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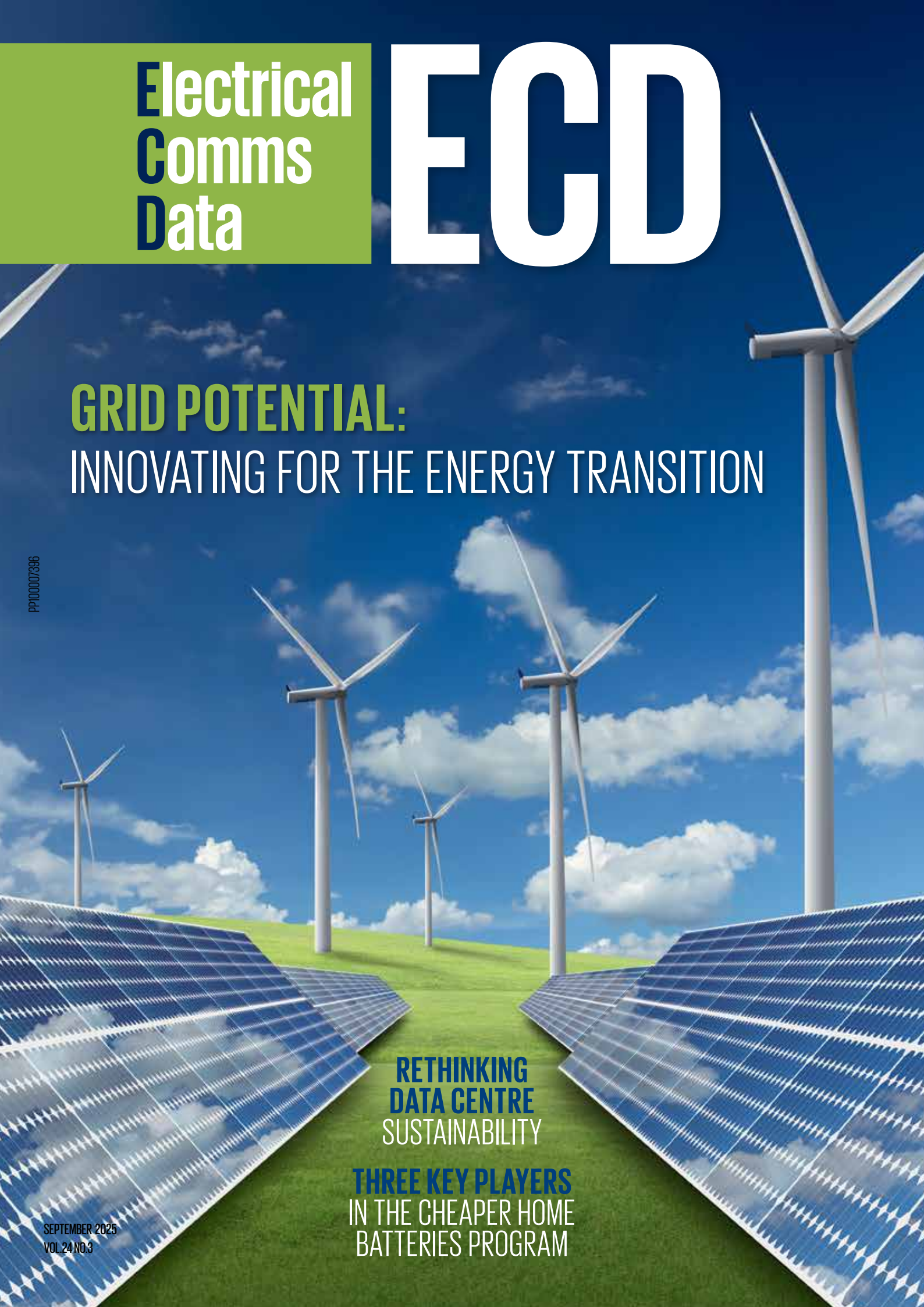

RETHINKING DATA CENTRE SUSTAINABILITY

THREE KEY PLAYERS IN THE CHEAPER HOME BATTERIES PROGRAM

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FROM THE EDITOR

Welcome to *ECD*'s spring issue, where sustainability continues to be a key concern for those who work in energy infrastructure.

Residential solar is booming, with one in two Australians looking to install a household battery alongside a new or existing rooftop solar system, according to a recent Climate Council report. Supporting the boom are various state and federal government initiatives, including the latter's $2.3 billion Cheaper Home Batteries Program, which offers a discount to households and small businesses installing small-scale battery systems. In our lead article on page 4, experienced solar installer Mark Wright digs into one aspect of this program by reviewing three batteries that have been approved by the Clean Energy Council — a requirement for inclusion in the scheme.

Like solar installations, data centres are also set to multiply, especially with the increasing adoption of generative AI. Unlike solar, however, this presents a significant challenge for sustainability rather than a means of supporting it. To maintain system security, for example, the AEMC is currently updating its grid connection rules in anticipation of massive energy demand from hyperscale data centres — which also consume huge volumes of water.

So how do we address this problem? Our interviewee on page 14, OVHcloud's Terry Maiolo, believes the issue will require a fundamental shift in how infrastructure is designed, powered and managed. He discusses a range of measures that will need to be taken in order to achieve this transformation — something that should also create opportunities for those working across sustainable infrastructure.

Innovating for a sustainable grid is a big theme throughout the magazine. On page 24, Heini Kloster makes a case for reconductoring aging electrical grids to upgrade transmission capacity; researchers look into the feasibility of space-based solar arrays on page 28; and on page 31, one of the biggest batteries in the world comes online in New South Wales.

Katerina Sakkas — Editor
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THREE KEY PLAYERS IN THE CHEAPER HOME BATTERIES PROGRAM

*Mark Wright**

In this in-depth review, solar installer Mark Wright examines three batteries approved for use in Australia's solar PV rebate scheme.

In July this year, the federal government announced the Cheaper Home Batteries Program. The program is administered by the Department of Climate Change, Energy, Environment and Water (DCCEEW) with funding allocated by the Clean Energy Regulator (CER), which is responsible for the solar PV rebates.

The program provides the upfront cost for new or existing solar power systems to install a CEC-approved battery between 5 and 100 kWh (although only the first 50 kWh is eligible). While many residential customers who install a 10 kWh battery on a solar PV system would typically see a rebate of approximately $3500 applied, in rural areas, where there is no reliance on a grid connection, storage would typically be much larger.

My company, Stand Alone Power Systems, has performed many rural off-grid installations, which typically have about 50 kWh battery capacity. ›

The rebate applied to a 50 kWh battery installed in an off-grid solar power system is approximately $18,000+. There are a few eligibility requirements; more on this at the end of this review. This article discusses three lithium batteries that are designed for both grid-connected and off-grid solar PV systems.

BYD B-BOX LV FLEX

BYD began making batteries in 1995 for the global market. The company entered the EV market in 2022 after establishing a global reputation as a lithium battery manufacturer and supplier to many EV companies. BYD's product range consists of both residential and commercial batteries.

The BYD B-BOX LV FLEX is a 48-volt 5 kWh battery. In terms of its flexibility, the LV Flex can be stacked up to 64 units, equivalent to 320 kWh, making it ideal for off-grid power systems. In this example, the BYD LV Flex is an excellent choice of product because it allows for future expansion with relative ease — especially where a customer may already have an existing solar PV system and have a surplus of solar generation, which has been a trend with many solar companies selling larger systems due to attractive rebates at the time.

Another great feature of the LV Flex is the number of inverter manufacturers it's capable of working with, most of which are approved by the CEC, meaning that this battery is eligible for the cheaper home battery rebate.

BYD's continual expansion in Australia is expected to solidify its position as a major player in the battery storage and EV markets. The BYD EV Sealin 7 SUV has knocked off the Tesla Model Yas in Australia (July).

ZYC's SIMPO 5000

ZYC, a Chinese-based battery manufacturer, has had a presence in the energy storage industry for over 10 years, specialising in advanced off-grid energy storage systems. It maintains distribution networks across Europe, Australia and Africa. In late 2023, ZYC launched its flagship SIMPO 5000 battery (5.12 kWh) $LiFePO_4$ module, which is compact yet scalable. In terms of scalability, the SIMPO can be expanded up to 80 units or 409 kWh in total capacity. ZYC's influence in the Australian market is beginning to be felt.

The Simpo 5000 is suited to both smaller (<10 kWh) residential systems and larger (>50 kWh) commercial off-grid systems. ZYC has installed systems in partnerships with local off-grid solar installers. The ZYC Simpo 5000 is CEC-approved for the Cheaper Home Battery Program and is warrantied for 10 years.

It will be interesting to see how the ZYC company positions itself against other, more established battery manufacturers.

PowerPlus eco4840P

PowerPlus is Australia's largest lithium battery manufacturer. Headquartered in Melbourne since 2017, the company designs and assembles imported LiFeP cells for a range of energy storage products for off-grid, hybrid and commercial systems.

The PowerPlus eco4840P is a 48-volt 4.7 kWh unlimited stackable battery. It is a popular option for off-grid installers in Australia because it is locally supported, designed for Australian conditions (being heat-tolerant and robust), and generally uses conservative ratings.

Due to their conservative ratings, it is fair to compare the eco4840P with the BYD and ZYC product range. All three have a 10-year warranty. The eco4840P is slightly more expensive than the Chinese brands for obvious reasons.

The greatest advantage of the eco4840P is that it is unlimited by the number of units that can be stacked, leading to an edge over its competitors (although it requires additional comms equipment). Also, the fact that the eco4840P's physical dimensions and weight are more than BYD or ZYC suggests that its specifications may be very conservatively underrated.

The eco4840P has also partnered with many leading brands of Australian inverters; therefore, you would expect excellent local support for any size of off-grid system.

Like any comparison between products, the devil is in the details. While all three products offer the same 10-year warranty, the BYD LV Flex warranty only applies to systems less than 50 kWh — above that, a commercial warranty applies, meaning that the installer must be an authorised BYD partner.

The other notable point in terms of specifications is that both BYD and PowerPlus claim a 60% usable capacity after 10 years, whereas ZYC claims a 70% capacity. It would be worthwhile seeing how long ZYC sticks around. Comparisons between cycle life are as follows:

PowerPlus Energy ECO4840P (4.7 kWh, $LiFePO_4$)

- Published cycle life (by DoD): (depth of discharge)
- 50% DoD: 7000–10,000 cycles
- 75% DoD: 4000–5,000 cycles
- 80% DoD: 3560–4,000 cycles

BYD Battery-Box LV FLEX / FLEX Lite (5.0 kWh module, $LiFePO_4$)

- Published cycle life: BYD does not state a cycle count for LV FLEX; it specifies usable energy at 100% DoD test conditions.
- What that means for 10 years: designed for daily cycling; actual life is governed by the throughput cap + 60% capacity guarantee rather than a published cycle number.

ZYC SIMPO 5000 (5.12 kWh, $LiFePO_4$)

- Published cycle life: >6000 cycles (at 25 ˚C)
- What that means for 10 years: >6000 cycles is well above 3650 daily cycles; the 70% SoH promise is a slightly stronger capacity retention than BYD's.

ZYC, A CHINESE-BASED BATTERY MANUFACTURER, HAS HAD A PRESENCE IN THE ENERGY STORAGE INDUSTRY FOR OVER 10 YEARS, SPECIALISING IN ADVANCED OFF-GRID ENERGY STORAGE SYSTEMS.

Eligibility

Eligibility requirements for the Cheaper Home Batteries Program for installations connected to the grid require that the system is virtual power plant (VPP)- capable. For systems off-grid, the eligibility requirements are that if the system is less than 1 kilometre from the grid, then it must be VPP-capable. For systems more than 1 kilometre from the grid, the cost of grid connection must be $30,000 or more (excluding trenches or overhead wiring to your home), or the system must be VPP-capable.

