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NEW FRONTIERS IN ENERGY

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LANDMARK VEHICLE-TO-GRID TECHNOLOGY

PREPARING FOR FLEXIBLE ENERGY DEMAND

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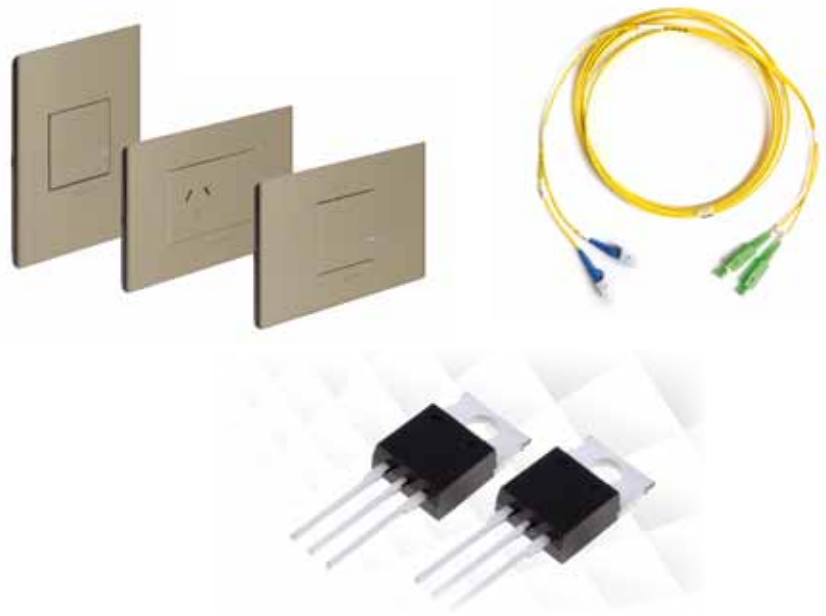

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FROM THE EDITOR

Welcome to the September issue of ***ECD***, where we take a look at connectivity, energy & grids, and efficiency — all of which come together in discussions about how best to deploy renewable energy. Not so long ago, renewables might have seemed like a niche issue for the electrical industry, but in light of Australia's race to achieve net zero by 2050, the adoption of clean energy infrastructure is rapidly taking centre stage, with an increasing number of industry and educational bodies providing specific upskilling courses to prepare the electrical workforce for the changes to come.

In this edition's feature article, ***ECD*** makes a visit to the renewable energy event Energy Next to find out what ideas and technologies are just around the corner. It's an experience that invites you to imagine what the world might look like in the very near future. Not all of Energy Next's talks were speculative, however — many innovative projects are currently being trialled or have been completed, including a couple of ambitious yet very different microgrids in Western Australia. Engineer Jey Shivakumar introduced these case studies at Energy Next and further discusses them in our interview on page 10.

Smart, agile systems will be essential for stabilising the grid as the world transitions away from traditionally rigid network infrastructure to the more variable patterns of renewable energy. Approaches to this problem can be found in three articles in this edition, covering the arrival of vehicle-to-grid technology at Flinders University, a CSIRO pilot involving 200 smart buildings in NSW and Germany's CACTUS project, which will use various smart technologies to coordinate consumer energy use and grid capacity with the energy market.

When the near future arrives, there are plenty of indications we'll be ready for it.

Katerina Sakkas — Editor
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NEW FRONTIERS IN CLEAN ENERGY:
STEPPING INTO THE NEAR FUTURE AT ENERGY NEXT

Katerina Sakkas

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Given the pressing need for Australia to find alternatives to fossil fuels, and the rapidity of our energy transition, the world of future energy is a heady one, full of wild-sounding ideas, innovation and experimentation, with an array of disparate tech and brands for consumers and industry to sort through. As a forum for these ideas and products, the renewable energy expo Energy Next can feel like stepping into the near future, even though many of the ideas being presented are currently being trialled or put into practice.

I visited on the second day of the event, when I encountered talks exploring the benefits of microgrids, virtual power plants, 'Superhybrids' and hydrogen.

