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SMART REGIONAL SPACES

WHY UTILITIES ARE TURNING
TO 3D DIGITAL NETWORK MODELS

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MARCH 2023
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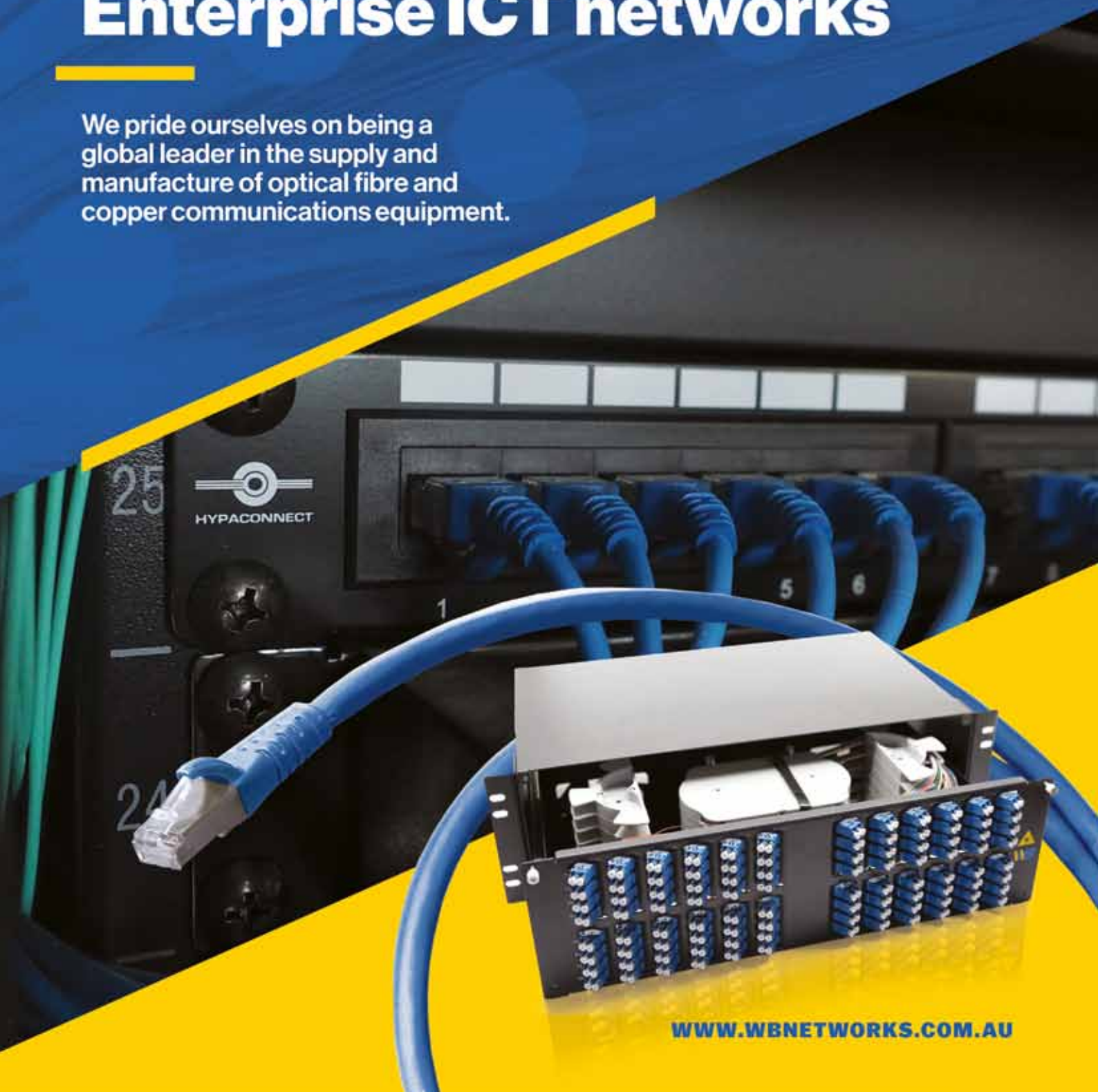

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FROM THE EDITOR

ECD's first issue for 2023 looks at some real-world applications of smart city technology and digital models.

Smart city projects might have been around for a while now, but they continue to be a pretty hot topic. Here in Australia, every capital city has some sort of smart city framework, with initiatives including pedestrian counting systems (Perth, Melbourne); tree data maps (Melbourne); smart bins and street lighting (Adelaide); smart lights and cameras for pedestrian safety (Darwin); free public Wi-Fi (Canberra); and smart bus stops (Hobart). The uses of smart city technology to improve urban life seem almost endless.

But something this thriving movement often seems to overlook is the application of smart tech to regional areas. In this issue's feature, *ECD* looks beyond the smart city to rural Australia and speaks with city planner and academic Dr Nancy Marshall about **Smart Regional Spaces: Ready, Set, Go!**, an exciting project that aims to bridge the digital divide between urban and regional Australia.

From smart city tech and the Internet of Things, we move on to the burgeoning relationship between digital technology and infrastructure. Utilities are increasingly using virtual models like digital twins to help them respond to disasters and mitigate other risks. In an in-depth interview, Jack Curtis, Chief Commercial Officer at the innovative Australian software company Neara, explains how Neara's 3D digital network model is making it easier for utilities to answer a host of crucial 'what-if' questions. Further on in the magazine, the case study 'Bridge building, digitally' describes how design software and 3D models were used to design a bridge in suburban Melbourne, allowing the firm handling the project to address some sticky problems.

Elsewhere in this innovation-packed issue, you'll find articles on geothermal energy, an eco-building with a solar facade and current challenges for the critical data centre industry.

Katerina Sakkas — Editor
ecd@wfmedia.com.au

Image credit: Penny Vozniak

GET READY FOR SMART REGIONAL SPACES

Katerina Sakkas

Old Portland Cement Works, Portland, Lithgow, with portraits painted by Guido van Helten of past Portland Cement workers.

Gaining traction in the 2000s (though the earliest examples date back to the late 1960s), the concept of the smart city — a dynamic network of digitally interconnected devices and services designed to improve urban life in a multitude of ways — continues to capture the imagination of Australian policymakers, with smart city projects currently underway in every capital city.

But what about regional spaces? Do they have a place in the smart city movement?

Up until very recently, in Australia at least, the answer seems to have been "no" — there is a marked digital divide between metropolitan and regional areas, according to the Australian Digital Inclusion Index. Seeking to redress the imbalance is **Smart Regional Spaces: Ready Set Go!**, a collaborative project between the University of Sydney, the University of New South Wales and the Department of Regional NSW, together with three local government partners: Lithgow City Council, Parkes Shire Council and Armidale Regional Council. Having commenced in March 2022, the project is set to run for 16 months, funded by a $2.2m grant from the Digital Restart Fund under the NSW Government's Smart Places Acceleration Program.

Project Lead Associate Professor Nancy Marshall, from the University of Sydney School of Architecture, Design and Planning, said the primary aim of the Smart Regional Spaces project is to promote the concept of 'smart readiness' in regional NSW. The project has three key objectives: to advance the relevance and application of smart place resources for regional NSW; to create a smart knowledge network between national and international experts and regional NSW; and to launch a 'Start Smart-Ready Program' as a plan of action in regional and rural NSW.

Image credit: Penny Vozniak

Cook St Plaza, Lithgow.

> WHEN WE WERE DESIGNING SOME OF OUR TOOLS, WE WOULD HAVE GONE A BIT MORE FANCY OR HIGH-TECH, BUT THERE'S NO POINT BECAUSE OUT IN THE FIELD, THEY REALLY DON'T HAVE ACCESS TO CONNECTIVITY ... SO WE'VE HAD TO SCALE BACK SOME OF OUR THINKING JUST TO BE USABLE. – NANCY MARSHALL

"Up to now, the 'smart cities movement' has been all about urban areas and the challenges that come with high-density living, traffic congestion and city open space," Marshall said. "That conversation needs to turn to the regional areas so that regional councils and communities can benefit from innovations in community management, infrastructure and the design of public spaces. The smart cities movement and its initiatives do not necessarily translate to the spatial scales, assets, budgets and distinctive regional contexts."

Marshall and her fellow project team leads had been working together in the smart cities space since 2017, but wanted to shift the discourse to the regions and work towards decreasing the digital divide that exists between urban and rural Australia.

"This was an important extension to our thinking and practical experience. We want to have a positive impact in NSW and, hopefully, to regions beyond. We also wanted to bring global smart city experts and precedents into this conversation, which we are doing."

Each of the three local council areas the team is working with had unique challenges and opportunities, which could variously be assisted or taken advantage of by smart systems.

Armidale Regional Council has rich natural resources, including national parks and waterfalls, as well as historic buildings and landmarks. "It is a cultural and educational hub of the New England Region, with a thriving agri-business sector playing a pivotal role in its economic development. The council's efforts in promoting sustainable agriculture and ecotourism have been commendable," Marshall said.

"Lithgow City Council is going through a period of industrial transition, with its traditional mining industry giving way to new sectors such as advanced manufacturing, renewable energy and tourism. The Blue Mountains, which flank Lithgow, are a major drawcard for visitors to the region. The council is taking steps to ensure the wellbeing and economic prosperity of its community, including investing in digital infrastructure and supporting the growth of small and medium-sized businesses.

"Parkes Shire Council is a critical logistics hub, with major highways and rail lines passing through the town. It is both a mining and agricultural centre in the state. It is also home to the famous Elvis Festival, which attracts thousands of visitors annually. The Parkes Special Activation Precinct, one of six in regional New South Wales, aims to attract investment and create jobs in sectors such as advanced manufacturing, logistics and renewable energy."

While many smart city projects focus on specifically enhancing infrastructure for the benefit of the community (for example, the City of Darwin's 'Switching on Darwin' lighting and security camera initiative), the focus of Smart Regional Spaces "is not on the physical infrastructure itself, but rather on developing tools and resources to support the adoption of smart technologies", Marshall said. To this end, the team has identified six key deliverables that should enable its partner councils to better understand and leverage the benefits of smart places. These are:

Online learning modules

- Developing a series of 12 digital smart places online learning modules that will inform and engage councils about the potential role of smart infrastructure and technology in enhancing people and place issues.