**Mark Wright is the founder of Stand Alone Power Systems (2006), which has been providing off-grid solar energy systems in Queensland and NSW for almost 20 years.*

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Image: Supplied

Official groundbreaking ceremony for the Bulabul Battery, Wellington, NSW.

WIRADJURI COMMUNITY SECURES EQUITY OWNERSHIP IN WELLINGTON BESS

An Indigenous community-led corporation in Wellington, NSW, has entered into an agreement that gives it the right to take long-term equity ownership in the local Wellington Stage 1 BESS.

Named Wambal Bila (Wiradjuri for "mountain-river"), the new corporation is led by Wiradjuri people who are accountable to its membership, which is open to the Wellington Aboriginal community.

"It's great to see First Nations communities working with proponents to develop and trial innovative arrangements, including equity, towards clean energy solutions and benefit sharing," said Karrina Nolan, co-Chair of the First Nations Clean Energy Network.

The equity right gives Wambal Bila the option to take a 5% equity stake in the battery project, with the underlying stake including both a right to a preferred, fixed annual return and a share of ongoing equity returns alongside other investors.

The equity arrangement was developed between Wambal Bila and and independent power company AMPYR Australia under a set of agreements which will see AMPYR Australia provide up to $300,000 to support Wambal Bila to establish its initial operations. Wambal Bila and AMPYR Australia will also seek to agree to a similar equity stake in the Wellington Stage 2 BESS.

As part of the agreement, the project will be renamed the Bulabul Battery. Bulabul means "two acting together" in Wiradjuri, representing the partnership between the community and the project. The concept also reflects the meeting of the Bell and Macquarie rivers at Wellington — an important local landmark and an inspiration for the Bulabul Battery logo.

"The creation of Wambal Bila is a testament to a new era of partnership and empowerment within the energy sector," said Wambal Bila Director Keiyana Guihot. "It ensures that the benefits of the Bulabul Battery project flow directly back to our community, enabling us to invest in our cultural heritage, create economic opportunities, and support the wellbeing of our people for generations to come. We believe this model will inspire similar collaborations across the industry."

Alex Wonhas, CEO of AMPYR Australia, said the agreement was a major turning point for large energy projects. "At AMPYR, we're extremely proud to work alongside Wambal Bila to shift the focus from short-term regional construction jobs to empowering communities through long-term ownership and sustained benefit," he said.

EV INCENTIVES MUST BE RETAINED: ELECTRIC VEHICLE COUNCIL

Following a record-breaking quarter for EV sales in Australia, the Electric Vehicle Council is urging the government to retain its EV incentives and policies in order to sustain uptake and drive down emissions.

Figures from the Australian Automobile Association show 41,146 new EVs were sold across the country in the second quarter of 2025, which:

- includes 29,244 battery electric vehicles (BEVs) and 11,902 plug-in hybrid electric vehicles (PHEVs);
- represents 13.1% of all new car sales for the quarter; and
- is up 37% on Q2 2024, when 30,028 EVs were sold and represented 9.59% of sales.

"Australian drivers are discovering what early adopters already knew: electric vehicles are better for the family budget. They're great to drive, better for the environment and cheaper to run," said Electric Vehicle Council CEO Julie Delvecchio.

"It's encouraging to see EV sales climb, but we're still in the early stages of the transition, and numbers remain well short of what's needed for a self-sustaining market. Electric vehicles need to make up at least 30% of all new car sales in Australia before governments can responsibly consider withdrawing incentives or imposing taxes."

Delvecchio cautioned that the Productivity Commission's call for road user charges and the removal of the FBT incentive risked slamming the brakes on growth. "These proposed changes will abruptly stall the shift to EVs, which benefit everyone through lower energy bills and cleaner air," she said.

"Australia's strongest quarter for EV sales yet is a testament to the current federal policies and incentives fuelling this growth. The New Vehicle Efficiency Standard is giving Australians more choice than ever before in low- and zero-emission cars. Combined with the discount on EVs through the FBT exemption, more everyday Australians are making the switch — and once they go electric, they don't look back."

Delvecchio said that with transport set to become Australia's largest emissions source by 2030, it was essential to keep supporting and motivating Australians to choose electric vehicles.


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AUSNET LAUNCHES DISTRIBUTION TRAINEESHIPS

AusNet has launched a traineeship program to boost Victoria's energy transition. The energy company is offering nine three-year distribution traineeships, with six of these based in regional Victoria and three in Melbourne.

"This is a great opportunity to enter and play your part in Australia's transition to net zero," said Andrew Linnie, AusNet Executive General Manager Distribution.

"We are creating meaningful careers in our regional communities, building the skills needed for the energy transition and helping Victoria meet its renewable energy and emissions targets."

AusNet is committing over $3 million to the program, in which trainees are provided with a $78,000 annual salary, hands-on experience, and the chance to live and work locally. At the end of three years, participants will graduate with a nationally recognised Advanced Diploma of ESI – Power Systems and a clear pathway into a permanent role.

Trainees will learn face-to-face alongside fellow trainees, building strong professional networks and shared knowledge.

While everyone completes the same qualification, the learning will be tailored to one of three specialised technical streams:

Network Connection Traineeship roles will be on offer in Sale, Bairnsdale, Seymour and Leongatha, while Traineeships in Access Planning will be available in Beaconsfield, Seymour and Traralgon. Distribution Control & Operations roles will be offered in Melbourne.

To qualify for the traineeships, applicants need to have completed Year 12 by the end of 2025 with strong performances in maths/science, have unrestricted working rights in Australia, access to a vehicle and a valid driver's licence, and be able to travel monthly for training if the role is based outside of Melbourne.

After completing the program, trainees will be fully qualified and ready to apply for a permanent role within their chosen stream.

"This is a unique opportunity to work in the energy industry, make a difference in the communities we operate in, and leave a positive legacy," Linnie said.

More information is available at: www.ausnetservices.com.au/trainees.

NEW MOBILE TOWERS TARGET WESTERN VIC BLACKSPOTS

AusNet plans to build three new mobile communication towers in Western Victoria as part of the Community Benefits Program of its Western Renewables Link (WRL) project.

Currently in the development phase, the Western Renewables Link is a proposed 190 km, 500 kV, overhead high-voltage electricity transmission line that will carry renewable energy from near Bulgana in Western Victoria to Sydenham in Melbourne's north-west.

AusNet has been contracted by the Australian Energy Market Operator (AEMO) to develop and deliver the WRL, which will connect wind and solar energy generators in Western Victoria to the grid, powering more than one million homes across the state.

The new mobile towers, planned for Lexton, Smeaton and Coimadai, should fix several major network blackspots, benefiting local residents and businesses as well as supporting emergency response. The WRL project has committed to invest more than $3 million on the towers.

Intended to provide improved 4G and 5G coverage, the planned installation of the new mobile base stations follows feasibility work undertaken by Telstra, which recognised the need for mobile service improvement in these locations.

Gerard Carew, AusNet General Manager, Major Projects and lead for the Western Renewables Link project, said that during the project's ongoing consultation with the community, AusNet received feedback that fixing the mobile blackspots would be a significant benefit.

"Reliable communication is vital to modern life, such as families staying in touch with relatives, students doing homework, employees working from home and people running local businesses," Carew said.

"These new towers will help deliver a noticeably improved connectivity experience for locals and visitors in these areas.

"Most importantly, we have been told that improving mobile connectivity will support community safety, particularly during emergencies," he added.

Regional Development Australia (RDA) Grampians Chair Michael Tudball said that the increased mobile connectivity brought by these towers would help to safeguard regional communities during future emergency events.

"Something RDA Grampians has been passionately advocating for is for providers to ensure that people can access mobile networks when they most need them," Tudball said.

Industrial cam switches

LAPP Australia has added the PCE Merz range of cam switches to its growing industrial automation portfolio — providing Australian industry with access to German-engineered switching solutions backed by local expertise.

Merz cam switches are precision-engineered for control and load-switching duties in a wide variety of industrial and commercial settings. Applications include motor control, isolating and changeover switches, and main or auxiliary switching functions for control panels and machinery.

Built to deliver long service life and dependable performance under tough conditions, Merz cam switches are deployed worldwide across sectors such as manufacturing, materials handling, food and beverage, mining, and utilities.

The range includes rotary cam switches with versatile configurations, compact designs, and robust construction for high switching capacity and mechanical endurance. Each unit is designed for easy installation and integration into new or existing systems.

LAPP Australia's expansion into switching solutions is supported by local stock availability, fast delivery, and technical expertise to assist with product selection and integration.

LAPP Australia Pty Ltd

lappaustralia.com.au

MTP/MPO patch cords

Warren & Brown Technologies' HypaFOX MTP/MPO patch cords are engineered for high-performance, high-density fibre networks — making them suitable for data centres, enterprise backbones, co-location facilities and other mission-critical environments.

Manufactured in Australia and available in a wide range of fibre types, lengths and connector configurations, the cables are designed to provide strong performance, reliability and scalability. Every cord is terminated and inspected to a high standard, for optimum optical and mechanical integrity.

Key features include multi-fibre connectivity (8, 12, 24, 48+ cores) for space-saving efficiency; tool-free, pre-terminated design for rapid deployment; and low smoke zero halogen (LSZH) jackets for safe, environmentally responsible installations. Designed to eliminate downtime, the cords are fully customisable to specific infrastructure needs and can be used in 40G, 100G and 400G deployments.

Warren & Brown Technologies

wbt.com.au

Cable reel trolley and stand

With manual handling issues a continuing concern on construction sites across Australia, A-frame cable drum stands and cable drum rollers provide a safe and cost-effective means of improving safety and productivity when handling cables.

Now available with upgraded wheels and pneumatic tyres, the Adept Cable Drum Trolley is supplied complete with durable powder-coated 'safety' yellow support frames and a galvanised steel axle. The A-frames of the trolley can be locked into position on the axle thumbscrews, once the cable reels are in position. This feature also allows for quick dismantling for transporting or for storage when the job is done. The cable drum trolley provides a convenient and easy means for one person to convey rolls of cable around a building site. It has capacity for multiple rolls of wire and cable, to be paid out at the same time.

The Adept Mobile Cable Drum Support is designed and manufactured in Australia using Australian steel. The maximum wire roll size is 1000 mm wide with a safe working load of 120 kg.

Adept Direct

www.adeptdirect.com.au

Plastic cable gland for hazardous areas

PFLITSCH has expanded its blueglobe cable gland range with the PC HT Ex e, a high-performance plastic gland specifically designed for increased safety (Ex e) applications in hazardous areas. Certified for use in Ex Zone 1 and 2 (gas) and Zone 21 and 22 (dust), the blueglobe PC HT Ex e is designed to provide secure cable entry with good strain relief and sealing.

Constructed from robust polycarbonate (PC), it offers high mechanical strength and long-term UV resistance. It is signiï¬ cantly lighter than metallic alternatives, which is particularly advantageous in applications with weight restrictions (eg, portable devices or installations at lofty heights). The HT (high temperature) variant extends application potential by tolerating elevated temperatures, making it suitable for demanding industrial environments, including chemical, petrochemical and offshore sectors.

Like all blueglobe cable glands, the product features a blue sealing insert, which provides uniform sealing pressure and protects cable sheathing from damage. It supports a wide clamping range while providing IP66/IP68 protection.

A lightweight, corrosion-resistant solution, the blueglobe PC HT Ex e is designed to offer safe performance where metal glands may not be necessary or feasible.

Treotham Automation Pty Ltd

www.treotham.com.au

Battery energy storage system-as-a-service

ABB's battery energy storage system-as-a-service (BESS-as-a-Service) is a flexible, zero-CapEx solution designed to accelerate the shift to clean, resilient and affordable energy. It is the first in a range of next-generation service models being developed by ABB to remove the barriers to clean technology adoption and accelerate industries' transition to net zero.

Requiring no upfront capital investment, the service allows a wide range of industries — such as data centres, transport and logistics, and commercial buildings — to benefit from advanced energy storage through a quarterly service fee. The offer includes all hardware, software and life cycle support, with ABB managing deployment, maintenance and optimisation so businesses can focus on their core operations while improving energy efficiency, resilience and long-term sustainability.