Pushing the envelope with VPPs

With more and more businesses and homeowners adopting solar batteries, virtual power plants (VPPs) are becoming a hot topic. To form a virtual power plant, you need a collection of solar PV and solar battery owners who agree to form a network, coordinated by underlying software, that provides excess power to the grid at times of need. In addition to the benefit of grid stabilisation, this allows participants in the VPP to potentially earn some money from the solar they produce.

In his talk on VPP Innovation for grid providers and customers, Alex Georgiou charted the history of ShineHub, the Australian solar tech company he co-founded with solar engineer Jin Kim. Beginning as a solar retail company that centralised all aspects of solar installation for the customer in the one online hub, ShineHub has since grown various sibling companies under the banner of GTL Group — one of these (released in 2020) is an independent VPP, meaning that users do not have to partner with an electricity retailer in order to be part of the virtual power plant.

When GTL introduced its cloud-based VPP in 2019 — the first in Australia, according to Georgiou — customers had to pay for hardware and there were relatively few takers. This changed when the company shifted its model so that it would pay its VPP customers 45c for every kWh the VPP drew from their household battery and fed into the grid (this has lately risen to 55c/kWh). This profit incentive resulted in a huge adoption rate, Georgiou said, with up to 95% of the company's customers coming onboard at that time.

Since its inception, ShineHub has gone on to become a major player in battery storage deployment (especially residential), installing 40 MWh of batteries and helping to prevent another South Australian blackout, according to Georgiou.

ShineHub's comprehensive approach stems from a desire to make things easier for companies who are trying to get into batteries from scratch:

"We built these software systems for the integration between products, systems and grid, to be able to really easily facilitate the positive adoption of these batteries," Georgiou said.

EVs: giant, mobile batteries

Electric vehicles present another opportunity for helping to stabilise the grid and participate in the energy market.

"In the same way that batteries can be used for virtual power plants in the home, car batteries can be used for virtual power plants wherever they're located," Georgiou said. A major challenge for making EVs part of a VPP, however, is that there are huge penalties from VPP markets if back-up power is not available for the grid when needed.

But Georgiou was confident these problems can be ironed out. He envisaged a situation where someone drives their EV to the mall, plugs it in, leaves it to recharge and makes their money off the virtual power plant while shopping. It's a solution "that's not that far away", he said.

Microgrids to the rescue?

Jey Shivakumar, Principal Engineer, Energy Transformation Services at the engineering firm Cossill & Webley, spoke about decarbonisation in a Western Australian context, where the state's major utility Synergy has been given a large sum of money to close down coal-generated energy.

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Letting the utilities handle Australia's energy transition on their own is not the best option, according to Shivakumar, especially not in a large state like WA that is not fully interconnected. With 4000 km of transmission network still needed, challenges for utility-scale solar PV, wind and hydro include the need for large-scale transmission line upgrades as well as access to easements and sizeable tracts of land.

While one solution is to let individuals arrange their own solar installations, probably with distributed energy resources (DER) like solar PV and batteries, this is not the most reliable system given a plethora of different brands and infrastructures, Shivakumar said.

Could microgrids help to fill the gap? Microgrids are small enough not to be burdened by the problems faced by large energy providers, yet big enough to be able to take advantage of energy sharing. At the moment, however, there is a fair bit of uncertainty around how microgrids are run (Shivakumar described it as a "Wild West mentality"), including the grey area of how much a utility needs to be involved, as well as making sure customers are protected downstream. There is a need for more regulation, governance and protection of customers. Into the future, though, Shivakumar believes the knowledge gained from microgrids can be passed on to utilities.

'Superhybrids': pulling everything together

Picture the energy transition and you probably see solar and wind farms; photovoltaic panels on roofs; batteries; and, taking on an increasingly prominent role, hydrogen.

> IN THE SAME WAY THAT BATTERIES CAN BE USED FOR VIRTUAL POWER PLANTS IN THE HOME, CAR BATTERIES CAN BE USED FOR VIRTUAL POWER PLANTS WHEREVER THEY'RE LOCATED. – ALEX GEORGIOU

But what if multiple energy sources could be pulled together in the one power plant?

Enter the Superhybrid, a solution developed by carbon-free energy company Sunshine Hydro and introduced at Energy Next by the company's Executive Chairman Michael Myer in his talk, 'Superhybrids' Role in Australia as a Green Superpower'.