Sharing other smart initiatives

- Sharing smart initiatives from around the world that could inspire regional NSW.

Smart readiness tools

- Designing and testing smart readiness tools that are tailored to the unique

needs of the partner councils. The team is identifying potential sites for smart technology implementation.

Creating a community of practice

- The three regional councils were invited to Sydney to observe and experience smart cities projects, precincts, programs and infrastructure in action. Several Sydney-based councils shared experiences during this urban expedition.

Bespoke smart strategies

- Developing smart strategies with each partner council that align with local and state priorities, and a smart strategy template that can be adapted by other regional councils.

Onsite training sessions

- Providing onsite training sessions for the partner councils, adopting a 'see one, do one, teach one' legacy model for technically solving local issues.

Devising ways to make rural areas 'smart ready' can be challenging. "Providing smart solutions to complex problems is very difficult when the infrastructure is still lacking in some rural locations," Marshall said. There are two major reasons for this lack of infrastructure: small populations and actual physical geography.

In the case of the first, when "more users equals more money", the incentive just isn't there for private providers to cater for very small populations, "which is why the cities are over-subscribed for access and the regions aren't", Marshall explained.

"When we look at somewhere out in the middle of NSW, where there's not the population base, for a private provider to use the hardware and the programs, you can see why they don't do it if their main purpose is to make money as a company — and you can't really blame them for that. So there are absolutely dead spots in the bush where they have no connectivity and you actually don't have to get far out from the regional centres to find them."

In an attempt to make things more equitable, the government sometimes does a deal with a private provider, or encourages different providers to work together, or provides the connectivity services itself. Elon Musk's Starlink satellite system has also reportedly been a very helpful addition to regional connectivity, Marshall said.

Then there's the second issue: the problem of physical geography. "A satellite has to go straight up," Marshall said, "so if you've got a forest or mountains it's really difficult to bounce signals through a landscape, because they want to go the shortest route possible but have to go up and over and back down rather than straight through."

The NSW Government's Gig State program is in the process of mapping out zones with zero or poor coverage, in order to try to make these priority areas. This lack of fundamental hardware remains the main challenge of creating smart regional spaces — when you can't even get a connection on your phone two km out of Armidale, you can hardly "get into all the fun stuff like garbage collection and smart street furniture", Marshall said.

"I think that is the biggest [issue] maybe that the urban dwellers don't think of, because [connectivity] is just everywhere here [in cities]. When we were designing some of our tools, we would have gone a bit more fancy or high-tech, but there's no point because out in the field, they really don't have access to connectivity … so we've had to scale back some of our thinking just to be usable."

The general response to the project in each area has been positive, however, with Marshall emphasising the importance of involving the community from the onset, as well as providing a springboard for councils to initiate further dialogue with the community around adoption of smart technology in public open spaces.

"We have had the opportunity to hear a diversity of voices — conservationists, educators, councillors, council staff, youth representatives, local business groups and not-for-profits — who have been incredibly enthusiastic about the possibilities of intersecting with smart technology as a way to enhance the social experience of places alongside improving efficiencies in resource and services management. Use of technology to improve community connectedness and livability have been other recurring themes emerging during our consultation sessions."

Given the project's intention is to facilitate rather than prescribe a course of action through specific technology, the team has let community needs, challenges and the places themselves be the determining factors for the type of technology that is best suited to each locality.

"We are exploring concepts such as digital place-making, smart environmental monitoring and IoT (Internet of Things) technology for better asset management capabilities as part of this project. Our partner councils have already engaged in various smart projects and trials so far, and we are happy to play a part in their ongoing journey within the smart places movement under this project," Marshall said.

"The strong community ties in regional and rural towns, their insights on local places through their lived experience and the overall participation of the community at a grassroots level have all been encouraging aspects of our engagement with our regional partners. This all bodes well for increasingly 'smart' regional places."

Smart Regional Spaces: Ready, Set, Go! team: Associate Professor Nancy Marshall, Associate Professor Kate Bishop, Dr Christine Steinmetz, Eshita Dutia, Dr Yuan Wei, Dr Sophia Maalsen, Professor Robyn Dowling.

Image credit: Penny Vozniak

View from Memorial Hill Lookout, Parkes.

Electrical Comms Data news

Aerial view of Mary River and Maryborough, Queensland.

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NEW REQUIREMENT FOR ELECTRICAL ENGINEERS WORKING IN VIC

Engineers Australia is reminding electrical and electronics engineers of an upcoming Victorian requirement that they must be registered in order to work in the state.

From 1 June 2023, professional electrical and electronics engineers practising in Victoria must be registered — this includes engineers living in other states and territories but working on projects in Victoria.

Engineers Australia is urging engineers to complete the first step of applying for a competency assessment by March 2023 at the latest.

To help electrical and electronics engineers get a better understanding of who needs to be registered and what they need to do, Engineers Australia is running a free information session specifically on Victorian registration, on 1 March.

The session will provide information about registration requirements and competency assessments. Attendees will also be able to ask Engineers Australia's team of experts any questions about the assessment and registration process.

Engineers Australia Chief Engineer Jane MacMaster said the compulsory registration of professional engineers will enable significant enhancement of public safety and consumer confidence.

"Registration helps to ensure that only those with suitable qualifications, enough relevant experience and a proven commitment to ongoing training and professional development can provide engineering services," she said.

Registration of engineers in Victoria is carried out by the Business Licensing Authority (BLA); however, an applicant must first be assessed by an approved entity, of which Engineers Australia is one.

The assessment process has two components:

- An 'Entry to Practice' assessment to determine the adequacy or otherwise of the applicant's qualifications.
- An 'Independent Practice' assessment to determine the acceptability or otherwise of the applicant's experience and competency.

Engineers Australia is advising engineers to start the registration process at least three months prior to the date by which they are required to be registered. This will help to ensure engineers can continue to provide professional engineering services in Victoria. It will allow six to eight weeks to gain an assessment from Engineers Australia and 28 days for the Business Licensing Authority (BLA) to process the application (as recommended by BLA).

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HOME-GROWN BATTERIES TO SHAPE QLD'S ENERGY FUTURE

Sustainable iron flow batteries from a Queensland-based, Australian-owned energy storage company are on their way to becoming part of Queensland's energy transition plan.

Energy Storage Industries – Asia Pacific (ESI) has announced that its long-duration, grid-scale batteries have completed the final stage of commissioning, with the first production batteries now being transported to a customer's pilot site.

ESI Managing Director Stuart Parry said the value of iron flow technology was being recognised across industry and government in Queensland and around Australia.

"Queensland is at the forefront of battery technology development and ESI is helping reinforce this state's reputation as a leader in the renewable energy economy," he said. "We will continue to deliver on the promise of our leading-edge technology, which is critical to supplying Queensland's and Australia's long-term, low-carbon energy needs."

In January an ESI battery completed commissioning at the National Battery Testing Centre at Banyo in Brisbane, where it demonstrated its capabilities to capture surplus energy and return it to the grid at peak times. During two months of examination by Queensland University of Technology experts, the battery proved capable of performing in Australia's harsh conditions.

Later in January, ESI welcomed representatives of leading energy operators including the Queensland Government-owned Stanwell Corporation, a major provider of electricity and energy solutions, to Banyo to inspect its fully recyclable technology.

At the same time, the next 10 battery systems manufactured by ESI's partner ESS Inc. in the United States started their journey across the Pacific, bound for the first of ESI's client pilot sites. Ten additional battery systems will follow in coming weeks. From 2024 onward iron flow batteries will be assembled at ESI's $70 million manufacturing plant in Maryborough, where civil works are underway to support the facility's construction.

Deputy Premier Steven Miles visited ESI's Maryborough site in January to launch Queensland's Battery Strategy Discussion Paper to assess how the state can become a leader in energy storage technology. The paper highlighted the role of iron flow batteries in Queensland's energy future.

His visit was followed by Mike Kaiser, Director General of the Department of State Development, Infrastructure, Local Government and Planning, who commented that large, grid-scale batteries will be in heavy demand in Queensland and around the world as global electricity grids shift to renewable energy.

"We are grateful for the support of the Queensland Government in bringing this technology to scale," Parry said.

"Localising assembly, testing and support will be critical to deploying at scale and the support we've received has been of immense value."

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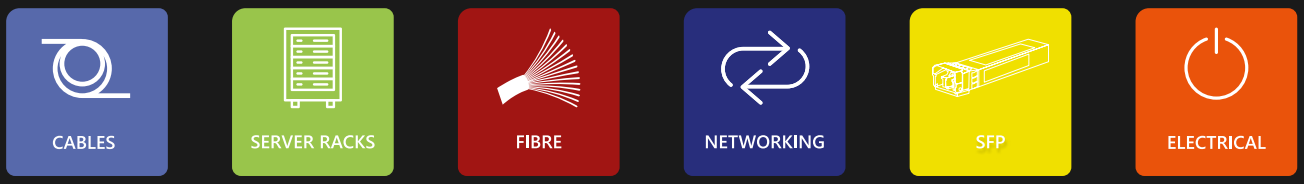

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The Vast Solar pilot project in Jemalong.

Image Supplied.

VAST SOLAR PLANT ON HORIZON FOR SA

Australia is one step closer to its first commercial-scale concentrated solar power plant.

On behalf of the Australian Government, the Australian Renewable Energy Agency (ARENA) has announced it has approved $65 million in funding to Vast Solar to construct VS1, a 30 MW/288 MWh concentrated solar power (CSP) plant in Port Augusta, South Australia.

ARENA's funding for VS1 is conditional upon the project reaching financial close, which is targeted to occur in late 2023. VS1 is expected to take two years to build, with commercial operations commencing in late 2025.

The $203 million project will aim to demonstrate how CSP can provide a reliable and scalable dispatchable renewable energy solution in the Australian market. It will test the technical and operational performance of Vast Solar's modular CSP technology at utility scale, with a view to unlocking investment in future projects and providing another pathway for Australian industry to decarbonise.

CSP uses mirrors to concentrate and capture heat from the sun in solar receivers, with high-temperature heat transferred via sodium and stored in molten salt. The stored heat can then be used to heat water to create steam to power a turbine and produce electricity, or the heat can also be used directly to decarbonise some industrial processes.