The service is designed to work with any type of battery technology, giving customers the flexibility to take advantage of the latest innovations without being tied to a single system. It is underpinned by performance guarantees, as well as coverage for maintenance costs and energy trading brokerage fees. By managing all aspects of energy market participation, ABB aims to enable customers to receive immediate financial benefits from selling excess energy.

ABB Australia Pty Ltd

www.abbaustralia.com.au

CASE STUDY

Shooting for 'true zero'

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Sydney's Circular Quay, with the tall blue Salesforce Tower on the right.

Greenhouse is a climate tech hub with headquarters in the imposing Salesforce Tower at Sydney's Circular Quay. The organisation, which describes itself as Australia's largest dedicated climate tech co-working space, brings together over 1000 climate innovators, founders, investors and government agencies under one roof to accelerate the development and deployment of climate solutions.

Greenhouse recently entered into an experimental partnership with Flow Power, an Australian renewable energy retailer, to road-test a new system where energy consumption is matched to renewable energy generation in real time, 24/7.

Under the new front-of-meter solar energy supply agreement with Flow Power, Greenhouse will purchase an amount of GreenPower-certified renewable energy that is put into the grid. That amount will closely match the energy consumed by Greenhouse's Sydney office. Under the agreement, Greenhouse will be powered by 100% GreenPower-certified renewable energy from an accredited generator.

As part of their partnership, Greenhouse and Flow Power are exploring how they can make advances towards 'true zero' electricity. Unlike the more commonly known net zero, which relies on mechanisms such as carbon credits or offsets, true zero aims to use renewable energy in real time, all the time. Time-matching consumption to generation is one of the key drivers for this new approach.

"At Greenhouse, we believe climate innovation must be grounded in action, not just ambition," said Ed Schmidt, COO at Greenhouse. "As home to over 1000 climate business founders, innovators, investors and advocates, we've built a thriving ecosystem where bold ideas are developed, demonstrated and scaled. Our space is a platform for real-world climate solutions to take shape, grow and lead the way forward.

"Our partnership with Flow Power is a powerful example of how we walk the talk. By running our operations on 100% renewable energy, we're not only reducing our own footprint — we're setting a new benchmark for what true zero can look like in practice. This collaboration shows how businesses can lead from the front, accelerating the clean energy transition through innovation, partnership and decisive climate action."

A load-following battery charge/discharge control strategy will be used to demonstrate, as a first step, that Greenhouse's electricity usage can be matched in real time with 24/7 renewable electricity generation or storage. Utilising its proprietary kWatch technology, Flow Power will closely monitor Greenhouse's consumption patterns in real time and aim to ensure that the organisation's energy demands are matched with generation and potentially storage from Flow Power's portfolio of renewable generation projects.

With an initial contract running until December 2025, the companies hope their pilot project will create a pioneering model for other businesses, as well as help to shape a future energy management plan for Greenhouse.

Flow Power's Chief Revenue Officer, Jacob Mahoney, said that while carbon credits and offsets had been key to stimulating renewable energy investment, Flow Power believes that time matching will be the next step in decarbonisation.

"Through this partnership with Greenhouse, we are so excited to take true zero from an in-house experiment to a real-world demonstration and hopefully set an exciting new benchmark for how organisations can decarbonise effectively," Mahoney said.

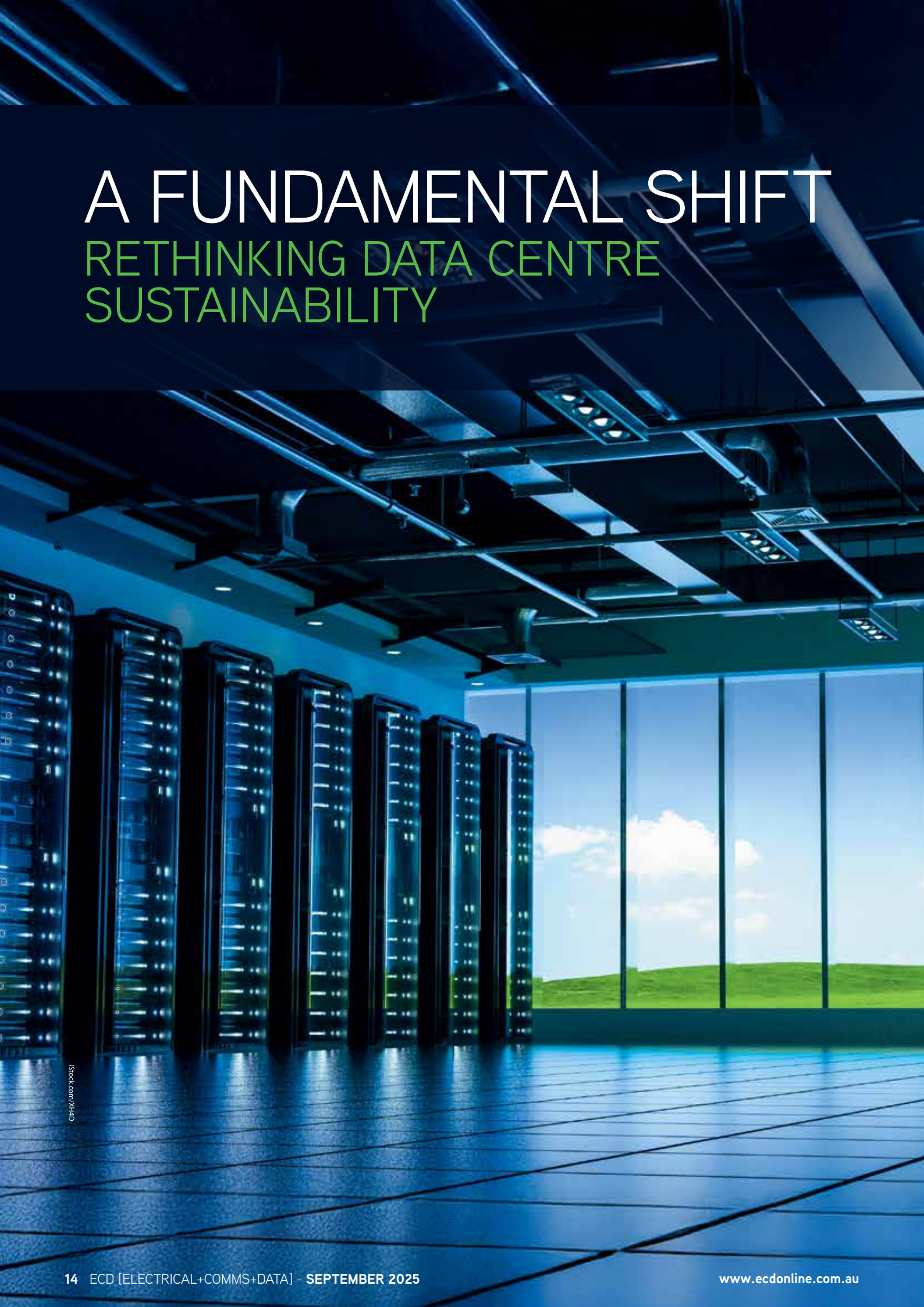
"By giving customers real-time access to their energy consumption data, we can ensure that the energy they are using is met by renewables generation at the exact moment it happens.

"At Flow Power, we know that smart energy usage and innovation are the key to fully transitioning Australia to renewables. We encourage everyone to explore whether time-matching renewables is an opportunity for their operations."

Flow Power
www.flowpower.com.au

A FUNDAMENTAL SHIFT

RETHINKING DATA CENTRE SUSTAINABILITY



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In this interview, Terry Maiolo, VP & General Manager for Asia Pacific at cloud computing company OVHcloud, discusses how data centres can become sustainable when faced with the resource-hungry demands of GenAI.

Can data centres ever be truly sustainable in an era when there is huge, increasing demand for generative AI, or will we reach a tipping point?

It's a critical question, one which the industry needs to address head on. While the demand for generative AI and cloud computing is accelerating, data centres can operate sustainably, but it does require a fundamental shift in how infrastructure is designed, powered and managed.

We should not view sustainability and innovation as mutually exclusive; they should be viewed as interconnected. The key is to embed sustainability into every layer of the value chain, from chip design to data centre cooling to software optimisation. With the right investments and innovation, we can scale AI responsibly and sustainably.

How can businesses assess the sustainability credentials of their data centre provider?

To assess a data centre provider's sustainability, businesses should look for measurable indicators like low sustainability metrics such as power usage effectiveness (PUE) and, more importantly, water usage effectiveness (WUE); use of renewable energy; and transparent carbon reporting. Providers should disclose their energy sources, cooling technologies and hardware lifecycle practices such as refurbishment and e-waste reduction.

Certifications like ISO 14001 or ISO 50001, which recognise the international standards for environmental management systems and energy management systems, and participation in initiatives like the Climate Neutral Data Centre Pact, also signal genuine commitment. Ultimately, sustainability should be embedded in the provider's operations, not just a marketing message.

How accountable should data centre providers be when it comes to transparency around their sustainability practices and commitments?

Data centre providers should be fully accountable and transparent about their sustainability practices. As demand for digital infrastructure grows, so does the responsibility to disclose energy usage, carbon emissions and progress toward environmental goals. Businesses have the right to understand a provider's environmental impact before choosing to partner with them. Transparency is not just good practice, it is essential for building trust and enabling customers to make informed, responsible decisions.

Data centre providers should also set clear goals in greenhouse gas emissions reduction including specific targets for Scope 1, 2 and 3. By being transparent on environmental targets and performance, data centre providers can offer businesses the opportunity to further scale the full potential of sustainable cloud computing.

Can you tell us a bit about the water-cooling technology developed by OVHcloud and how it contributes to more sustainable data centres?

OVHcloud has been using its proprietary water-cooling technology at scale since 2003, helping it achieve an average PUE of just 1.26 and a WUE of 0.37, of which the latter is five times less water usage than traditional systems. Unlike conventional cooling that chills entire rooms, OVHcloud targets heat directly at the source. A proprietary water-cooled 'thermoblock' sits on heat-generating components like the chip, circulating water in a closed loop without evaporation. This design improves energy and water efficiency, reduces land use and enables higher server density, making data centres more sustainable by design.

Is data centre sustainability creating new opportunities for industry (ie, those businesses responsible for data centre infrastructure)?

Yes, the drive for data centre sustainability is opening up major opportunities across the infrastructure ecosystem. It is fuelling innovation in energy-efficient cooling, renewable integration and carbon tracking. A great example is OVHcloud's enhanced Environmental Impact Tracker, announced in July 2025. This newly enhanced tool helps customers accurately measure the carbon footprint of their cloud usage across OVHcloud solutions including Baremetal, Hosted Private Cloud and Public Cloud Compute — with more services to follow. Combined with OVHcloud's vertically integrated supply chain and circular IT practices, sustainability is becoming a competitive differentiator and a catalyst for industry-wide transformation.

Terry Maiolo.

ARE WE DANGEROUSLY DEPENDENT ON SUBMARINE CABLES?

A new study from the School of Sustainability at Reichman University has warned that submarine communication cables — the backbone of global internet infrastructure — are dangerously vulnerable to both natural disasters and deliberate sabotage, posing systemic risks to international communication, commerce and security.

The peer-reviewed paper, by the Dean of the School of Sustainability, Dr Asaf Tzachor, has been published in *Nature Electronics*. It examines the various threats to submarine cables, which transmit over 95% of the world's international data.

"The world's overreliance on a uniform submarine cable network is a textbook case of a progress trap," Tzachor said. "While cables have enabled a connected planet, they also represent a fragile chokepoint in global communications."

The impact of natural disasters on submarine cables was witnessed in the 2022 eruption of the Hunga Tonga-Hunga Ha'apai volcano, which unleashed a tsunami and underwater shockwaves that snapped the fibre-optic connection between Tonga and Fiji, plunging the island nation into digital isolation for weeks.

