also at a commercial and industrial scale.

AWRE is where waste professionals come together to join forces and showcase a world of solutions towards a cleaner, more sustainable future.

Discover new and innovative solutions, learn from industry leaders and build face-to-face connections as the thriving sector reunites at AWRE 2022.



24-25 AUGUST 2022
ICC SYDNEY

REGISTER NOW



Get your FREE trade pass

Australia can help lower carbon emissions in APAC: study



©stock.adobe.com/au/myphotobank.com.au

Australia could lower carbon emissions in the Asia-Pacific region by exporting zero-carbon commodities such as electricity, green hydrogen and green metals, according to new research by experts at The Australian National University (ANU).

The study of Australia's potential to supply zero-carbon commodities to the Asia-Pacific region is said to be the first to quantify the energy, land and water requirements of a new zero-carbon export model for Australia.

The study shows Australia could reduce the Asia-Pacific region's greenhouse gas emissions by about 8.6% if the current level of key commodity exports such as thermal coal, liquefied natural gas, iron ore, bauxite and alumina could be replaced by green alternatives.

To do so would require about 2% of Australia's land area for solar and wind farms.

Lead author Professor Paul Burke, from the ANU Crawford School of Public Policy, says Australia has a big opportunity.

"Australia is one of the world's largest exporters of fossil fuels, and we have a real chance to shift to a much cleaner export

bundle," he said. "Becoming a clean commodity exporter could generate sustainable export revenues for Australia and play a useful role in reducing greenhouse gas emissions well beyond our border."

The International Energy Agency's 2020 World Energy Outlook estimated countries in the Asia-Pacific contributed about half of global carbon dioxide emissions from energy use in 2019. The Asia-Pacific is expected to account for almost two-thirds of global energy demand growth over the next two decades.

Countries such as China, Japan, South Korea, India and Indonesia have already announced net-zero emission targets.

Fellow authors Dr Fiona Beck, Dr Emma Aisbett and Professor Ken Baldwin say the way Australia sources and uses energy is transitioning rapidly and the country has an opportunity to lead the way globally.

"Australia has fantastic wind and solar resources, meaning that the area of land needed to produce zero-carbon energy exports is relatively small, and the required solar panels and wind farms could be co-located with existing land uses such as livestock grazing," Dr Beck said.

Dr Aisbett said emissions from overseas use of Australia's fossil fuel and ore exports currently dwarf domestic greenhouse emissions.

"With appropriate policy settings, Australia has an opportunity to make major contributions to achieving sustainable development goals in the Asia-Pacific, including for remote Aboriginal communities in Australia," she said.

Professor Baldwin said Australia is well placed to become a regional powerhouse for renewable energy.

"Substantial investment is needed to become a major supplier of zero-carbon energy and materials to the Asia-Pacific. This is potentially greater than the investment needed for Australia's domestic energy transition," he said.

The study, *Contributing to regional decarbonisation: Australia's potential to supply zero-carbon commodities to the Asia-Pacific*, has been published by *Science Direct* as part of the Zero-Carbon Energy for the Asia-Pacific Grand Challenge at ANU.

An open access version of the study is available here.

Australian National University
www.anu.edu.au

FREE

to industry and business professionals



The magazine you are reading is just one of 11 published by Westwick-Farrow Media. To receive your **free subscription** (magazine and eNewsletter), visit the link below.



www.WFMedia.com.au/subscribe



GREEN!

- Low power consumption on standby
- No locked rotor current on starting
- Low running current inverter drive
- Good for Solar and irrigation applications
- Can easily be UPS or battery supported

auma®

Solutions for a world in motion

BARRON

78 Dickson Avenue Artarmon NSW 2064

Telephone: (02) 8437 4300

Email: info@barron.com.au Website: www.barron.com.au

BARRON GJM PTY LTD

ABN 90 003 560 076