One of the benefits of CSP is that the captured heat can be stored cost-effectively for long periods with little loss of energy. This means that CSP can be used to generate electricity or provide heat on demand, including overnight.

ARENA has supported the Vast Solar technology since 2012, including providing $9.9 million in funding towards the 1.1 MW CSP Pilot Plant in Jemalong, New South Wales.

"With the increasing need for dispatchable renewable generation and longer-duration energy storage, CSP has potential to assist Australia's energy transition alongside pumped hydro and large-scale batteries," said ARENA CEO Darren Miller.

"Vast Solar's global recognition as a leader in CSP technology innovation, combined with its significant technical and commercial expertise, mean that it is well placed to deliver Australia's first large-scale CSP plant which should deliver power at a cost competitive with other forms of renewable generation," Miller said.

Craig Wood, CEO of Vast Solar, said: "We are grateful for ARENA's long-term support. Their understanding of the potential of our CSP technology is a testament to the Australian Government's ambition to deliver cost-competitive dispatchable renewable energy to help uphold emissions reductions goals while supporting local jobs and industry."

More information on the project can be found on ARENA's website.

ACQUISITION TO INCREASE NETWORK RESILIENCE

Amokabel, the Swedish specialist cable producer, has acquired Euro-Tech Cables Pty Ltd, a Sydney manufacturer of high-quality signal and communication cables. Completed in December 2022, the deal has established a manufacturing footprint in Australia for Amokabel, with the long-term goal of producing covered conductor.

Amokabel says its new-generation covered conductor enables distribution network operators (DNOs) to increase their network resilience and vastly reduce the risk of bushfires starting when electrical lines come into contact with dry vegetation. This was the primary cause of the Black Saturday fires in 2009.

Image Supplied

According to the CSIRO, covered conductor reduces the risk of ignition by 98%. It can be easily retrofitted to existing poles and infrastructure with minimal changes. As a lightweight technology, covered conductor virtually eliminates 'interpoling', which is the practice of adding additional poles to support the weight of older styles of covered conductor. It also brings other benefits, such as increased public and wildlife safety.

Having established its Australian subsidiary in 2021, Amokabel has been supplying DNOs with covered conductor and accessories from Sweden via a warehouse in Australia. However, demand is growing and it wanted to demonstrate its long-term commitment to the market by developing local production.

"As manufacturers, Amokabel and Euro-Tech are a good natural fit as we share a philosophy of having flexible production lines and a fast response so that our customers can have exactly the cable they want when they want it," said Stephen Rutland, Managing Director for Amokabel Australia. "Our immediate plan is to invest in the facility in Sydney and grow Euro-Tech's existing market, but looking further into the future, we'd like to develop the business further by producing covered conductor."

Amokabel will continue to serve Euro-Tech's customers with control and instrumentation cables for mining, electronics, signalling and other industries. The Sydney production line features purpose-built machines that produce cables for specialist applications, eg, supplying nylon sheathing to cables for protection against termite attack.

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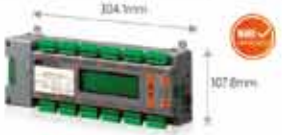

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Stage lighting connector

The Amphenol Socapex Connector is a standard cable type for stage lighting, offering a high strength-to-weight ratio.

Used for conducting dimmed power from a dimmer to stage-lighting instruments, it can also occasionally power other equipment. It is used in film, television and stage lighting to terminate the multi-cable. The 19-pin connector is UL recognised and is supplied with solder or crimp gold-plated contacts. The SLG version has seven first mate/last break (FMLB) ground contacts providing electrical safety. The connector has a reinforced locking ring and can be operated up to 600 V and in temperatures of -40 to +85°C.

RoHS versions are available with black coating (non-conductive) and nickel plating (conductive).

The split backshell enables simple maintenance and wiring, while the metallic monopiece backshell provides an IP67 waterproof sealing for outdoor applications.

Treotham Automation Pty Ltd

www.treotham.com.au

AC input module

ICP Australia has introduced ICP DAS's M-7017RMS-G, which is an 8-channel differential AC input module that is used to convert AC input signals to their true RMS DC values.

M-7017RMS-G facilitates an RMS input range that can be from +150 mVrms to +10 Vrms, and each channel can be configured individually. The M-7017RMS is a complete RMS-to-DC converter that computes the True RMS DC value of any complex waveform. It also features 4 kV ESD protection, 2500 VDC intra-module isolation and ±35 VDC overvoltage protection. Furthermore, M-7017RMS-G can withstand tough industrial conditions as it can function well under a wide temperature range (-25 to ~75°C). Likewise, to facilitate a better user experience M-7017RMS-G supports a DIN-rail installation.

Lastly, M-7017RMS is a multifaceted device that can be used for a variety of applications, particularly in the field of automation, eg, building, factory and machine automation.

ICP Electronics Australia Pty Ltd

www.icp-australia.com.au

Wall box

Clipsal by Schneider Electric (Clipsal) has launched a new wall box to meet the growing needs of electricians.

The 157MDF Deep Fire-Rated Wall Box has been designed to provide protection and support for new and emerging technology that has outgrown traditional models. Now, with a depth of 70 mm, the wall box can safely house modular devices such as Iconic and Clipsal Wiser Smart Home.

For faster and more efficient installation, the wall box features a new earthing terminal that is compliant to AS/NZS 3.7.11. It also offers 120 min integrity and 90 min insulation fire ratings.

The product also features acoustic rated up to STC50, 11 mm intumescent material and a solid surround for easy application of mastic.

The tabs on the 157MDF Deep Fire-Rated Wall Box have also been repositioned, in order to offer a better fit and smoother installation for the electrician, while its recessed mounts make it possible to support a large variety of plate ranges.

The product is available to electricians Australia-wide.

Schneider

www.clipsal.com

OT platform

Now available worldwide, Belden Horizon is a platform designed to provide secure, OT-centric services for deploying, connecting and managing OT devices and applications at the edge.

With Belden Horizon, users can simplify OT device and application management using a single, modern cloud interface. They can scale industrial edge deployments with the ability to onboard, monitor and update connected edge gateway devices and to deploy and orchestrate edge applications. Connections can be remotely and securely managed through on-demand secure remote access (SRA) and always-on persistent data network (PDN) connections.

The carrier-agnostic connectivity enables better access to geographically dispersed assets, while secure machine access helps to reduce downtime and support costs.

The platform enables users to deploy and manage containerised applications on edge devices. Authorised users can control access via the virtual lockout-tagout (vLOTO) feature.

The platform enables IT/OT convergence with support for Active Directory via single sign-on, token-based multi-factor authentication and user-configurable password policies.

Belden Australia Pty Ltd
www.belden.com

Networking solution

Aruba Instant On is Aruba's solution for any business looking to address security concerns, covering the entire organisation, without draining limited resources. Aruba Instant On supports businesses by providing a fast and secure network solution.

Aruba Instant On's innovative portfolio of access points and switches delivers a high-performance, business-grade networking solution that's easy to set up. Aruba provides premium hardware and scalable software that delivers a smooth user experience for customers and employees and is suitable for a variety of businesses.

Access Points are for desk/wall, indoors or outdoors, with fast Wi-Fi coverage that's ready to set up out of the box. The Instant On cloud-enabled switches offer more bandwidth, power and ports, while the mobile app allows network set-up and management from any iOS or Android smart device.

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Q&A WITH JACK CURTIS:

WHY 3D DIGITAL NETWORK MODELS ARE THE WAY FORWARD FOR RISK MITIGATION

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In this interview, Jack Curtis, Chief Commercial Officer, Neara, goes beyond the concept of the digital twin to discuss the crucial role 3D digital network models can play in mitigating a multitude of risks for utilities.

ECD recently covered Endeavour Energy's use of the Neara digital twin in disaster response management during the 2021–2022 Hawkesbury River floods, for which the utility received an Innovation Award from Energy Networks Australia. This is obviously cutting-edge stuff. Are you doing similar work with other utilities?

Our work with Endeavour Energy during the Hawkesbury River Floods definitely enabled similar work with other network utilities by illuminating ways that networks can better prepare and recover from extreme weather events, from major floods to bushfires. As extreme weather events increasingly become part of our reality, there's more urgency than ever among our customers to prepare a strong response.

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Our partnership with Endeavour has not only raised the bar for how utilities manage severe weather, but it has also opened the aperture for utilities to reimagine how they manage all kinds of risks. Our platform essentially boils down to helping utilities understand how their networks will be impacted by anything, not just severe weather — the very same functionality helps utilities answer an exhaustive list of critical 'what-if' questions, from everyday clearance concerns to the best way to optimise network availability and bring more clean energy online.

Are we essentially talking about digital twins for every project Neara is involved with, or do you develop other types of platforms as well?

While Neara grew up with the "digital twin" terminology and we can trace our beginnings to new network design, the majority of our current customers rely on our 3D digital network model to help them with everything from severe weather management to accelerating their decarbonisation journey. The 3D network model differs from traditional digital twins in that it's not simply a visualisation — it behaves exactly as the physical assets do in real life, which enables our customers to simulate the scenarios they care about, using hundreds of variables so that they know exactly how their network will respond and prepare accordingly.

The 3D digital network model is the foundation of every project and can be leveraged for any of the myriad 'what-if' scenarios today's utilities face — while we serve a variety of use cases, we do so using the same single platform that is built from the same data source. Fortunately, this makes it easy for utilities to scale up their risk reduction efforts and achieve great outcomes even faster than they would across a series of disparate products and data sources. For example, if a vegetation team is excited about their colleagues' success with flood management, they can easily stand up their own use cases in no time, because it's on the same platform. We're proud of our platform orientation because we believe it's mission-critical that every utility employee has access to the same level of situational awareness for the safety of their team and community.

Once an organisation/company subscribes to Neara's software, how collaborative is the process from that point on? Does Neara continue to work with the company?

Once we've engaged a customer, our approach is to work closely together to ensure we're defining and realising the right outcomes. Our goal, however, is for the platform to be self-service for our customers. In addition, our platform is designed to grow with our customers and their objectives as they evolve, reducing the need for multiple solutions and keeping information and workflows streamlined.

While particularly early in an engagement, our team can take a hands-on approach to prescribing a roadmap. We often find that once our customers reach escape velocity they are often the ones coming back to us and highlighting net new use cases they've discovered on their own. In this way, we see our customers as incredibly valuable partners in continuing to build out our product roadmap.