A Superhybrid can be thought of as an ecosystem, Myer said, combining traditional pumped hydro with wind, solar, hydrogen electrolysis, liquefaction and fuel cells, with the aim of producing 24/7 carbon-free energy. (A Superhybrid is capable of producing the same almost-100% carbon-free energy as a nuclear power station, but more cost-effectively, according to Sunshine Hydro.) It provides 'deep' energy storage: more than 15 hours. Crucially, the ecosystem is coordinated and optimised by the company's AESOP software, developed over the past seven years. While a Superhybrid is thought of as a single piece of infrastructure, parts of it can be divided between different companies.

Sunshine Hydro currently has several Superhybrid projects planned in Australia, including the $2bn Djandori gung-i hydropower project near Miriam Vale within the Central Queensland Renewable Energy Zone, for which development applications are being prepared.

Other areas of interest

Other presentations at Energy Next looked at the potential role of hydrogen, which has considerable funding behind it at the moment (including the federal government's $2 billion Hydrogen Headstart initiative for green hydrogen projects). Solar technology featured heavily, as might be expected, and there was plenty of focus on EVs (charging infrastructure, as well as electric vehicles' role as energy storage systems).

Energy data — and systems for capturing it, such as GTL's VPP and Sunshine Hydro's AESOP software — was a key theme throughout the conference. In her talk on a real-time marketplace for energy data, Grace Young, Chief Innovation Officer at Wattwatchers Digital Energy, examined the multiple issues that need to be balanced when collecting, aggregating and sharing energy data from homes and businesses in real time, including security and privacy concerns.

In fact, if there was one major takeaway from Energy Next, it was the necessity of having good underlying software to log and coordinate the movement of renewable energy as it makes its way flexibly from solar panel, battery, EV, wind farm or pumped hydro and into a rapidly changing grid.

Energy Next will next take place at the Adelaide Convention Centre from 8–12 April 2024.

PERTH GAINS $123 MILLION ENERGY HUB

WA Energy Minister Bill Johnston has launched a $123 million energy hub designed to service the Perth metropolitan area.

Built by ADCO and designed by SPH Architects, Western Power's South Metro Depot in Forrestdale consolidates the Kewdale, Jandakot, Forrestfield and Mt Claremont depots.

"Western Power's new South Metro Depot has been designed for the future — to support the rapid transformation of the grid, while continuing to deliver safe and reliable power," Johnston said.

"The consolidation of Kewdale, Jandakot, Forrestfield and Mt Claremont depots into the one at Forrestdale will improve efficiencies and services as well as help drive down network costs."

In collaboration with local Noongar and Ballardong Elders, Western Power named the depot Boyli Mia, meaning Power House. The depot features artwork by Noongar artists Bradley Kickett and Buffie Corunna.

About 850 employees are based at Boyli Mia, which accommodates 500 vehicles and includes state-of-the-art workshops and laboratories delivering a range of services.

The facility includes 34 electric vehicle charging stations; a one-megawatt battery energy storage system; 10,000 m^2 of solar panels (aimed at reducing energy consumption); and a drive-through undercover loading bay with 28 bays.

"Western Power's new South Metro Depot facility will be a central hub for energy services in the Perth metro region and provide fit-for-purpose and enhanced facilities for its employees," said Jandakot MLA Yaz Mubarakai.

"This is a great addition for Forrestdale and the surrounding community, as the 850 staff will help support local businesses in the area."

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Images courtesy of Pollinate Group.

AUST ENERGY INITIATIVE EMPOWERS WOMEN IN INDIA AND NEPAL

Australian energy retailer Flow Power has partnered with Pollinate Group, a global social enterprise that empowers women micro-entrepreneurs in India and Nepal.

Pollinate was founded in 2012 by six young Australians wanting to address poverty and improve access to safe renewable energy in India, where they saw marginal communities using toxic fuels such as kerosene. Their concept eventually evolved to focus on women as the agents of change.

"We are excited to partner with Flow Power to make a deep and lasting impact on these under-served communities by helping them generate income sustainably," said Sujatha Ramani, CEO of Pollinate Group.

"The program will minimise their usage of biomass, coal and harmful fuels such as kerosene, replacing them with solar products."