In 2011, Japan's devastating 9.0 magnitude TÅ hoku earthquake disrupted trans-Pacific telecommunications, while a 2006 earthquake off Taiwan's southwest coast triggered submarine landslides in the Luzon Strait that severed critical cables linking Hong Kong, China, the Philippines and Japan. The fallout of the latter incident was global, with Hong Kong's internet nearly paralysed, and financial markets around the world affected.

In the past 18 months alone, submarine cables in the Red Sea, Baltic Sea and Pacific have been damaged — some likely the result of deliberate sabotage — disrupting data flows across continents and underscoring the risks of relying on a single, vulnerable communications backbone.

Accidental damage from ship anchors and deep-sea trawlers causes frequent disruptions, while the growing trend of targeted cable sabotage by state and non-state actors could see an increase in intentional, high-impact blackouts.

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If left unaddressed, these compounding vulnerabilities could cascade into large-scale communications failures with serious consequences.

Thinking beyond the ocean floor

Tzachor has devised an ambitious yet scientifically grounded roadmap for diversifying global communications infrastructure, envisioning three alternative systems that could together reduce our overreliance on vulnerable submarine cables.

The first is satellite-based laser communication networks — already in operation through NASA and commercial ventures like Starlink. These low-Earth-orbit constellations can deliver fibre-like data speeds without the seismic or geopolitical risks that threaten undersea systems. While atmospheric interference remains a technical hurdle, advances in beam steering, adaptive optics and high-throughput inter-satellite links suggest enormous potential, according to Tzachor.

The second solution is high-altitude platform systems, or HAPS, which involve solar-powered drones and airships stationed in the stratosphere. Acting as floating, low-latency data relays, these have proven useful in emergencies and remote regions.

WHILE CABLES HAVE ENABLED A CONNECTED PLANET, THEY ALSO REPRESENT A FRAGILE CHOKEPOINT IN GLOBAL COMMUNICATIONS. DR ASAF TZACHOR

Though still early in development, prototypes have shown that they could one day provide agile and resilient internet infrastructure — particularly for areas underserved by current cable networks.

The third, more speculative, approach, involves autonomous underwater optical wireless networks — swarms of robotic vehicles equipped with blue-green lasers, forming a dynamic mesh of short-range optical links beneath the sea. These systems could offer critical redundancy near existing cables, and are especially promising for military, deep-sea energy and environmental monitoring applications.

However, Tzachor cautioned that technology alone wouldn't be enough to secure the future of global communications. His paper calls for coordinated public–private action on a scale not seen since the rise of the semiconductor industry. Governments are urged to step up with targeted funding, policy reform and international agreements. This includes incentivising research into alternative communications, setting clear standards for space-debris mitigation and orbital traffic management, and aligning frequency, airspace and oceanic regulations across borders.

"Cable redundancy isn't enough. We need genuine diversification of the global digital infrastructure if we're to withstand 21st-century threats — from geohazards to geopolitical conflict," Tzachor said.

The article is available via subscription at DOI: 10.1038/s41928-025-01424-z.

HOW CAN DIGITAL TWINS EFFECTIVELY SUPPORT THE ENERGY TRANSITION?

AI-powered digital twins — digital replications of the physical world — have huge potential for use in renewable energy systems, and are already being deployed in the sector to improve efficiency, safety and sustainability.

However, while digital twins' ability to replicate and interact with complex systems has made them a cornerstone of innovation across industries, scientists from the University of Sharjah have cautioned that current models still face notable limitations that restrict their full potential in harnessing energy from renewable sources.

"Digital twins are highly effective in optimizing renewable energy systems," the researchers wrote in the journal *Energy Nexus*. "Yet, each energy source presents unique challenges — ranging from data variability and environmental conditions to system complexity — that can limit the performance of digital twin technologies, despite their considerable promise in improving energy generation and management."

In their study, the researchers conducted an extensive review of existing literature on the application of digital twins in renewable energy systems. They examined various contexts, functions, lifecycles and architectural frameworks to understand how digital twins are currently being utilised and where gaps remain.

To extract meaningful insights, the researchers employed artificial intelligence, machine learning and natural language processing to analyse large volumes of raw data and uncover structured patterns, concepts and emerging trends.

This in-depth analysis allowed them to identify research gaps, propose new directions and outline challenges that must be addressed to fully harness the potential of digital twin technology in the renewable energy sector.

The research team summarised their most significant findings across five major energy sources: wind, solar, geothermal, hydroelectric and biomass. Each source presents unique opportunities and challenges, with the study offering a comprehensive overview of how digital twins can be tailored to optimise performance in each domain.

The findings revealed that digital twins offer significant advantages across various renewable energy systems:

With **wind energy**, digital twins can predict unknown parameters and correct inaccurate measurements, enhancing system reliability and performance.

In **solar energy**, they help identify key factors that influence efficiency and output power, enabling better system design and optimisation.

Digital twins can simulate the entire operational process in **geothermal energy** — particularly drilling — facilitating cost analysis and reducing both time and expenses.

With **hydroelectric energy**, the AI-driven models simulate system dynamics to identify

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influencing factors. In older hydro plants, they are used to mitigate the impact of worker fatigue on productivity.

In **biomass energy**, digital twins improve performance and management by offering deep insights into operational processes and plant configurations.

But, importantly, the study identified critical limitations in the application of digital twin technology across these energy sources, underscoring the need for more robust models that can address specific challenges unique to each renewable energy system.

The authors identified several limitations in the application of digital twins across different renewable energy systems:

Wind energy: Digital twins face challenges in accurately modelling and monitoring environmental conditions. They struggle to simulate critical factors such as blade erosion, gearbox degradation and electrical system performance — particularly in aging turbines.

Solar energy: Despite their potential, digital twins still fall short in reliably predicting long-term performance. They have difficulty tracking panel degradation and accounting for environmental influences over time, which affects their accuracy and usefulness.

Geothermal energy: A major obstacle is the lack of high-quality data, which hampers the ability of digital twins to simulate geological uncertainties and subsurface conditions. The technology also faces complexity in modelling the long-term behaviour of geothermal systems, including heat transfer and fluid flow dynamics.

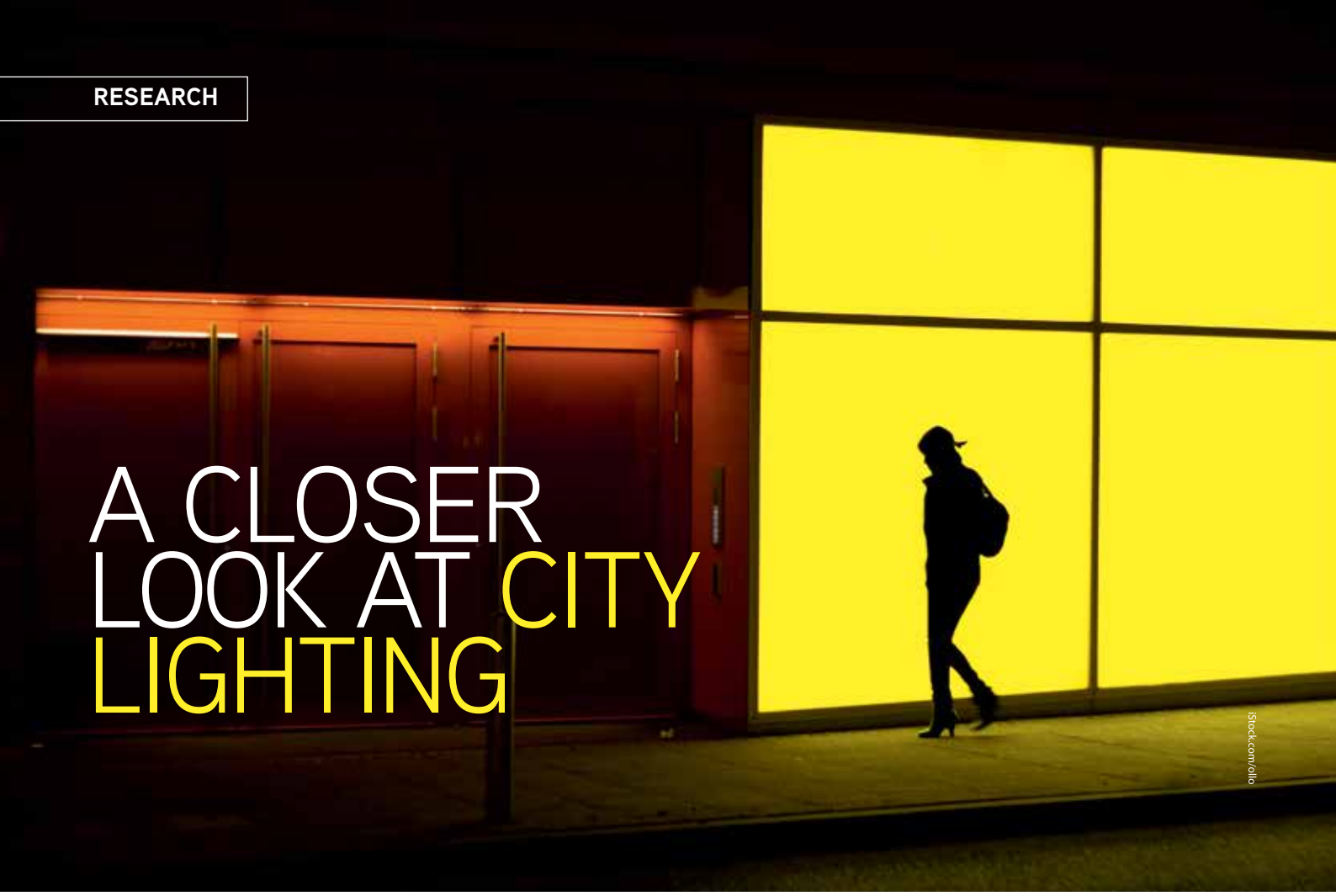
Hydroelectric energy: In hydroelectric projects, digital twins face challenges in accurately modelling water flow variability and in capturing environmental and ecological constraints. These limitations reduce their effectiveness in optimising system performance and sustainability.

Biomass energy: When used with biomass energy systems, digital twins still struggle to simulate the entire production supply chain. They fall short in providing precise models for biological processes, biomass conversion and the complex biochemical and thermochemical reactions involved.

To address these challenges, the researchers are offering a set of guidelines and a research roadmap aimed at helping scientists enhance the reliability and precision of digital twin technologies.

Their recommendations focus on improving data collection methods, advancing modelling techniques and expanding computational capabilities to ensure digital twins can deliver trustworthy insights for decision-making and system optimisation.

The study, 'Harnessing the future: Exploring digital twin applications and implications in renewable energy', by Concetta Semeraro, Haya Aljaghoub, Hamad Khalid Mohamed Hussain Al-Ali, Mohammad Ali Abdelkareem and Abdul Ghani Olabi, can be found at DOI: 10.1016/j.nexus.2025.100415.



A CLOSER LOOK AT CITY LIGHTING

German researchers have deployed citizen scientists to record the sources of night-time lighting in cities — offering detail that satellite images cannot provide.

There are pressing reasons to study the sources of urban night-time lighting. As well as contributing to energy consumption, light pollution affects the rhythms of life of animals, plants and humans.

It's a growing environmental problem, affecting a quarter of the world's land area and 88% of Europe, according to Germany's GFZ Helmholtz Centre for Geosciences. While satellite images provide some insight into where this light is coming from, local authorities really need a more detailed analysis in order to come up with targeted countermeasures.

Enter physicist Dr Christopher Kyba and his team of citizen scientists.

In autumn 2021, Kyba, then a geographer at the GFZ Helmholtz Centre for Geosciences and the Ruhr University Bochum, organised a group of 258 volunteers to count and evaluate light sources in city centres, residential areas and commercial areas.

The citizen scientists used the 'Nachtlichter-App' (Nightlight App), specially developed for the project, to register a total of 234,044 lights on 3868 individual measurements. The counting covered a total area of 22 square kilometres in predefined areas of 33 municipalities (nine of which were outside Germany).