Additionally, as much as we enjoy working alongside our customers, one of the most rewarding things is seeing our customers come together independently and collaborate on how to solve shared challenges, based on what they've learned about their own processes working with us.

What sort of data does Neara capture across its projects?

While we don't directly capture data, our models typically feature a combination of GIS (geographic information system), LiDAR (light detection and ranging), EAM/SAP (enterprise asset management), CAD (computer-aided design) drawings, inspection and satellite libraries, asset libraries and IoT/sensor data. We maintain a data-agnostic posture, as a key strength of our 3D digital network model is that it reflects a combination of high-quality, diverse data sources that result in high accuracy.

> IN NEW SOUTH WALES ALONE WE'VE ALREADY BUILT A NEAR-COMPLETE DIGITAL MODEL OF THE STATE'S ELECTRICITY INFRASTRUCTURE AND ARE IN THE PROCESS OF OBTAINING ADDITIONAL DATA FOR WIDER GRID MODELLING. – JACK CURTIS

Does use of Neara's software increase the efficiency of a project?

Absolutely. Across customer engagements of every kind, our 3D digital network model enables customers to significantly speed up the end-to-end process of every workflow while reducing costs and manual labour.

For example, in our initial work with Endeavour, we helped them eliminate 300 hours of inspection time so that they could instead focus on targeting their response to customers at greatest risk. In a similar deployment, we found that following a severe flood, the utility was able to restore power 3x faster than they originally anticipated.

Across the board, our digital model's network-wide scale makes it significantly easier to identify and respond to risks. On average, our customers identify and resolve routine risks 9x faster than they otherwise could.

Furthermore, customers that use our software to execute new transmission line planning are moving twice as fast as they otherwise could, cutting through red tape in weeks instead of months.

Can you tell us about Neara's work with government bodies to unify Australia's clean energy transition?

As part of Australia's massive move to renewable energy, regulatory bodies have been working to coordinate the efforts of all industry players, from utilities, government, regulators and technology platforms, to deliver electricity at the lowest possible cost to consumers. This coordinated approach will help to ensure that 2030 goals are not only met on time but achieved in the most time-efficient and cost-effective manner.

Our role within this transition is to work collaboratively with all parties, almost acting as the connector between network service providers and government bodies. Leading utilities across the country use our digital modelling platform which generates reliable data-driven network insights that keep all parties on the same page. As the connector in the chain, we map the entire network through our platform, which assesses risk across the network and allows NSPs to better allocate capital to areas that most need it. This helps parties across the whole ecosystem avoid expenditures on the network, which is critical to ultimately delivering electricity at the least cost to consumers, while entertaining tenders for investment in new projects.

Do you predict the use of digital models by the energy industry will become widespread over the next few years?

Technology that reinforces stability, efficiency and sustainability of the grid has gained major traction, especially as we approach the 2030 clean energy targets and the demand for electricity rises. Simple visualisation functionality will unfortunately not be enough to meet these targets, as the ability to simulate how assets respond to real-life events becomes critical in our sector to get ahead of the game and provide more precise accuracy.

In New South Wales alone we've already built a near-complete digital model of the state's electricity infrastructure and are in the process of obtaining additional data for wider grid modelling. These efficiencies and insights could ultimately be used across the entire nation's grid in one unified platform enabling all solutions to be successfully integrated.

Beyond grid efficiency, as the frequency of extreme weather events rises, government bodies and network service providers across the nation will be looking for ways to mitigate risk — whether it be from a safety, cost or consumer perspective. Technology that is trusted for its accuracy and reliability will play an integral role in helping modernise the way public and private bodies respond to these weather crises moving forward.

Neara
www.neara.com

HNM rectangular connectors

Treotham is expanding the market for rectangular connectors with the new ILME RKAX size '21.21' metal housings (bulkhead and surface mounted) and hoods with a CLASS single locking lever. The new connectors come together with a wide range of connector inserts for 5, 10, 16 and 40 A, as well as the redesigned RQF/M 05, with integrated HNM (high number of mating cycles) screw-type PE terminal.

Treotham's new combined connectors, RXC 4/2 and RXC 4/8, extend from 500 to 10,000 mating cycles thanks to the HNM treatment.

The new RX7M2D P series of 70 A crimp contacts is now expanded by adding a variant of male contacts with an insulating cap on their tip. This determines the finger-proof safety feature (IPXXB or IP20 in combination with the MIXO CX 02 7M module).

The ILME HNM range is a good solution for applications with frequent disconnection use, such as test benches, charging systems or removable tooling equipment activities.

Treotham Automation Pty Ltd
www.treotham.com.au

Car-mounted computer

Designed for industrial usage, the Winmate FM12Q 12.1″ Android car-mounted computer is capable of enduring hostile environments. Its sturdy casing has an IP65 rating and MIL-STD-810H certification, which affirms its durability. With a PCAP touchscreen on a compact 12.1″ panel, the rugged device is resistant to dirt and debris while offering sensitive touch instructions.

As an industrial computer, the product's low-power parts avoid overheating and are less prone to experiencing high temperatures in the first place.

To support the next generation of Internet of Things (IoT) edge devices, the computer has a new line of processors enhanced for IoT — the Qualcomm Snapdragon 660 Series. These processors incorporate integrated IoT features, real-time performance, manageability, security and functional safety in addition to new CPU and graphics performance levels.

Backplane Systems Technology Pty Ltd
www.backplane.com.au

Cam latch with padlocking L-handle

Southco's E5 Cam Latch with Padlocking L-Handle combines a door handle, latch and padlock hasp in a single package, simplifying installation for a variety of applications, including HVAC units, electrical enclosures and other enclosures located in public spaces. Designed with corrosion-resistant materials, the E5 Cam Latch with Padlocking L-Handle is sealed to NEMA4/IP65 and is suitable for indoor and outdoor use.

Available with padlocking or key locking, or padlocking combined with key locking for maximum security, the E5 Cam Latch with Padlocking L-Handle provides an extra level of protection for applications that are prone to vandalism. With the option to add a padlock to the cam latch, the newest addition to Southco's E5 Cam Latch series allows users to easily upgrade security and change out the padlock when needed.

The L-shaped handle design provides added leverage needed to compress thick gaskets between doors and panels. The E5 Cam Latch with Padlocking L-Handle is available with extended housing and is suitable for use for a range of door thicknesses, from thin sheet metal panels to thick, insulated doors used in outdoor HVAC applications.

Southco Fasteners Pty Ltd
www.southco.com

iStock.com/pranka

THREE MAJOR CHALLENGES FOR DATA CENTRES IN 2023

Alpesh Saraiya, senior data centre director at Honeywell

Data centres play a critical role in keeping the global economy productive. Demand for data storage and processing has become insatiable worldwide, which makes it more challenging than ever to operate and scale these facilities efficiently. Managers also face mounting pressure to make their operations more energy-efficient. Data centres consume about 3% of the world's electricity — more than most countries — and produce 2% of global carbon emissions: about the same as the entire airline industry.[1]

Given the exponentially increasing demand, managers are often forced to do more with less, while at the same time dealing with tougher internal environmental, social and governance (ESG) directives and more stringent regulatory landscapes. When preparing for 2023 and ahead, operators should factor in three significant trends: continued pressure to cut operating costs; increasing demand for more sustainable facilities; and a growing shortage of talent interested in and qualified for managing data centres.

Rapid scaling with a sharp focus on managing OpEx

To meet the unrelenting demand, both hyperscale and colocation data centre operators have aggressively acquired smaller firms — but this practice has created as many problems as it has solved. For one, it creates a pastiche of 'snowflake' designs — no two are exactly alike — which means major headaches for integrators and heftier operating expenses (OpEx) for owners.

Blueprinting data centre designs to achieve commonality across facilities has thus become a key strategy for 'doing more with less'. While many see it as a critical step towards developing and implementing global design standards, operators must still comply with local and national building codes, financial accounting laws and security regulations.

Many data centre managers are also streamlining their operations with well-defined, purpose-built workflows and operational management tools to further reduce OpEx while still protecting uptime. To this end, some are installing cross-domain, site-level monitoring and management platforms to automate as many tasks as possible, thereby easing workloads and reducing the chances of human error, which caused major outages over the last three years at 40% of organisations surveyed by the Uptime Institute.[2]

Tougher internal and external sustainability mandates

Data centres face mounting pressure from governments, clients and stockholders to become more sustainable and energy-efficient. A sustainability strategy is no longer simply a 'nice to have' item; in the future, it may determine whether an operator succeeds or fails. With financial firms at either end of the transaction — as both clients and providers of capital — operators will face an additional hurdle of expectations when seeking to fund future projects, particularly as pressure increases on private equity and real estate investors to make greener investments.[3] Further, even clients shopping for data centre colocation service providers are now examining ESG profiles to account for upstream Scope 2 and 3 carbon footprint.

As data centre operators struggle to scale up across different geographies, they face a range of ever stricter local and national regulatory landscapes. Many of these include increasingly rigorous sustainability and ESG financial reporting standards that will phase in over this decade.

Governments including Ireland, the Netherlands and Singapore are requiring owners and operators to submit a detailed sustainability plan before granting them approval to build a new facility or expand an existing one. Singapore, in fact, imposed a moratorium[4] on new data centre projects in 2019 and kept it in place until January of 2022. Applicants for new projects now must explain how they will meet tough new standards enacted to protect the nation's land, water and renewable energy resources.

Increasingly, governments are expecting data centres to measure and disclose their carbon footprint and demonstrate progress toward reductions. There are numerous ways to reduce carbon emissions — no one size fits all — but cost and new technologies usually factor into the equation. Among these, operators are evaluating a variety of energy optimisation techniques, from control loop optimisation to liquid cooling options, especially as high-performance computing (HPC) and AI/ML applications become more ubiquitous and more demanding in heat dissipation requirements. Air cooling systems simply can't keep up with the

cooling needs of continually evolving, higher-density racks for these next-gen workloads.

Liquid cooling leverages the higher thermal transfer properties of special fluids, providing as much as 3000 times the efficiency[5] of air cooling. With more and more businesses integrating HPC applications driven by AI — which require tremendous computing power — operators are realising that the time has arrived to seriously incorporate liquid cooling in their architecture and roadmap.