With Flow Power's backing, Pollinate will train and provide support to women from marginalised communities to distribute products such as solar lights and fans, water filters, clean cooking stoves and sanitary products, resulting in cleaner, safer and healthier communities.

Flow Power is funding the provision of solar lights for 2000 households in India and Nepal, with the goal of supporting 11,200 people to access clean and reliable electricity, reducing CO_2 emissions by 10,468 tonnes and fuel costs by more than $190,000.

"We are thrilled to partner with Pollinate Group and support their work providing access to safe and sustainable energy solutions to underprivileged communities," said Declan Kelly, Regulatory Policy and Corporate Affairs Manager at Flow Power. "We're passionate about the opportunities clean energy creates, and this partnership with Pollinate offers those opportunities to communities where clean energy can lift people out of poverty and improve their health outcomes."

Pollinate has set an ambitious goal of distributing 1.5 million solar products by the end of 2025, empowering 10,000 women and improving the lives of 10 million people across India and Nepal. The products, distributed by the micro-entrepreneurs, or "Suryamukhi", have to date helped communities save more than $31 million and reduced 1,540,000 tonnes of CO_2 emissions.

The Suryamukhi, meaning "sunflowers" in Hindi, are a diverse group of women aged 18–54 from various regions across India and Nepal.

BUSINESSES WORRIED BY ENERGY VOLATILITY: REPORT

New research from Schneider Electric has found that volatility is a key energy supply concern for businesses, with only one-third (32%) of companies feeling adequately equipped to navigate future energy market volatility.

Schneider Electric's 'Sustainability Index, 2023' report, a quantitative survey conducted with over 500 decision-makers across corporate Australia, focused on the leading concerns regarding energy supply in the corporate sector. Cost and risk management in the face of volatility (42%) and cybersecurity (42%) emerged as the top two concerns, underscoring the need for businesses to adapt to market changes and protect against data breaches.

Climate change and its associated impacts (34%) was the number-three energy supply concern for business leaders, reflecting increased recognition of the impact of climate change on economic performance, combined with growing public interest in climate action following last year's bushfires, droughts and floods.

The survey highlighted a promising trend among businesses choosing to invest in energy efficiency. Approximately 70% of businesses are currently discussing or implementing strategies to improve energy efficiency, recognising its potential to reduce costs and enhance environmental performance. Additionally, two-thirds (66%) of companies are considering implementing renewable energy solutions onsite, such as solar power.

Electrification and fuel-switching solutions were also popular, with half (50%) of surveyed businesses exploring these options. By transitioning to electrified systems and incorporating fuel-switching solutions, businesses can reduce their carbon footprint and minimise reliance on traditional energy sources, the prices of which are tied to global market circumstances.

"A strong, resilient energy mix is essential for every business," said Lisa Zembrodt, Principal and Senior Director of Schneider Electric's Sustainability Business.

"Leaders should create holistic, optimised energy management strategies that look to action efficiency measures, electrify wherever possible and develop a mix of onsite renewable generation, storage and real-time monitoring to help manage and reduce their energy needs," she added.

COMMERCIAL REFRIGERATION TO EASE PRESSURE ON THE GRID

The Australian Renewable Energy Agency (ARENA) has announced $3.7 million in federal government funding to Enel X to demonstrate and scale flexible demand solutions in the commercial and industrial refrigeration sector.

The Unlocking Flexible Demand in the Commercial Refrigeration Sector project is seeking to recruit 440 supermarkets and 13 refrigerated warehouses to aggregate 20.9 MW of flexible demand across the National Electricity Market.

The supermarkets and warehouses will participate within Enel X's virtual power plant (VPP), to provide services in support of Australia's electricity system. In doing so, the facilities will help alleviate grid constraints and support the safe and reliable supply of electricity to all consumers while being financially rewarded via Enel X's VPP.

Flexible demand is the coordinated orchestration of electrical load to ease pressure on the grid. As variable renewable sources like wind and solar produce an increasing share of Australia's electricity generation, solutions are required to help match up supply and demand.

Storage is one part of the equation, but shifting demand away from peak times and reducing demand at critical times can complement this, reducing the overall cost of energy and supporting integration of renewables into the grid.