Lights were counted and classified along with additional information such as the degree of shielding or the size of the installation. Extrapolated across Germany, the researchers reported that 78 million lights remain on after midnight: roughly one light per person.

The team found that streetlights are only responsible for part of the night-time light in urban areas. In such areas, there are nearly twice as many illuminated advertising signs and shop windows. Private windows were by far the most frequently observed light source, even after midnight, although these are less bright.

A further quarter of the lights consisted of other sources such as floodlights, house number and doorbell signs, and decorative garden lighting. The data also made it possible to examine how the composition of light varied between city centres and less densely built-up areas such as residential neighbourhoods.

Comparing ground data with satellite measurements

The areas where the counting took place were selected so that they corresponded with the measurement zones of a night-time light-observing satellite. This allowed the results of the light detection on the ground to be compared with the satellite data.

The results showed a clear correlation between the number of counted lights and the radiance observed by the satellite; the researchers were able to determine a conversion factor for converting the 'brightness' measured by the satellite into the more easily understandable unit of 'lights per square kilometre'. The number of individual sources in a given community or region could then be easily estimated.

"By scaling our results up to cover all of Germany, we estimate that just over one light per person stays on after midnight," Kyba said.

Kyba added that the results showed significant potential for future light and energy savings in German municipalities.

"Both energy and lighting policy as well as research on the effects of artificial light on the environment have generally focused on street lighting," he said.

"Our findings indicate that a broader approach that considers all lighting is necessary in order to understand and reduce the environmental impacts of light in cities."

The peer-reviewed study has been published in the journal *Nature Cities* [doi.org/10.1038/s44284-025-00239-5].

Lightweight energy chain

Energy chains made from high-performance plastics are in use worldwide. They are primarily intended to guide cables reliably, eg, on indoor cranes used in production halls. igus has developed a new lightweight chain, designed to be cost-effective, for simple gliding applications with travel distances of up to 30 m.

The glide-chain G4.42 is characterised by its extra-large sliding surfaces and efficient construction, with material only used where it is needed for sliding movements. Due to this innovative design, the G4.42 is up to 25% lighter than standard igus chains. Another advantage of the chain is the cost-optimised side link used on the left and right. Combined with the large pitch, the product consists of just a few individual and different components.

The glide-chain has been subjected to a series of intensive tests in the company's 4000 m² test laboratory; igus also gives a four-year guarantee on all its energy chains.

Treotham Automation Pty Ltd
www.treotham.com.au

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SMART WINDOW CONTROLLED BY ELECTRICAL SIGNALS

Korean researchers have developed a glare-free, heat-blocking 'smart window' that can be used in buildings or vehicles.

'Active smart window' technology, which enables the free adjustment of light and heat based on user operation, has been attracting a lot of attention recently in the research community. Unlike conventional windows that passively react to changes in temperature or light, these next-generation window systems can be controlled in real time via electrical signals.

The technology has significant potential for the building sector, which currently accounts for approximately 40% of global energy consumption, according to the Korea Advanced Institute of Science and Technology (KAIST).

A KAIST research team have now presented 'pedestrian-friendly smart window' technology that is designed to not only reduce heating and cooling energy in urban buildings, but also to resolve the persistent issue of light pollution in urban living.

Led by Professor Hong Chul Moon from KAIST's Department of Chemical and Biomolecular Engineering, the team said the technology allows users to control the light and heat entering through windows according to their intent, and effectively neutralise glare from external sources.

Dubbed RECM (Reversible Electrodeposition and Electrochromic Mirror), the smart window system is based on a single-structured electrochromic device that can actively control the transmittance of visible light and near-infrared (heat). An electrochromic device is a device whose optical properties change in response to an electrical signal.

A particular benefit of RECM is that it suppresses the glare phenomenon caused by external reflected light, leading to a 'pedestrian-friendly smart window' which is suitable for building facades. This sets the RECM system apart from traditional metal deposition smart windows, which tend to suffer from glare. (Deposition is a process using an electrochemical reaction to coat metal ions onto an electrode surface in solid form.)

The RECM system developed in the KAIST study operates in three modes depending on voltage control:

- **Mode I (Transparent Mode)** is advantageous for allowing sunlight to enter the indoor space during winter, as it transmits both light and heat like ordinary glass.
- In **Mode II (Coloured Mode)**, Prussian blue (PB) and DHV+• chemical species are formed through a redox (oxidation-reduction) reaction, causing the window to turn a deep blue colour. In this state, light is absorbed, and only a portion of the heat is transmitted, allowing for privacy while enabling appropriate indoor temperature control. (Prussian blue is an electrochromic material that transitions between colourless and blue upon electrical stimulation. DHV+• is a radical-state coloured molecule generated upon electrical stimulation.)
- **Mode III (Coloured and Deposition Mode)** involves the reduction and deposition of silver (Ag+) ions on the electrode surface, reflecting both light and heat. Concurrently, the coloured material absorbs the reflected light, effectively blocking glare for external pedestrians.

The research team validated the practical indoor temperature reduction effect of the RECM technology through experiments utilising a miniature model house. When a conventional glass window was installed, the indoor temperature rose to 58.7˚C within 45 minutes. However, when RECM was operated in Mode III, the temperature reached 31.5˚C, demonstrating a temperature reduction effect of approximately 27.2˚C.

Additionally, since each state transition is achievable solely by electrical signals, it is regarded as an active smart technology capable of instantaneous response according to season, time and intended use.

"This research goes beyond existing smart window technologies limited to visible light control, presenting a truly smart window platform that comprehensively considers not only active indoor thermal control but also the visual safety of pedestrians," Moon said.

"Various applications are anticipated, from urban buildings to vehicles and trains."

The team's findings have been published in Volume 10, Issue 6 of *ACS Energy Letters* [DOI: 10.1021/acsenergylett.5c00637]. The authors are Hoy Jung Jo, Yeon Jae Jang, Hyeon-Don Kim, Kwang-Seop Kim and Hong Chul Moon.

CASE STUDY

Integrated cabling for smart trams

Thoreb, a computer hardware company specialising in innovative public transport solutions, was recently commissioned to upgrade a series of trams in Victoria.

With connectivity playing a key role in this upgrade, finding a reliable cable specialist was crucial.

"All vehicles, from personal cars through to trains, buses and trams, have a series of sensors and modules, so to connect these together, gather data and add functionality, there needs to be a 'highway' of reliable cables," said Ralf Otto, General Manager at Thoreb.

For this particular upgrade, Thoreb chose LAPP Australia to supply the cable assemblies — "because not only did they provide the quality and reliability we were seeking, but they were willing to go above and beyond to meet tight deadlines and deliver to our customer's precise requirements", Otto said.

The cable assemblies, each rated with the appropriate rail certifications, were supplied by LAPP Australia's new LAPP Harnessing Solutions division — a service that provides complete assemblies labelled, tested and ready to go, to save time on automation projects.

"It was the personnel at LAPP that made this project possible; from quality control through to communications and final checks, they ticked all the boxes so that we could confidently deliver to our customer," Otto said.

As part of the proof of concept that Thoreb needed to deliver to the customer, all cables had to be clearly packed and labelled. "This is where LAPP Australia really stood out," Otto said.

"Each assembly features a range of cables such as network cables, power cables and earth cables, for four different classes of tram. Each component was labelled — at each end for cables — with what tram it belongs to, what type it is and what its function is. They were then packed into kits that were clearly labelled as well.

"This not only means that we can complete the installation accurately, but if we ever need to perform troubleshooting later on, we can isolate specific parts swiftly to reduce downtime," he explained.

Smart functionality via integrated cabling

Using LAPP cables, Thoreb's solutions have enabled various smart functions for the trams:

- Vehicle signage (both inside and on the exterior of the tram) displays upcoming destinations, or communicates messages to passengers.
- Passenger counters, typically installed on doors to count how many passengers enter or leave the tram, help with planning public transport timetables and services according to demand.
- Communication with satellites, allowing a tram's location to be tracked, can be reported on real-time apps.
- In some cases, the solution even enables tram operators to control upcoming traffic lights, giving them priority over cars and keeping passengers on schedule.
- Finally, the system facilitates anything requiring electrical power, such as door functions and stop buttons.

"With so many cables in a small space, electrical emissions could create too much noise pollution and reduce the performance of the system, or the comfort of passengers, but LAPP's cables have electromagnetic interference shielding properties to protect against this issue," Otto said.

Communication the key to success

With tight customer deadlines, and LAPP and Thoreb's NSW head offices needing to coordinate closely with Victorian project teams, effective communication was key to the success of the project.

"LAPP kept us well-informed throughout the process. What we particularly liked was that they informed us if there were any delays," Otto said.

"Some companies don't like to deliver negative news, but we are aware that sometimes there are delays outside of their control, and learning about it as early as possible helps us plan accordingly," he added.

"Our experience with the LAPP Australia team was that they were reliable, trustworthy and respectful. We hope to be able to work with them again on future projects."

LAPP Australia Pty Ltd
lappaustralia.com.au

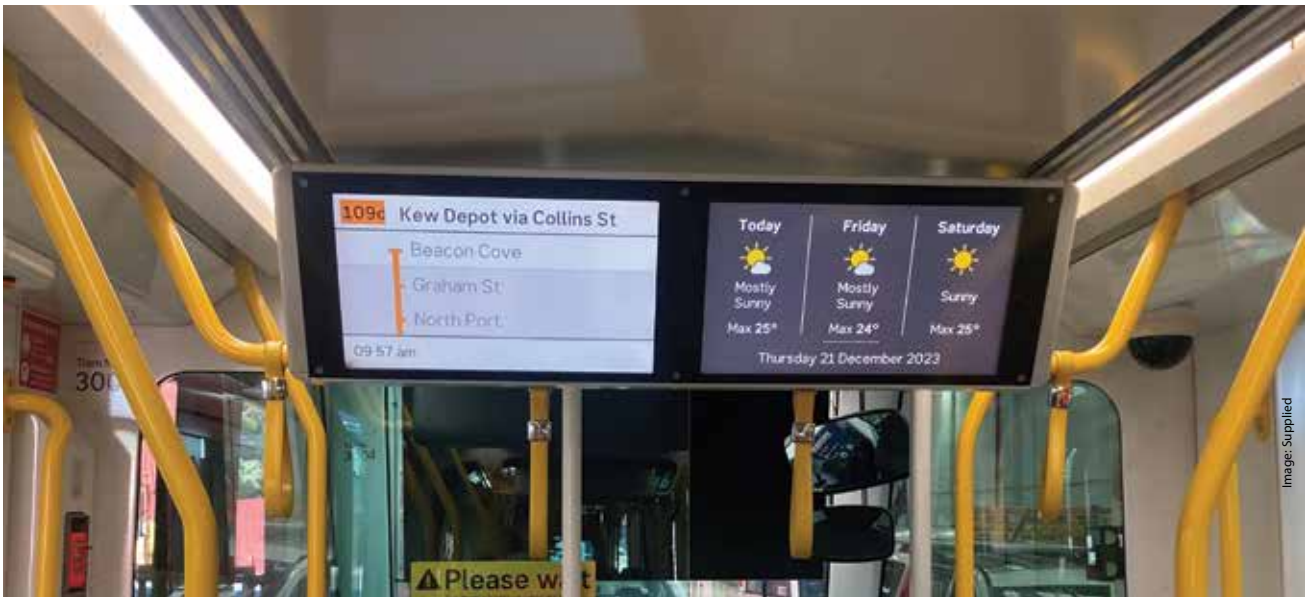


Image: Supplied

Computer hardware specialist Thoreb used high-quality cable assemblies from LAPP Australia in a public transport upgrade project in Victoria.

HOW TO BOOST AN AGING GRID

Heini Kloster

A May 2025 report from the Australian Energy Market Operator (AEMO) has highlighted the need to search for alternative ways to enhance its transmission infrastructure due to a 25–55% increase in the cost of overhead powerlines. Here, Heini Kloster, product owner for conductor cores at global composites manufacturer Exel Composites, explains how reconductoring electrical grids with carbon fibre conductor cores can help meet the increasing power demands of domestic devices, data centres and electric vehicles (EVs) at affordable costs.