The human element: a looming talent shortage

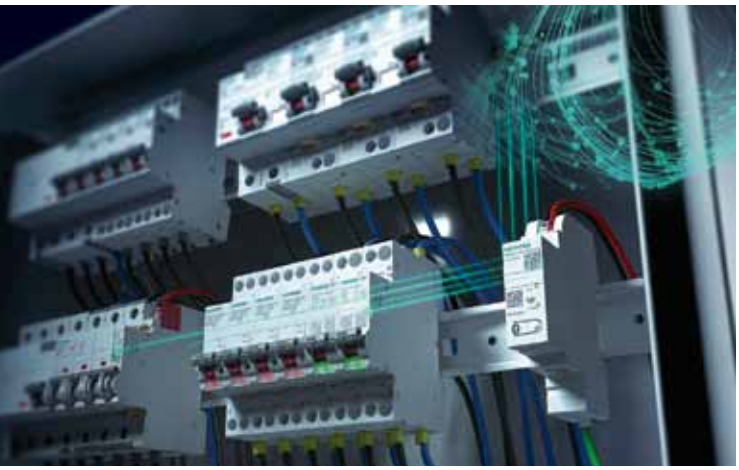
Not least among data centre challenges is a widening skills gap and the ongoing 'great resignation'. Some see this as a result of the industry's ineffective efforts to actively recruit and retain talent[6] from vocational schools over the last two decades. The industry is also dealing with an aging workforce of subject matter experts — those qualified to teach entry-level employees — many of whom will retire within the next 10 years. Yet Gen Z workers who have the skills and aptitude to pursue such a career are not seeing careers in data centres as an attractive option. Nevertheless, there are promising initiatives in the industry to source candidates from a pool of disciplined and well-qualified military veterans.

As operators develop plans for 2023, they should be considering strategies for scaling up intelligently, reining in OpEx and prioritising sustainability efforts. They should also take a hard look at how they can make the profession — and their facilities — more attractive to the next generation of talent.

1. Deloitte, Big data or low carbon? Can you deliver more IT with less carbon impact?, by Richard Pone, April 22, 2019.
2. Uptime Institute, 2022 Outage Analysis finds downtime costs and consequences worsening as industry efforts to curb outage frequency fall short, June 8, 2022.
3. S&P Global, Sustainability is no longer a 'nice to have' goal for the data center industry, by Kelly Morgan and Filippo Bonanno, June 8, 2022.
4. Data Center Dynamics, Singapore lifts data center moratorium — but sets conditions, by Peter Judge, January 12, 2022.
5. Business Insider, The rise of AI requires so much supercomputing power that companies are turning to liquid cooling, as much as 3,000 times more effective than using air, to keep it all from overheating, by Andy Patrizio, October 9, 2020.
6. Data Center Knowledge, Why isn't there more young talent in the data center industry?, by Skyler Holloway, September 15, 2022.

Honeywell Building Solutions
www.honeywell.com

iStock.com/gorodenkoff



Miniature circuit breakers

The number of electrical consumers continues to grow — and along with them the load on electrical systems.

In the event of overload or a short circuit, Siemens' miniature circuit breakers (MCBs) are designed to safely cut the connected circuit and thus protect electrical systems and devices against damage.

MCBs in the SENTRON portfolio are also easy to assemble and install. The devices feature a uniform design and can be expanded to include many more functions thanks to an extensive range of accessories. For industries, buildings or infrastructure — the Siemens SENTRON portfolio available from APS Industrial has the right MCB for every application.

APS Industrial

www.apsindustrial.com.au

Rugged mobile workstation

Getac has expanded its X600 mobile workstation range with the launch of the X600 Server and X600 Pro-PCI.

Designed for industries such as defence, manufacturing and energy, the Getac X600 Server is a rugged mobile server that can be folded to a slim profile for easy transportation.

It has an Intel Xeon W-11855M processor with Intel Turbo Boost Technology and integrated Intel UHD graphics. The X600 can also accommodate up to 128 GB DDR4 RAM, while optional error correcting code (ECC) memory helps to preserve the integrity of data by detecting and correcting single-bit memory errors.

A 1000 nit, 15.6″ full HD Getac LumiBond display with sunlight-readable technology enables complex tasks to be performed in challenging weather conditions. Connectivity options, including 2.5G BASE-T Ethernet (x2), allow simultaneous connection with multiple servers and/or networks. Onboard Thunderbolt 4 USB-C, high definition multimedia interface (HDMI) 2.0 and DisplayPort enable connectivity to additional monitors as and when needed.

The X600 Server's security features enhance privacy and data protection, while its solid-state storage drives (SSDs) are user-removable and toolless, for enhanced data security during device storage. Getac's 'keep your hard drive' service lets users remove and keep all SSDs should they need to send their device in for repairs. Additional security features include trusted platform module (TPM) 2.0, Kensington lock compatibility, smart card reader and optional Intel vPro Technology.

The X600 Server is built to withstand rugged conditions, with MIL-STD-810H, MIL-STD-461G and IP66 certifications and an operating temperature range of -29 to 63°C.

The X600 Pro-PCI's features include dual PCI/PCIe expansion slots for add-on card functionality, a standard DVD (or optional Blu-ray) super-multi drive, and Express Card 54 and personal computer memory card international association (PCMCIA) Type II card readers as standard. The X600 Pro-PCI also includes two additional hot-swappable batteries, bringing the total that come with the device to four, for all-day functionality.

Getac Technology Corp

www.getac.com

3D mapping software

Digital twins have become a critical tool for many industries, and to be effective they rely on accurate and up-to-date maps and 3D models derived from imagery. Esri's ArcGIS Reality is a family of products for site-, city- and country-wide reality mapping — all using the new ArcGIS Reality Engine.

ArcGIS Reality for ArcGIS Pro is an extension of Esri's flagship desktop GIS software, allowing users to input images from drones or crewed aircraft to generate 3D outputs for reality mapping. ArcGIS Reality Studio is a focused application for reality mapping from aerial images for entire cities and countries, featuring a map-centric intuitive interface that enables high production efficiency to deliver survey-grade representations of reality.

Site Scan for ArcGIS is Esri's cloud-based end-to-end reality mapping software for drone imagery, designed to simplify drone program management, imagery data collection, processing and analysis. ArcGIS Drone2Map is an intuitive desktop application focused on reality mapping from drone imagery, enabling offline processing and in-the-field rapid mapping.

ESRI Australia

www.esriaustralia.com.au

Wireless communication module

Quectel Wireless Solutions has launched the latest addition to its LTE module portfolio, the industrial-grade EG800Q-EU LTE Cat 1 bis wireless communication module. An ultra-compact module in an LGA form factor, the product offers flexibility in IoT designs and enables a wide range of IoT use cases, particularly for size-sensitive applications.

Based on the Qualcomm QCX216 LTE IoT Modem, the LTE-only module features LTE FDD band coverage of B1, 3, 5, 7, 8, 20 and 28. The module delivers a maximum downlink data rate of 10 Mbps while enhancing battery life, making it suitable for a variety of high-performing IoT applications including smart utility meters, asset trackers, e-mobility, parking meters and home automation.

The unit's support of Cat 1 bis allows it to use a single antenna. It has a compact form factor of 15.8 x 17.7 x 2.4 mm, enabling integrators and developers to design size-sensitive applications easily. Its advanced LGA package allows fully automated manufacturing for high-volume applications.

The product also provides a set of internet protocols and industry-standard interfaces including USB 2.0, UART, I²C, PCM and USIM, extending the suitability of the module to a variety of IoT applications such as asset management, remotely managed access control (RMAC) and smart grid. Additionally, the module supports DFOTA to enable automatic firmware upgrades and integrated Wi-Fi positioning services when there is no GPS signal indoors.

Quectel

www.quectel.com

Protection mode for UPS

Schneider Electric has announced an enhanced version of eConversion (formerly known as ECOnversion), the company's generally recommended protection mode to provide increased sustainability for its Galaxy V Series three-phase UPSs. After years of field tests, all Galaxy V Series UPSs are now shipped to customers with eConversion as the default.

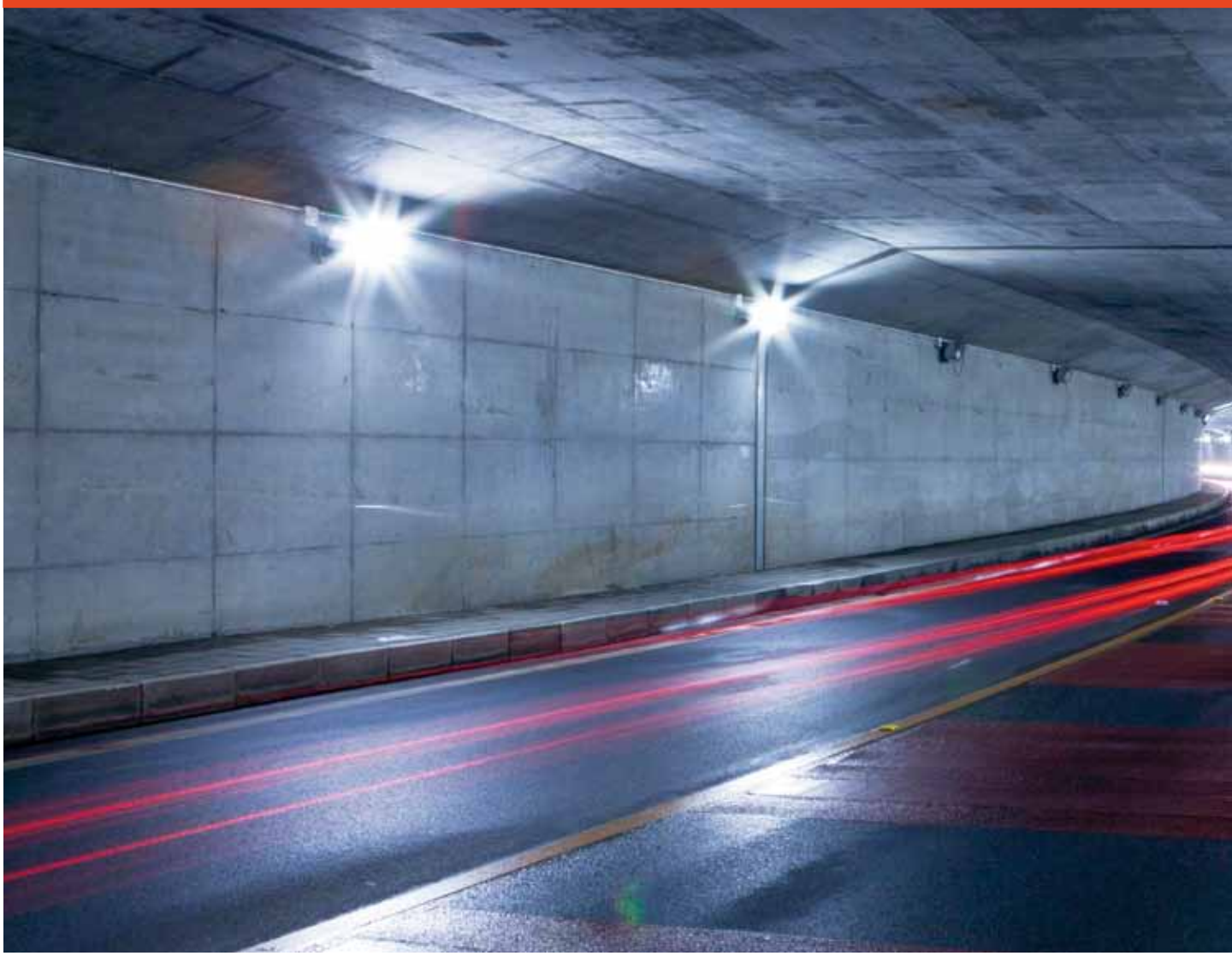
eConversion mode offers a three-times reduction in uninterruptible power supply (UPS) electricity consumption with 99% efficiency without compromising availability. It has been certified to achieve Class-1 protection per IEC 62040-3, which is the maximum level and matches double conversion. It provides critical back-up power solutions for IT and non-IT environments, such as industrial edge applications.

With the eConversion Savings Meter, customers can check electricity savings on the UPS display.

Schneider Electric

www.se.com/au

Grid milestone for longest undersea tunnel



The longest undersea tunnel in the world, the Channel Tunnel, has reached a technological milestone with the commissioning by Getlink of a high-voltage grid solution from GE Renewable Energy's Grid Solutions business. GE's flexible Static Synchronous Compensator (STATCOM[1]) solution delivers the fast voltage support Eurotunnel requires to be able to run up to 16 trains simultaneously in the Channel Tunnel — a 60% increase in maximum capacity, or as many as 1000 trains per day.

As the busiest and most heavily used rolling motorway in the world, Eurotunnel needed to increase the power and stability of its network to ensure a constant flow of traffic and meet peak demand when multiple trains run simultaneously. The STATCOM solution, developed by GE and adapted to the Channel Tunnel in collaboration with Eurostar, supports voltage stability, grid resilience and enhanced power transfer capability.

The solution stabilises the voltage of the power network — a major problem for power systems — with its ability to either absorb or generate reactive power in synchronisation with demand. The STATCOM solution will double the reactive compensation power flow as well as improve stability even during peak periods — and will deliver enhanced quality of service by enabling optimised regularity of the freight and passenger shuttle service.

"Faithful to its pioneering spirit, the Channel Tunnel welcomes the world's largest and most powerful STATCOM solution in a railway environment," said Nicolas Brossier, Engineering & Projects Director for Eurotunnel. "This state-of-the-art technological system reinforces the reliability and capacity of our infrastructure and ensures optimal operational performance for our customers."

"Providing a stable and consistent flow of electricity to this vital link is critical," added Johan Bindele, Grid Systems Integration Business Leader, GE Grid Solutions. "We are proud to have collaborated with valued customer Getlink to facilitate the successful upgrade of the traction network for the Channel Tunnel, which will ensure that millions of passengers continue to travel safely and efficiently between the UK and France.

"GE's STATCOM technology is the prime solution to ensure power stability in the Tunnel and help navigate the complex environment that our customers are facing today," Bindele said.

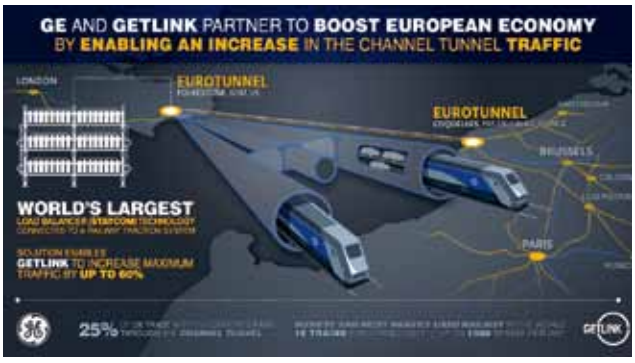
GE's STATCOM technology will enable the Channel Tunnel infrastructure to remain in place for the long term. Expected traffic growth will facilitate access to a new generation of speed

trains, which will support the development of new cross-Channel services.

Amar Chaabi, Chief Operations Officer of Eurostar Group, said, "As pioneers of high-speed rail transport in Europe, Eurostar Group is proud to be part of this adventure that pushes the boundaries of cross-Channel travel. By improving the efficiency of the infrastructure and increasing the number of trains running through the tunnel, this new technological advance will support our ambitious target of carrying 30 million passengers a year by 2030, across our network."

GE custom-designed and supplied the entire STATCOM system, including its adaptive SmoothSine control system, which provides the Eurotunnel with reactive power compensation and an improved range of operational voltage, leading to faster response times. Additionally, this technology has a smaller physical footprint than traditional Static Var Compensation (SVC[2]) systems.

GE is an industry leader in the development of high-voltage grid solutions, including STATCOM, SVC, Series Compensation Systems and Synchronous Condensers — resulting in project cost savings, increased quality, greater reliability and lower environmental impact.



GE and Getlink Eurotunnel infographic.

1. STATCOM = Static Synchronous Compensator, technology allowing voltage stability, power transfer capability and reactive power balance in a grid
2. SVC = Static Var Compensation, technology used since the early 1970s; reliable means of controlling voltage over transmission lines and improving network dynamic stability while increasing power transfer capability.

GE Grid Solutions
www.gegridsolutions.com

Sustainable energy software portfolio

Emerson's Ovation Green portfolio is designed to help power generation companies meet the needs of customers navigating the transition to green energy generation and storage. By uniting the recently acquired Mita-Teknik software and technology with its own Ovation automation platform, renewable energy knowledge base, cybersecurity solutions and remote management capabilities, Emerson has created an extension of its power-based control architecture. The resulting portfolio focuses on the emerging clean energy market to provide simplified renewables automation to help power producers build and scale sustainable operations.

Transitioning to cleaner energy systems or scaling up existing ones is a complex undertaking for power producers. Wind turbines, solar arrays, lithium-ion batteries, hydrogen electrolysers and hydroelectric power all use a wide variety of automation software and technologies. As renewable portfolios grow, the number of applied technologies will multiply, increasing learning curves and adding complexity to operations as solutions from different vendors require additional integration. The Ovation Green portfolio will deliver a single set of purpose-built software and solutions that supports different technologies in one standardised, intuitive system, independent of equipment manufacturer or system type, across a single or multiple sites.

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

Battery with hybrid inverter

Redflow has integrated its zinc-bromine flow batteries with Deye's hybrid inverters. The inverter offers the ability to have a direct connection of solar and batteries in a three-phase grid-connected inverter and can also continue charging batteries from solar PV even in the event of a grid outage, as well as a backup generator input.

As a CEC-listed grid-connected inverter, the Deye hybrid inverter now has more options regarding the use of Redflow's ZBM flow batteries. It is designed to simplify the way users connect to the grid and seamlessly integrates batteries and solar.

In tests, the Deye inverter demonstrated complete compatibility with Redflow's ZBM3 zinc-bromine flow battery.

The Deye 10 and 12 kW three-phase hybrid inverters are fully AS4777.2:2020 certified and CEC approved for the Australian market and integrate with solar PV arrays, 48 VDC battery storage, grid and generator connections in a single device.

For larger storage systems, up to 10 Deye inverters can be clustered together in parallel to service large commercial site deployments.

Redflow will also provide the option to integrate the Deye hybrid inverter into its QuadPod energy storage solution — a custom-designed, scalable, 40 kWh, pre-wired enclosure.

Redflow Limited
www.redflow.com

Strip lights

B-Corporation Brightgreen has launched a series of long-lasting LEDs to spotlight interior and exterior architecture. The lights can be easily concealed in walls, roofs, floors, cabinetry, skirting boards and more.

The scissor-cuttable LEDs are designed for consistent, quick and easy installation on most standard plasterboard thicknesses, clipping into the hidden channel without additional parts or tools.

With an IP67 rating for durability indoors and outdoors, a solid silicone form and a sealed NST, the LEDs can withstand harsh conditions. They are waterproof, dustproof and resistant to insects.

Brightgreen's lights have a low UGR (unified glare rating), designed to eliminate glare directly at the light source.

Brightgreen Pty Ltd
www.brightgreen.com

SUSTAINABLE BENEFITS OF GEOTHERMAL ENERGY

iStock.com/Nastco

A recent study from the University of Technology Sydney (UTS) has found that homes at a sustainable community in Western Sydney use 21% less electricity than comparable nearby suburbs, due to geothermal technology.

The $1.64 million project known as the Fairwater Living Laboratory was funded by the Australian Renewable Energy Agency (ARENA), Frasers Property Australia and the NSW Office of Energy and Climate Change.

Led by Professor Leena Thomas, the study examined the effects of ground source heat pumps on the 750 homes at the Fairwater community by Frasers Property Australia. It found that when installed at scale and at the beginning of the building process, geothermal technology can be both a profitable and environmentally beneficial addition to a home.

Ground source heat pumps use the stable ambient temperature below ground to heat and cool homes. In summer the units take heat from inside the home and transfer it via a series of underground pipes to the ground for cooling before returning it to the home. In winter they take natural heat from the ground and reverse the process.

"The research demonstrated clear energy benefits from geothermal technology and high ratings for comfort in the Fairwater homes," Thomas said.