Australia's electricity grid is confronting significant challenges in scaling up transmission capacity to meet the demands of emerging technologies. Much of the nation's transmission infrastructure is aging, with many lines exceeding 40 years in service. In 2023, Australia's electricity consumption reached a record 267.82 billion kilowatt-hours (267.82 TWh), demonstrating the demand for substantial grid enhancements to ensure reliability, facilitate renewable integration and accommodate future growth.

Electrical infrastructure doesn't come with a quick fix either. The average duration between granting permission for and commissioning of renewable power plants is around five years, whereas new electrical lines, with bases, towers and conductors, take eight to 10 years. Thus, grid owners need other options to be able to react faster to these changes and avoid untenable downtime and increase capacity by 25% by 2030, as required in Europe by the European Commission's 'Fit for 55' proposals, for example.

Reconductoring existing electrical lines

One way to expand the transmission capacity of the existing network is to reconductor the lines. Reconductoring with advanced composite core conductors allows transmission system operators (TSOs) to transmit more electricity and reduce energy losses without altering structures, like powerline routes or towers. This approach will decrease project costs by minimising construction work.

Urban centres where extensive infrastructural work is most difficult, especially major cities, consume huge quantities of power through the day and night. Residential and commercial development around electrical lines prevents electrical contractors from building new lines, so maximising existing conductors' transmission capabilities is the only approach to help supply meet demand.

Additionally, reconductoring requires less comprehensive planning permission than construction of new electrical lines. Fewer regulations control its execution, limiting the red tape involved and helping the push for fast upgrades.

Reconductoring with advanced conductors with carbon fibre cores also helps TSOs to tackle operational costs by reducing transmission losses by between 20 and 50%. Increased transmission efficiency links to sustainability, as less over-production is required to meet the demand.

Image courtesy of Exel Composites.

Composite materials support reconductoring

Reconductoring means less work than building entire new transmission lines. It's made possible with the help of advanced conductors. Using strong, lightweight carbon fibre composite as the conductor core allows use of a greater cross-section of annealed aluminium, which means increased flow for electrical current.

The increased flow of electricity raises the temperature of the conductor. In the case of traditional conductors, this makes the metals

> RECONDUCTORING MEANS LESS WORK THAN BUILDING ENTIRE NEW TRANSMISSION LINES.

Electricians fixing transmission line.

expand and causes lines to sag. The problems presented by sagging, especially in urban areas, are obvious and thus tightly regulated. Luckily, carbon fibre cores' excellent tensile strength and very low coefficient of thermal expansion earns them the HTLS classification: high temperature, low sag.

Carbon fibre conductor cores are typically divided into single-wire and multi-wire categories. While single-wire cores are better known and still a slightly more economical option, TSOs are increasingly turning their interest towards the second-generation multi-wire cores for their safety and robustness.

Safety is an important factor, as the single-wire cores especially are more prone to break during installation, if not properly handled. However, the flexibility of the multi-wire solution is more similar to the traditional steel core conductors, significantly increasing safety during installation and use.

In manufacturing conductor cores, Exel Composites uses its expertise in pultrusion, a continuous manufacturing technique. The global manufacturer produces kilometres of thin rod of different shapes and sizes and reels them around wooden spools for shipping.

Demand for electrical power will not soon decrease in Australia or elsewhere in the world. By replacing aging steel core conductors with alternatives using carbon fibre, TSOs can boost power networks' carrying capacity to serve increasing demand, be it from new data centres or modern homes, with less construction work.

Cleaning pen for fibre-optic connectors

Designed to prevent contamination from impacting signal quality, Warren & Brown's Fibre Optic Connector Cleaning Pens deliver precise, scratch-free cleaning for LC, SC, FC and ST connectors and are used by manufacturers and carriers around the world.

Suitable for fibre panels, network assemblies and high-volume production, these one-click pens cut cleaning time and reduce labour costs without compromising performance.

Capable of over 800 cleans per unit, the pens leave no scratches or residue, and can be used in the field or in production environments. They are also available in SC and MTP/MPO variants.

Warren & Brown Technologies
wbt.com.au

EV charger

Jolt's 50 kW DC EV charger has been installed in Melbourne's Bayside City Council, with additional locations across Australia launching in the months ahead.

The new charger is said to offer drivers double the charging speed of existing units while continuing to deliver its 7 kWh of free power per day for users via the JOLT app. The new charger can deliver up to 45 km of range in 8–10 minutes, according to the company.

Featuring a 'flagpole' design, the charger integrates advanced cable management with a five-metre reach — over 25% longer than standard chargers, the company said. This improves accessibility across a variety of EV types and parking bay configurations. The system is engineered for ease of use, with cables designed to be lightweight and manageable for all users. An adjustable cable holster allows the plug height to be tailored to site conditions, supporting accessibility compliance and inclusive design.

Designed for urban streetscapes, the charger also includes base skirt lighting for enhanced visibility and safer night-time charging.

JOLT
jolt.com.au

Inverters

Mitsubishi Electric's FR-D800 series inverters are designed to deliver good performance, easy operation and improved energy efficiency for a wide range of industrial applications, including conveyors, pumps, food processing equipment and textile machinery. Selected models are also suitable for harsh, corrosive environments, due to circuit board protection meeting IEC 60721-3-3:1994 3C2/3S2 standards (these protected models are identified with a '-60' suffix in the part number). The inverters can also control both induction and permanent magnet (PM) motors, eliminating the need for multiple inverters for different motor types.

With a focus on user-friendliness, the inverters feature a door-style surface cover and integrated wiring to make installation fast and easy. The FR-D800 is up to 37% smaller than its equivalent predecessor, reducing enclosure size requirements, and allowing for more flexible mounting and reduced installation costs. A new USB Type-C interface lets users set parameters directly from a PC without powering up the inverter, streamlining both set-up and maintenance.

The inverters can help save energy with advanced synchronous motor control, which reduces power consumption and cuts operating costs. A high-efficiency motor drive and lower standby power consumption also contribute to a reduced carbon footprint, supporting more sustainable production practices. Models in the series are designed for different voltage requirements, including single-phase 100 and 200 V, and three-phase 400 V options.

Built-in support for popular Ethernet protocols including CC-Link IE TSN, Modbus/TCP and EtherNet/IP helps with seamless integration into existing industrial networks, enabling users to quickly incorporate the inverters into their digital manufacturing and smart production environments. Preventive maintenance functions include lifetime diagnostics for key components like capacitors and fans, helping operators spot potential issues early, especially when using the FR Configurator2 support software. Anomaly detection based on current patterns helps reduce the risk of unexpected downtime, and when a fault does occur, analysis functions have been designed to solve the problem quickly.

Mitsubishi Electric Australia
www.mitsubishielectric.com.au

CASE STUDY

Rugged electrics for 'seaweed trees'

SeaGrown, an innovative aquaculture company based in Scarborough, UK, has created a type of 'seaweed tree' that's anchored to the seabed and tethered just below the surface of the water.

These underwater trees, which the company names 'Kelpedo units', host a canopy of kelp that mimics the structure of natural marine ecosystems, providing a habitat for over 60 marine species, including seabed invertebrates, fish, seabirds and marine mammals.


Image: Supplied.

SeaGrown's Kelpedo unit in the North Sea is a floating structure designed to boost marine biodiversity, improve water quality and capture carbon.

As well as increasing biodiversity, the structures absorb carbon and nitrogen from surrounding waters, helping to combat the effects of climate change and coastal pollution. SeaGrown's offshore site is currently home to about 50 seaweed trees and has the capacity to host 100.

Bulgin, a manufacturer of environmentally sealed connectors and components, is supporting marine sustainability by taking part in SeaGrown's new environmental, social and governance (ESG) program, which gives businesses the chance to fund their own kelp-growing seaweed tree. Bulgin is the first company in the scheme to sponsor its own unit, helping to boost biodiversity and support carbon capture in the North Sea.

The partnership will involve Bulgin technology, with the company's robust electrical connectors set to be used in SeaGrown's onshore hatchery to support the monitoring of water quality, temperature and salinity during the early growth phases of kelp. These components will also play a key role in marine instrumentation used for underwater surveys and environmental monitoring.

Wave Crookes, co-founder and Director of SeaGrown, is enthusiastic about the shared project, which began as a casual conversation over coffee.

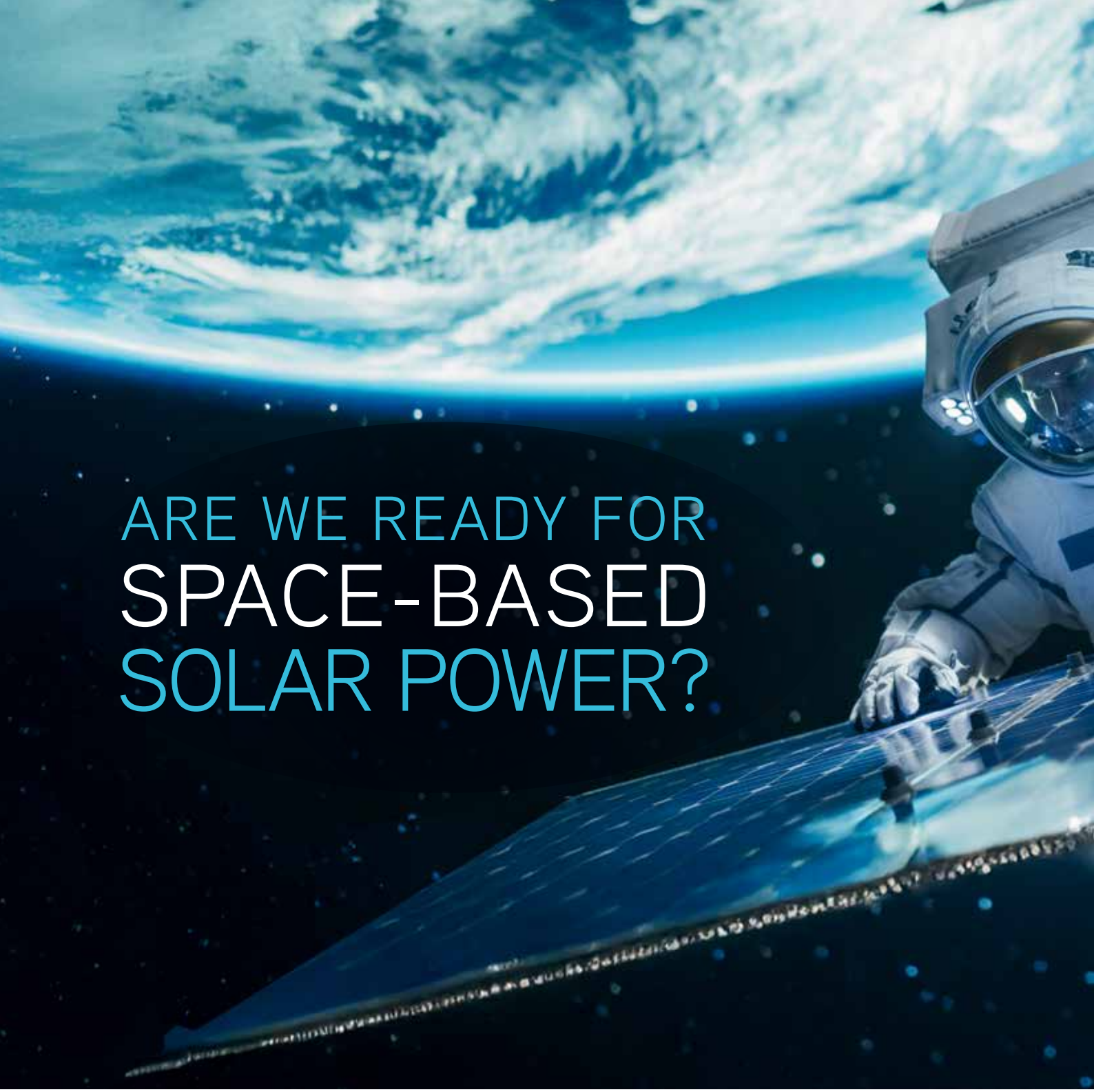
"At SeaGrown, we're focused on restoring marine ecosystems and creating real-world solutions to environmental challenges, from carbon capture to sustainable agriculture," he said.

"Our seaweed trees are a scalable way to bring life back to the ocean and strengthen coastal communities. That mission really resonated when I sat down for a coffee in Scarborough with John Love from Bulgin, and we realised our goals were closely aligned. What began as a simple conversation has grown into a partnership that we're proud of — one that's already making a real impact."

Bulgin said the initiative aligned with its commitment to sustainability by offsetting carbon emissions and improving water quality and biodiversity — as well as fostering local employment and contributing to the circular economy.

"From our very first meeting, it was clear that SeaGrown's mission aligned closely with Bulgin's values," said Love, who is Bulgin's Business Development Manager. "Their approach to ocean regeneration delivers real, measurable impact — from boosting biodiversity to supporting coastal communities — and we're proud to back that with both funding and technology."

Bulgin
www.bulgin.com/au/



ARE WE READY FOR SPACE-BASED SOLAR POWER?

Originally proposed in 1968, the idea of putting solar panels in space has only recently become technologically and economically feasible. Now, space-based solar power is being actively pursued by China, India, Japan, Russia, the US and the UK.

The advantage of placing solar technology in space is that the panels are able to harvest solar power continuously instead of only when sunlight reaches Earth. This could reduce Europe's need for Earth-based wind and solar by 80%, according to a study published in the Cell Press journal *Joule*.

"In space, you potentially have the ability to position solar panels to always face the sun, which means power generation can be nearly continuous compared to the daily pattern on Earth," said senior author and engineer Wei He of King's College London. "And, because it's in space, the solar radiation is higher than on the Earth's surface."

Using energy models, He and fellow researchers estimated that in 2050, space-based solar power could cut the total costs of Europe's total grid system by 7–15%. However, these numbers hinge upon the rapid development of two NASA-designed technologies.

Space-based solar panels would work much like communications satellites, with the panels orbiting Earth and rotating to optimally catch the sun's rays. This energy would be beamed to receiving stations on Earth in the form of microwaves, which could then be converted to electricity and fed into the existing grid infrastructure.

"This is the first paper to put space-based solar power into the energy system transition

iStock.com/gorodenkoff

> IN SPACE, YOU POTENTIALLY HAVE THE ABILITY TO POSITION SOLAR PANELS TO ALWAYS FACE THE SUN, WHICH MEANS POWER GENERATION CAN BE NEARLY CONTINUOUS COMPARED TO THE DAILY PATTERN ON EARTH. – DR WEI HE

framework," He said. "We're currently at a stage to transfer this blue-sky idea into testing at a large scale, and to begin discussing regulation and policymaking."

The researchers were particularly interested in whether space-based solar power could support Europe's goal of net zero by 2050, and developed models of Europe's energy grid in that year. First, they estimated the annual costs and energy-harvesting potential for two space-based solar power designs from NASA — the Innovative Heliostat Swarm and the Mature Planar Array.

The heliostat design is in the early stages of development, but has higher potential to continuously capture solar energy. On the other hand, the simpler planar array is closer to being technologically ready, but can only capture solar energy about 60% of the time — this is still a big improvement on the 15–30% efficiency of standard Earth-based solar panels.

Then, the team compared scenarios with and without space-based solar power to test whether the technology could complement or outcompete other sources of renewable energy in Europe. They found that though the planar design was less economical than Earth-based renewable energy in all of the scenarios, the heliostat design would outperform wind and solar power by 2050, based on performance and costs projected by NASA.

Overall, the model estimated that the heliostat design would reduce total system costs by 7–15%, offset up to 80% of wind and solar, and reduce battery usage by over 70%, though hydrogen storage would still be vital in the winter months for some regions.

To be cost-effective, the team estimated that the heliostat design's annual costs would need to decrease to about 14 times the estimated cost for Earth-based solar panels in 2050, whereas the planar design would be cost-effective at nine times the estimated cost for Earth-based solar panels in 2050.

"At present, space-based solar power's costs are 1–2 orders of magnitude above these break-even points," He said.

Despite its relative inefficiency, the researchers said it was worth pursuing the planar design in addition to the more efficient heliostat because it has a higher technological readiness and thus could be used to demonstrate and further develop the concept on a shorter timescale.

"We recommend a coordinated development strategy that combines and leverages both technologies to achieve better performance," He said. "By first focusing on the more mature planar design, we can demonstrate and refine space-based solar power technologies while concurrently accelerating R&D for designs with more continuous power generation."

The researchers noted that many technological breakthroughs are needed before space-based solar power can be implemented. In particular, large-scale testing of wireless transmission is essential, and advancements are needed to enable the devices to be robotically assembled while in orbit.

"In the future, I also want to explore potential risks to space-based solar power, such as orbital debris and system degradation, and how we can minimise those risks," He said.

The research was supported by funding from the Royal Academy of Engineering and UKRI/EPSRC, and the article can be read at DOI: 10.1016/j.joule.2025.102074.

19″ rack cases

COMBIMET 19″ is METCASE's largest, most advanced range of rack cases — suitable for applications including networking and communications equipment, industrial computers, sound and studio systems, laboratory instruments and industrial control.

The robust aluminium enclosures are available with (or without) vented top and base panels as standard. They can also be custom machined to meet specific ventilation requirements, such as mountings for fans.

For maximum ventilation, an open-top Version T is also available (2U/3U x 365 mm). A 1U x 265/365 mm smooth-top version with no visible fixing screws can also be pre-punched with ventilation slots to create internal airflow.

The enclosures feature a flat 19″ front panel design that enables faster manufacturing in custom sizes. Ergonomic front handles make it easy to install the enclosure in a rack or remove it, while the top, base and rear panels can be removed quickly for inspection and maintenance. Inside, there are mounting holes in the base for PCBs and chassis. All panels have M4 earth studs for electrical continuity.

The enclosures are available as standard in heights 1U to 6U and in three depths: 265, 365 and 609.6 mm. There are two standard colours, light grey (RAL 7035) and black (RAL 9005), with custom colours available on request. Accessories include mounting plates, 19″ mounting kits and a PCB mounting kit.

The enclosures can be specified in custom heights up to 12U and also in bespoke widths and depths. Other modification services include custom front panels, CNC machining, fixings and inserts, and photo-quality digital printing of legends, logos and graphics.

ROLEC OKW Australia New Zealand P/L

www.metcase.com.au

Building management solution for small and mid-sized buildings

Schneider Electric has launched its EcoStruxture Building Activate solution in Australia and New Zealand. The solution is an open, plug-and-play platform designed to help small and mid-sized buildings become more energy-efficient, compliant and occupant-friendly.

According to the Australian Energy Regulator, electricity prices for small businesses in NSW, South Australia and Queensland are set to rise by up to 8.5% in 2025–26. In some areas, energy price increases have exceeded 20%, particularly impacting cost-sensitive sectors like retail and hospitality.

EcoStruxture Building Activate helps building owners and operators respond to these pressures with a cloud-based platform that integrates HVAC, lighting, refrigeration and energy systems. The solution is modular, vendor-agnostic and offered as a subscription, eliminating the need for large upfront investments or dedicated facility teams.

In addition to reducing emissions and cost, the solution improves the comfort and wellbeing of occupants by automatically optimising temperature, humidity and air quality. It is suited to multi-site operation, enabling centralised visibility and benchmarking across portfolios. The offering is accessible via desktop and mobile, and works with existing infrastructure.

Customers can choose the capabilities they need, ranging from energy and sustainability management to operations, workplace and asset performance modules.

Schneider Electric

www.se.com/au

Tool-less connectors for Type J thermocouples

Fast, tool-less connectivity is shaping the future of modern electrical systems, transforming how they are powered and managed. Simplifying the assembly and mounting of connectors is important to boosting efficiency and flexibility in industrial and small-scale settings.

ILME's SQUICH technology allows for tool-less connection at the push of a button while providing resistance to extreme temperatures, shocks and vibrations. Now, the SQUICH Series has been further enhanced with the addition of the latest variant for Type J thermocouples.

Type J thermocouples are widely used in temperature-sensing applications where precision monitoring is critical, such as die-casting, moulding and process engineering.

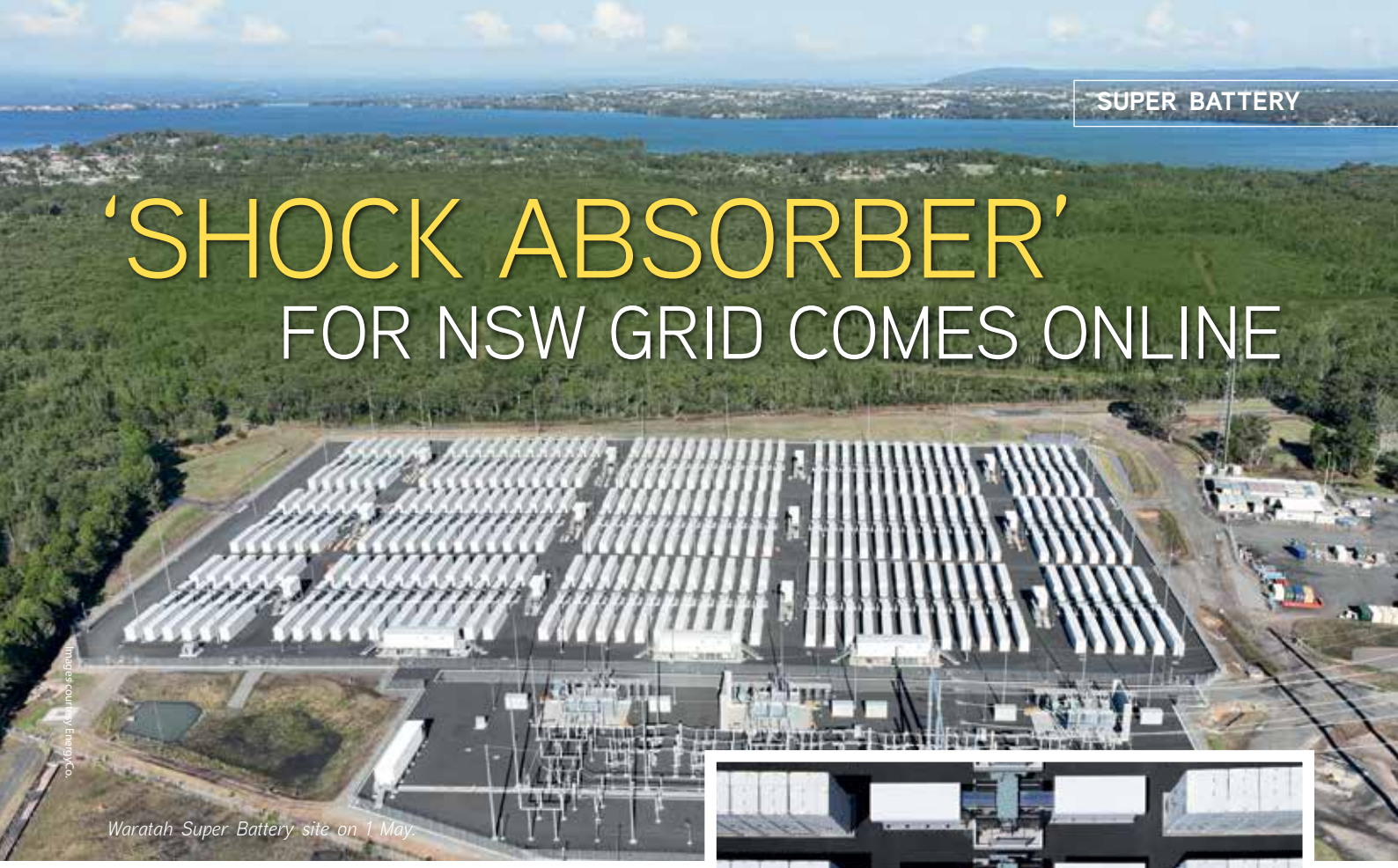
The CSHT Series for Type J thermocouples is the latest variant of the established SQUICH CSH Series, and is available in 10-, 16- or 24-pole inserts. It has two rows of contacts: one made from iron (Fe, gold-plated for corrosion resistance), and the other from constantan alloy (CuNi), for consistent temperature readings over time. It also has a wide temperature range for Type J thermocouples, from -210 to +760°C, and full compatibility with prepared, unprepared and solid wires.