"An overwhelming majority of residents at Fairwater also reported that living in the precinct has had a positive effect on their health and wellbeing."

The project, which spanned three years from September 2019 to August 2021, and encompassed the Sydney COVID lockdowns, also found that the demand reduction aspects of the geothermal technology had the potential to 'smooth out' electricity grid usage, which could help avoid spikes that can lead to blackouts and power cuts in extreme weather.

Fairwater homes recorded an average of 3 kW of avoided power demand per household during critical peak events.

An integrated approach is key to reaching net zero

While the study focused on the benefits of the ground source heat pumps, it also looked at the other environmentally sustainable aspects of Fairwater, including its light-coloured roofs.

It found that the roofs already produced a cooling effect of three to four degrees. As trees at Fairwater mature it is expected the ambient temperatures in the community will reduce even further.

"Our findings highlight that an integrated precinct-based approach for incorporating sustainability and energy-efficient technologies when combined with an understanding of occupant practices offers the best pathway for decarbonisation and getting beyond net zero," Thomas said.

"This has been such an interesting project to support and watch unfold," said Cameron Jackson, General Manager Development NSW, Frasers Property Australia.

"We were confident the installation of geothermal heating and cooling technology in our Fairwater homes would help our customers reduce their energy consumption and their bills, and now we have confirmation of that," he said.

"We will use the findings of this groundbreaking study to guide us on our pathway to net zero."

The study found installing geothermal technology at scale at Fairwater added additional upfront cost to the construction; however, combined with other environmentally friendly features of Fairwater homes, it contributed a cost saving to the users and value to the properties at completion.

Future benefits

Belinda Whelan, Director of Strategic Projects, Climate-KIC Australia, said the study would provide governments and the property industry with solid information on which to base their geothermal decision-making.

"The built environment sector in Australia has a really important role to play in helping Australia meet its net-zero ambitions. Studies like Fairwater provide policymakers and the property sector with deep insight and data to guide informed decision-making to make rapid change at scale," she said.

The Fairwater Living Laboratory project drew on multidisciplinary expertise from UTS's faculties of Design, Architecture and Building; Science; and Health, along with its Institute of Sustainable Futures. It was undertaken in association with Climate-KIC Australia and Curtin University.

Bridge project seeks digital solution

The design of a new roadway bridge under tight site conditions and a compressed schedule might seem challenging enough on its own. Combine that with concurrently implementing new design software and a digital project delivery system, and the mission might seem daunting.

However, for Hatch Ltd., the firm designing the Lathams Road bridge in suburban Melbourne, Australia, the approach was a triumph, as new software tools helped the team deal with various project challenges and prepare for future projects.

Overcoming project challenges with digital solutions

The AU$150 million Lathams Road project widened an existing road from two to four lanes and added a new bridge over an existing freeway. When the project's lead designer discovered the existing bridge abutment location differed from as-built records by approximately 300 millimetres, the Hatch team had to adjust road and bridge alignments accordingly after design was already in progress.

Using Bentley Systems' OpenRoads Designer and OpenBridge Modeler to develop 3D models, the team was able to amend the road and bridge geometry and make the necessary adjustments in a week, a fraction of the time if using traditional 2D methods. The ability to seamlessly exchange information between bridge and road models greatly simplified the process. "If we did not have the 3D modelling approach, this wouldn't have been possible," said Tanmay Vegad, Senior Bridge Engineer for Hatch. He estimated the changes would have taken four to five weeks using traditional methods.

Designing innovative bridges for future resilience

The 3D approach also helped the team design modifications to the existing bridge. Due to updated Australian standards, the railings on the existing bridge did not meet current standards for collision resistance, requiring upgrades in conjunction with the new bridge. The team was able to model the system and replace the railings with a stronger design that met standards without requiring modifications to the existing bridge structure.

iStock.com/johnason

Images: Supplied

The Lathams Road bridge project.

The bridge design team also developed custom objects in OpenBridge to accurately model bridge components. While OpenBridge includes a library of templates for common bridge components, such as abutments, piers and barriers, the Lathams Road bridge called for unique shapes not included in the library. Working with Bentley staff, the Hatch team expanded the library with custom objects reflecting the project design.

"3D visualisations promote a greater level of understanding amongst the project team, which has helped to foster a highly collaborative working model between project partners and delivered a fully resolved design. Changes are inevitable, and when they did occur, time and cost impacts were substantially reduced," said Steve White, Design Manager for contractor Winslow Infrastructure.

Digital project delivery

Along with the numerous project challenges, the team was learning OpenBridge Modeler and had to ramp up quickly, obtaining training from Bentley and integrating OpenBridge with the company's digital project delivery (DPD) initiative. The company is implementing DPD to increase information value and drive quality and efficiency, extending the life of information into operations, according to Michael Gilham, Hatch's Global Solution Lead for civil work. The firm is committed to following ISO 19650, an international standard for building information modelling (BIM), on every project.

Hatch's two-pronged approach to meet company objectives and a tight project schedule presented a unique combination of challenges, but was well worth the effort, Gilham said. "This project helped us move the DPD project forward at the same time. The team did an amazing job to finish on time and on budget. Final deliverables were actually delivered four weeks ahead of schedule," he said.

Digitalisation sets a benchmark for AEC industry

The use of 3D modelling and digital project delivery through Bentley established dramatic benefits for designers and other stakeholders on the Lathams Road upgrade, a key infrastructure improvement in the Melbourne suburb of Carrum Downs.

With the Lathams Road project under its belt, Hatch is actively applying its expanded 3D experience on other projects. The company recently completed the design of the Hall Road upgrade, another project for Major Road Projects Victoria. On that project, Hatch used a similar suite of software to model the project, which featured 24 culverts of various sizes and shapes.

As technological experience grows in the architecture, engineering and construction industry, similar approaches are likely to be adopted by other firms and agencies worldwide.

Bentley Systems Pty Ltd
www.bentley.com/en-AU

Two-pole OSM Recloser

When implementing protection for two-wire systems, it is important to trip both poles in the event of a fault to ensure the downstream line is completely isolated. Problems occur if only one phase is interrupted, such as downstream earth faults that could be fed from either wire, or downstream phase-to-phase transformers being energised from the uninterrupted side. Electrical engineers must be sure to interrupt both wires in fault conditions.

Historically, protecting two-wire systems was accomplished with three-phase equipment, but the centre phase was left disconnected. While this was a practical solution, this configuration often meant excess expenditure on components that weren't being used — in this case the centre switchgear pole.

Driven by this market requirement, NOJA Power has developed a two-pole variant of the OSM Recloser.

NOJA Power's OSM Recloser product can be used to protect single-wire earth return (SWER), two-wire single-phase and three-phase medium-voltage distribution lines. While the switchgear pole configuration may vary, the controller could be identical. This allows utility engineers to standardise on a single control option, while addressing a multitude of distribution network protection applications.

NOJA Power Switchgear Pty Ltd
www.nojapower.com.au

Mini power connector

Treotham has launched the new Lapp EPIC POWER power connector with M12L coding. It is claimed to be the smallest M12L connector available on the market and is particularly powerful, with up to 16 A.

As part of the development process for the new mini connectors, the technical properties of the connectors were simulated using virtual models and virtually put through their paces, before the first 3D-printed model was created.

The new EPIC POWER M12L connector is suitable for small robots, known as cobots, which act together with people in production or in the warehouse. Other fields of application are automated guided vehicles (AGVs) and use in I/O modules for PROFINET. To date, 7/8″ connectors have been the standard power interface for the sensor/actuator control cabinet. The change from the old standard to the M12 L enables boxes to be reduced in size by over 50%. The PNO has defined the M12 L coding as the interface for the power supply for all PROFINET applications. This is the set standard for PROFINET devices such as intelligent motors or I/O modules.

The mechanical L coding of the connector face prevents incorrect plugging with the mating connector. Crimp termination creates a vibration-proof connection, provides maximum contact protection between the contact and cable and is suitable for automated assembly. When connected and locked, protection class IP65/67 and IP69 can be achieved. Thanks to UL certification, the EPIC POWER M12L is approved for use in North America. The new connector is also available as a 4-pin variant with black insulation and as a 4+FE variant with grey insulation and functional earthing contact (FE).

Treotham also offers other additions to suit the EPIC POWER M12L series: an EPIC POWER M12L D6 coupling connector, an EPIC POWER M12L G4 panel-mount base, an EPIC POWER M12L F6 cable connector and the EPIC POWER M12L A4 panel-mount base. All variants are also available with solder contacts as an option. There are also EPIC POWER M12L contacts with multiple slots and marking of the conductor cross-section to ensure maximum contact from the plug connection.

Treotham Automation Pty Ltd
www.treotham.com.au

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HOW WILL AUST HOUSEHOLDS USE ENERGY IN THE FUTURE?

A report led by Monash University researchers reveals new 'foresights' (defined in the report as knowledge developed about the future) relating to energy management in Australian households, including a shift to electric vehicles, the need for better battery-charging infrastructure and the sharing of renewable energy.

The recently launched 'Digital Energy Futures: Foresights for Future Living' report from the Emerging Technologies Research Lab (ETLab) at Monash University reframes current assumptions held by the energy industry about how people do, or will, interact with energy and technology.

The report also presents key foresights into what Australians will want in the immediate future for better adoption of electric vehicles and battery charging as well as energy needs associated with cleaner air technologies. The report also presents long-term foresights into how energy needs will change to match a changing climate.

Lead author and ETLab Director Professor Sarah Pink said the energy sector has to adapt new practices to support the changing behaviour of consumers.

"There are many new opportunities for energy companies to re-evaluate energy management in alignment with how Australian households are consuming energy and contributing to the energy grid," Pink said.

"Our research shows that there are changing needs within households with more expectations towards collaboration with the energy system, tailoring and customising technologies to individual energy needs and wanting a values-led social benefit approach to energy consumption.

"Especially with more Australians adapting and producing renewable energy in households, we have found that people are keen to contribute solar energy produced in households back to the grid and share it with other consumers," research co-author Dr Hannah Korsmeyer said.

The research also shows, in the immediate future, there will be a significant switch to electric vehicles, and households are looking for better energy infrastructure and battery-charging facilities to support this changing need.

"Our foresights suggest that households will want fully charged vehicles every morning, electric vehicle ownership will likely be higher where there is better charging infrastructure and future drivers will be more dependent on battery services and roadside assistance," Pink said.