The CSHT Series integrates seamlessly with the existing range of SQUICH solutions.

Treotham Automation Pty Ltd

www.treotham.com.au

'SHOCK ABSORBER' FOR NSW GRID COMES ONLINE



Images courtesy EnergyCo.

Waratah Super Battery site on 1 May.

Waratah Super Battery: aerial view of batteries.

The Waratah Super Battery Project has begun partial operation as a 'shock absorber' for the NSW grid in the event of powerline outages due to incidents such as lightning strikes and bushfires.

"The Waratah Super Battery is one of the biggest in the world, and a crucial addition to our energy system," said Minister for Climate Change and Energy Penny Sharpe. "As it comes online, it will help power our homes and businesses while stabilising the grid to avoid blackouts."

Delivery of the project is being overseen by NSW Government body EnergyCo, while Transgrid is the network operator and Akaysha Energy operates the battery storage system.

The first 350 megawatts (700 megawatt-hours) of the project's battery capacity have come online in the lead-up to full operation. This is about half of the battery's capacity, with the remainder (for a total of 850 MW/1680 MWh) expected to come online later this year.

Located at the site of the former Munmorah coal-fired power station, the project is a key part of the NSW Government's plan to upgrade the state's grid and provide renewable, reliable and affordable energy as its aging coal plants retire.

The Waratah Super Battery Project has multiple parts that work together to help it perform its role in supporting the electricity grid. In addition to the battery energy storage system that gives the project its name, it also includes an overarching control system; arrangements for paired generation services (which help balance the grid during a powerline outage); and upgrades to the state's existing transmission network.

The project will allow more power to flow from existing generators to supply electricity to people around the state and is faster to implement than new transmission lines, the government said.

In addition to half of the battery's capacity now being online, the overarching control system is in operation, agreements with generators are in place, and the first stage of upgrades to the existing transmission network has been completed.

"Transgrid is proud to work with EnergyCo and Akaysha Energy to deliver the Waratah Super Battery Project — the first priority transmission infrastructure project under the NSW Government's Electricity Infrastructure Roadmap," said Transgrid CEO Brett Redman.

"To support the project, Transgrid's experts have designed and installed a System Integrity Protection Scheme (SIPS) Control System which is the largest and most innovative of its kind in Australia.

"Specialist crews have also carried out upgrade work at 22 substations and four existing transmission lines across NSW to deliver additional energy to consumers when it's needed."

In the case of a powerline outage due to a lightning strike, bushfire or other major event, the SIPS Control System will send a signal to the battery to deliver more energy to the grid, while simultaneously instructing paired generators to reduce their output as necessary to balance the flow of electricity.

Akaysha Energy CEO Nick Carter said bringing the first 350 MW of the Waratah Super Battery online was a major milestone for everyone at Akaysha Energy.

"This achievement is the result of a tremendous collective effort spanning our global business units across all areas such as delivery, engineering, commercial and legal, technical integration, grid modelling, software, operations and trading," Carter said.

"Of course, we could not achieve success without our outstanding delivery partners — CPP, Hitachi Energy and Wilson Transformer Company," he added.

"Delivering this scale of infrastructure on such an accelerated timeline is no small feat, and we are honoured to have been entrusted to deliver a project of such significance to NSW's energy security."

Remote-controlled load break switch

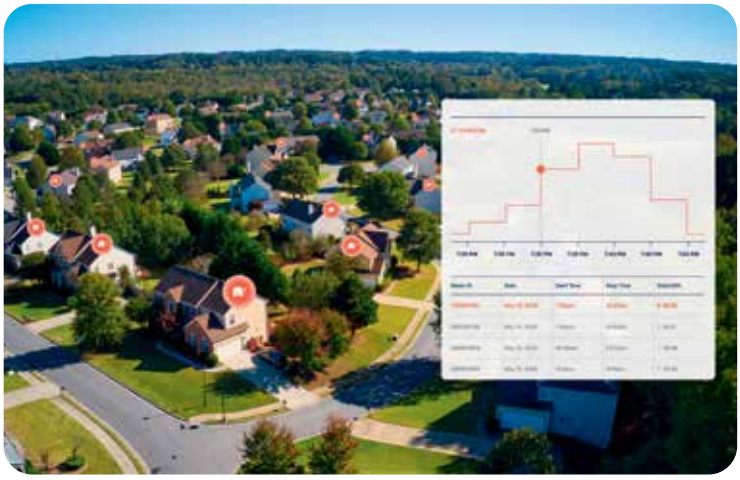
NOJA Power's VISI-SWITCH, a solid dielectric insulated load break switch with an integrated visible isolation gap, is now enhanced with remote control capabilities. This innovation in distribution network automation offers utilities a sustainable, SF6-free alternative for load break switching with enhanced operational flexibility.

The load break switch is equipped with a motorised accessory and integrated with NOJA Power's RC-10 Controller, enabling full remote control from the utility control room. The visible isolation gap enables clear confirmation of disconnection, improving safety for field crews.

The remote control feature helps reduce travel time and operational costs in rural and remote areas, where isolation points may be located far from maintenance sites. Finally, by eliminating SF6 gas, the load break switch supports utilities in meeting environmental and sustainability goals.

NOJA Power Switchgear Pty Ltd

www.nojapower.com.au



EV analytics tool

Sense's EV Analytics tool is designed to provide electric vehicle detection and charging insights that unlock smarter forecasting, better distribution planning and more efficient managed charging program delivery for energy retailers, distributed network service providers (DNSPs) and meter coordinators.

The tool uses AI to process waveform data at the grid edge and detect the electrical signatures of EVs. It monitors both level 1 and level 2 charge events, as well as providing detailed data including start/stop times and kilowatt-hour consumption.

A load management solution delivered through next-generation smart meters, the analytics tool can be used as an app, providing real-time data and identifying trends and patterns around EV charging.

Sense

sense.com

Fire system for small commercial buildings

FireFocus is a transitional fire system purpose-built for Building Classes 2, 3 and 5–9 to bridge the gap between residential and commercial fire solutions.

The unit consists of a single-loop model supported by a colour LCD touchscreen interface with integrated status LEDs and an app-based menu system. It is designed to offer streamlined, user-friendly access to fire safety for small-scale commercial buildings.

Fully compatible with all Panasonic loop units, the system can house up to one COM loop supporting 253 addresses, with a maximum of four sub-loops, 128 isolators and 64 wireless devices. Utilising a wizard-based auto set-up for easy, PC-free commissioning and maintenance, the discreet design of the unit and ease of access offers a solution for consumers across all points of installation, including architectural designers, construction and electrical tradespeople, and end users.

Brooks Australia

www.brooks.com.au

CASE STUDY

Boosting agrivoltaics in Japan

iStock.com/mith_67

Solar panels used for clean energy generation among rice paddy fields, Japan.

In countries like Japan, where mountainous terrain limits space, balancing clean electricity production with agricultural land use can be a challenge.

Researchers from the University of Tokyo have turned to the practice of agrivoltaics — ie, combining solar panels with agriculture — in order to address this problem. Their findings have been published in the *Journal of Photonics for Energy*.

For their pilot project, the researchers set up a dual-axis sun-tracking photovoltaic (PV) system above a rice paddy in Miyada-mura, Nagano Prefecture. Positioned three metres above the ground, the solar panels generated electricity while allowing rice cultivation to continue underneath. The system was designed to adjust panel angles daily and seasonally, prioritising rice growth during the planting season and maximising energy production during the off-season.

Over two growing seasons, the agrivoltaic system achieved rice yields of 75% and 85% when compared to the average crop yield in the surrounding area. The yield improved significantly in the second year after the team fine-tuned the amount of sunlight reaching the crops. Importantly, the rice also met Japan's highest grain quality standards, the scientists said.

Meanwhile, the PV panels generated nearly 44,000 kilowatt-hours of electricity annually, with an energy yield (961.4 kWh/kW) that compared favourably to similar systems in Europe, according to the researchers. Over a projected 20-year lifespan, and without government subsidies, the estimated cost of electricity production was about 27 yen per kilowatt-hour — roughly equivalent to Japan's household electricity rate at the time.

The study examined the trade-offs involved in balancing crop productivity with solar energy output. Ultimately, it showed that careful management of shading, including adjusting the panels' angles throughout the day and season, can help in achieving both goals.

In addition, the researchers highlighted potential future directions such as using AI to optimise sunlight-sharing in real time, and experimenting with high-efficiency or semi-transparent solar panels to further reduce crop shading.

With Japan aiming to dramatically increase its solar capacity by 2030, the researchers hope their results will inform broader adoption of agrivoltaics — particularly in rural areas where preserving food production is essential. By combining energy and agriculture, they argue, it may be possible to support both sustainability and economic resilience on the same piece of land.

The original Gold Open Access article by Y. Okada et al., 'Case study of rice farming in Japan under agriphotovoltaic system', can be read at doi: 10.1117/1.JPE.15.032704.

CASE STUDY

How UniSuper adopted a digital power model

When UniSuper, one of Australia's largest superannuation funds, was looking to modernise its aging UPS systems, it turned to Schneider Electric to deliver a new approach to critical infrastructure management.

The result was a transition from a traditional capital expenditure model to a flexible, usage-based service agreement through Schneider Electric's Secure Power as a Service offering.

Under this new model, Schneider Electric takes full operational responsibility for UniSuper's UPS infrastructure across all Australian sites, with the infrastructure monitored, maintained and managed 24/7.

The shift eliminates the need for upfront capital expenditure and allows UniSuper to scale infrastructure in line with its changing needs, avoiding the pitfalls of overprovisioning and life cycle uncertainty.

"With support from Schneider Electric, we've moved to an outcomes-based model that delivers the performance we need without the complexity of managing physical assets," said Lachlan McDonald, Infrastructure Operations Manager at UniSuper.

"It's a more sustainable, more strategic way to meet our power continuity obligations and operational requirements."

Predictable, transparent and sustainable

Like many organisations, UniSuper had previously relied on oversized or extended-life UPS systems, for reasons such as budget cycles and shifting priorities.

Adopting Secure Power as a Service has allowed the organisation to mitigate the associated risks and transition to a predictable, transparent and sustainable solution. This also supports its long-term planning efforts by replacing reactive infrastructure decisions with a scalable and proactive model.

"This approach gives us peace of mind and removes the unpredictability of managing complex assets across multiple sites," McDonald said.

"We no longer have to overinvest in infrastructure and we only pay for exactly what we use. It's a great fit for our business and a smart way forward."

Schneider Electric said the move demonstrates how service-based infrastructure models can unlock financial and operational value for enterprise organisations, particularly those with distributed locations and strong continuity requirements.

Freeing up time for innovation

By delivering defined service-level outcomes like load capacity and runtime — without requiring the customer to own or manage the associated infrastructure — Secure Power as a Service enables organisations to focus on innovation, customer experience and other aspects of business continuity.

"Secure Power as a Service is designed to deliver what organisations really need: resilient, scalable power infrastructure, without the cost and distraction of managing the assets," said Seg Narayanan, Vice President Services & Safety, Pacific Zone, Schneider Electric.

"Our partnership with UniSuper highlights how this model can support complex, distributed environments while delivering tangible operational value."

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