"The foresights in our report will be an essential guide to shape the future of our energy systems. It is important that policymakers understand how people are likely to adopt electric vehicles. Building energy support and infrastructure which evenly supports diverse populations, in rural and urban communities alike, will help to avoid inequalities in switching to electric vehicles," Pink added.

The report is informed by research conducted across 72 households in Victoria and New South Wales and supplemented by consumer survey data and analyses of energy and digital technology industry reports.

This research is part of the landmark Digital Energy Futures project and expands on ETLab's previous 'Future Home Life Report'.

The Digital Energy Futures project is supported by the Australian Research Council's Linkage Projects Funding Scheme in partnership with Monash University, Ausgrid, AusNet Services and Energy Consumers Australia.

WHY UNDERSTANDING SCOPE 3 EMISSIONS IS A MUST FOR ENTERPRISES IN 2023

Tony Yammine, Co-founder and CEO of Avarni

In the lead-up to the federal Budget in May this year, there have been many conversations about overturning the Safeguard Mechanism, one of the government's key policies to drive down carbon emissions to meet net zero 2050 targets. While much is up for debate from a policy perspective, if the mechanism is overturned it leaves enterprises with unlimited access to carbon credits, allowing payment for emission cuts instead of making progress towards carbon neutrality.

In 2012, when the original carbon tax was introduced in Australia, the goal was to implement a carbon price and related legislation for the country's biggest carbon emitters. Since the carbon tax abolition, Australia has endured a decade's worth of climate policy deliberation and within that time, nations like America and Europe have progressed with carbon policies, tax incentives and Scope 3 emission reporting requirements. Now, Australia is in a position where the laws across different jurisdictions, such as the US Securities and Exchange Commission's mandate requiring companies to disclose their Scope 3 emissions, will have a flow-on effect on Australian companies.

Outside of policy, what needs to be of primary importance for Australian enterprises in 2023 is gaining a better understanding of their Scope 3 emissions[1], which are notoriously difficult, expensive and time-intensive to measure accurately. The Carbon Disclosure Project (CDP)[2] estimates Scope 3 emissions to be 11.4 times higher than the company's direct footprint. Whether a company is in an electrical field, manufacturing field or heavily data-driven, emissions emanating from a company's supply chain need to be the main focus to speed up decarbonisation efforts across the country.

Shine a flashlight on Scope 3 emissions

When you stop and consider that 75%[3] of Australian companies have net zero 2050 targets, yet more than one-third will miss their targets, the future doesn't look overly bright. Overall, renewable energy adoption and sustainable supply chains are becoming best practice, but what Australian enterprises are really struggling with is carbon accounting, reporting and management of Scope 3 emissions. At present, Scope 3 emissions make up 53 million tonnes or 71% of the ASX 300's total, compared to 8 million tonnes combined from Scope 1 and 2 emissions.

Traditionally, enterprises have struggled to receive emissions data from their supply chain as the data is either incomplete or inconsistent, or requires months to manually clean and organise. Take, for example, an energy management company that has set out to aggregate supply-chain and spending data to understand, report and forecast its carbon footprint across Scope 1, 2 and 3 emissions. While hiring a consultant may make sense to manage Scope 1 emissions produced solely by the energy management company, accurately measuring and tracking all 'indirect' emissions from another supplier's facility becomes almost impossible without having the right tech and data set in place.

By adapting technology that already exists, this can reduce the historical month-long process into weeks or even days. AI-backed platforms allow businesses to access their Scope 3 emissions quickly, effectively and without the burden of significant cost. Enabling change starts with creating a single source of truth around Scope 3 emissions in order to make strategic decisions to reduce emissions, which may include avoiding outsourcing and absorbing extra costs.

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Decarbonisation makes good business sense

Addressing Scope 3 emissions has largely fallen by the wayside for companies over the last decade, with the focus being squarely placed on addressing carbon footprints, through offsets and endeavours for more sustainable operations. In 2022, 53%[4] of Australian businesses still believed there to be difficulty in accessing the technology they needed to support their sustainability initiatives.

Now, what is being widely recognised is that a failure to act on sustainability strategies will hurt business as well. Following a business-as-usual approach, those lagging in understanding their Scope 3 emissions will become less competitive and resilient as suppliers engage in their own environmental action to lower costs and better their reputations to survive.

With climate risk being one of the biggest concerns for executives, boards and shareholders today, this issue isn't going away anytime soon. For enterprise companies, shining a spotlight on Scope 3 emissions not only enables quick decarbonisation and the meeting of net zero goals, but also forecasts potential challenges within the supply chain. Given the typical supply chain size of an Australian enterprise, being the first within an industry to take the step towards understanding and making decisions around Scope 3 emissions has an extremely beneficial trickle-down impact on the business.

Act now, and thank yourself later

While many local companies will continue to claim a lack of technology and associated costs as the root cause of their failure to implement emissions measurement, this is increasingly untrue. A plethora of companies are leading the charge in their own measurement, and the increasing competition among carbon management companies speaks volumes about the technology available. There is undeniable evidence to support the availability of Scope 3 emission identification technology, which is well and truly in use.

The future of net zero emissions begins with making a change through greater ownership of emissions across all facets of enterprises and up and down the supply chain. Urgent access is required from Australian organisations to support the country in achieving its 2050 sustainability targets, and the availability of research and technologies provides a clear path to success, with Scope 3 management as the key focus.

1. https://www.cleanenergyregulator.gov.au/NGER/About-the-National-Greenhouse-and-Energy-Reporting-scheme/Greenhouse-gases-and-energy
2. https://www.cdp.net/en/research/global-reports/transparency-to-transformation
3. https://news.microsoft.com/en-au/features/more-than-one-third-of-australian-organisations-will-miss-their-net-zero-targets/

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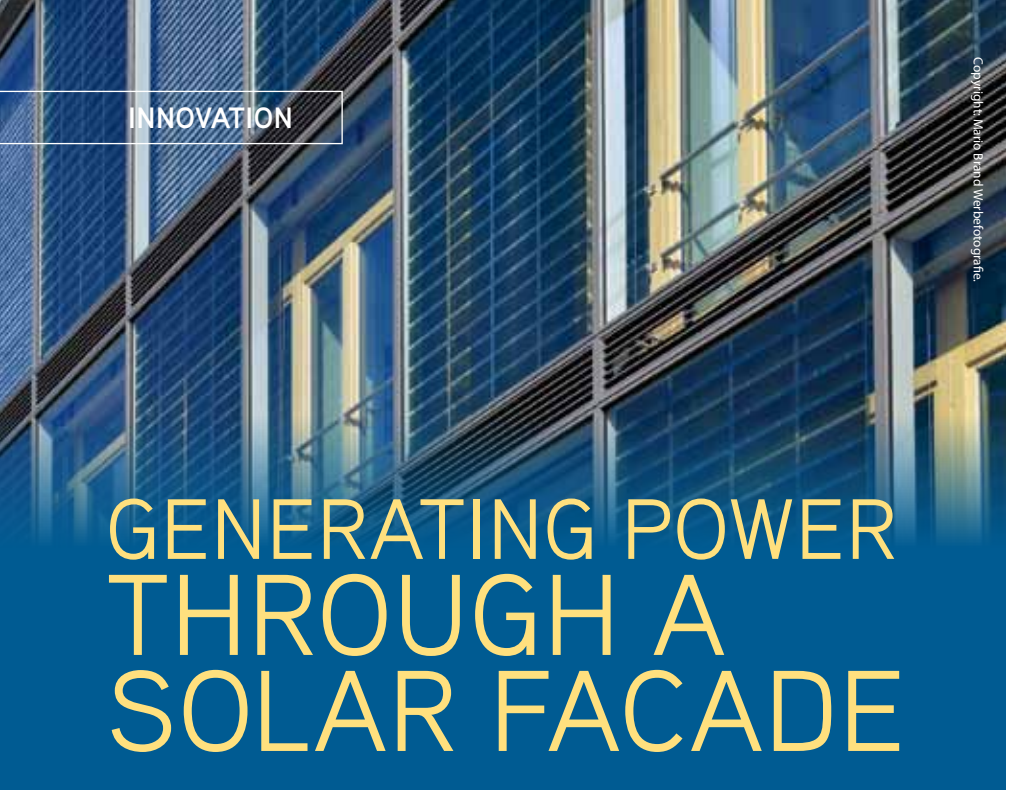

GENERATING POWER THROUGH A SOLAR FACADE

In the western Münster region of Germany, the new administration building of the Gronau municipal utility has a facade that will generate environmentally friendly solar power in the future. BGT Bischoff Glastechnik GmbH integrated the custom-designed solar modules manufactured by ASCA — an ARMOR Group company and a world market leader in organic photovoltaics (OPV) — into the facade glass.

The project was conceived and carried out by the architects of H III S — harder stumpfl schramm freie Architekten from Stuttgart.

"The display window facing the street visualises the themes of energy and sustainability," the architects said. To this end, the glass modules with integrated ASCA solar film measuring 3.66 by 2.25 metres were attached to the south facade of the new building, alternating with conventional glass panes.

"The size of the solar modules is world-class and no more complicated to produce than normal laminated glass panes. This represents a milestone for building integration of photovoltaics (BIPV)," said Hermann Issa, ASCA's senior vice president in charge of Business Development & Project Management.

The glass facade at the administration building in Gronau covers an area of 222 square metres. "With this project, we are demonstrating how easy it is to manufacture solar-active facade elements with ASCA OPV products," Issa said. "Planners and designers no longer have to worry about technical hurdles, even with customised facade modules of this enormous size."

Transparent glass modules produce electricity

The municipal utility moved into the building in late 2022. While the glass modules allow light into the building from the outside, they also offer a sense of enclosure and security despite their transparency — while still providing employees with a full view outside. The electricity is produced by organic photovoltaic cells (OPV), which ASCA applies to films using a special printing process.

For the project in Gronau, ASCA produced green foils to match the surrounding clinker brick facade of the adjacent structures. The architects were impressed by how much influence they had in designing the solar foils. "Building-integrated photovoltaics is a hot topic that will continue to grow in importance in the future," they said.

Images show different aspects of the solar facade with integrated solar modules by ASCA.

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