The project is targeting commercial and industrial refrigeration because it provides an ideal source of flexible demand on a large scale, with an estimated 500 MW of potential flexible demand in refrigeration across Australia's supermarkets, grocery stores, beverage shops and warehouses.

"The energy market needs new ways to balance renewables and businesses need new ways to reduce energy costs," said Jeff Renaud, Managing Director of Enel X APAC.

"With ARENA's support, we will prove that small-scale refrigeration systems, when plugged into a virtual power plant, can make a large-scale contribution to the renewable energy transition."

The project aims to demonstrate the business case for flexible demand solutions in refrigeration and to de-risk the uptake of new technology for prospective demand response providers.

ARENA CEO Darren Miller said the project could pave the way for further investment in flexible demand.

"Our electricity grid is changing, and a more variable supply requires more flexible demand," Miller said.

"Commercial refrigeration can unlock this opportunity at a material scale, so we're excited to see the Enel X project rolled out across Australian supermarkets and other businesses with refrigeration."

The Unlocking Flexible Demand in the Commercial Refrigeration Sector project is due to be completed in 2027.

MAKING THE SWITCH:

THE CHALLENGE OF ELECTRIFYING LOW-INCOME HOUSEHOLDS

While shifting from gas to renewable electricity is increasingly becoming a priority for governments, little has been done so far to address the challenges faced by low-income households in making this transition. A new joint report from the Brotherhood of St. Laurence (BSL) and the Australian Research Council Centre of Excellence for Children and Families Over the Life Course (Life Course Centre) has investigated the issue with a view to providing solutions.

The 'Enabling Electrification' study focused on households facing energy stress to better understand their attitudes towards shifting away from gas and their capacity to electrify their homes, as well as the barriers they face and potential policy solutions.

The study found that lower-income households will need significant assistance from government to transition away from gas.

"Policy plans, such as Victoria's Gas Substitution Roadmap, can drive this shift," said co-author Sangeetha Chandrashekeran from ARC's Life Course Centre.

The report, which drew on 220 survey responses and six focus groups, found that most participants surveyed supported a planned transition from gas to electricity in principle but faced barriers to electrifying their own homes. Reducing energy bills and environmental concern were the key drivers for households wanting to electrify. Also, people's preferences for gas or electricity were strongly linked to what they currently used.

"Getting off gas will reduce household energy bills and make an essential contribution to reducing Australia's greenhouse gas emissions. However, lower income households are likely to be the last ones left on the gas network, paying more, unless further support is put in place," said Damian Sullivan, co-author and BSL's Climate Change and Energy lead.

Sullivan said that renters faced some of the biggest barriers. "Even if they can afford to, they're often not allowed by their landlords to switch to electric appliances, and many were afraid to even ask.

"Electrification and energy efficiency upgrades are essential because they lead to robust energy bill reductions, which last over time, unlike one-off payments," he said.

The research points to the need for a clear plan to move away from gas and accelerate quality retrofits for lower-income homes (including social housing) — a one-stop shop that provides tailored and trusted electrification information and advice, reforms to help renters electrify and subsidies for low-income homeowners.

Witchcliffe Ecovillage.

Q&A WITH JEY SHIVAKUMAR:

HOW MICROGRIDS CAN SERVE RESIDENTIAL AND INDUSTRIAL SITES

In this interview, Jey Shivakumar, Principal Engineer, Energy Transformation Services, Cossill & Webley, discusses two of the case studies he presented in his recent talk on decarbonisation through the use of microgrids at Energy Next 2023. The sites were Witchcliffe Ecovillage and Peel Business Park — both located in WA.

Witchcliffe Ecovillage

Witchcliffe Ecovillage is a picturesque sustainable community of 11 residential clusters each containing 20–25 homes. The community produces and harvests its own energy, water and fresh food produce onsite.

Could you describe the Witchcliffe Ecovillage site and what was involved in designing suitable energy infrastructure for it?

This development is located 8 km south of Margaret River, in sub-regional WA. The electrical network within the area is constrained with long feeders that are a mixture of pole-top and underground cables. Any system designed to interface with this type of network would need to consider reduced network reliability (dropouts) and limited hosting capacity for large-scale embedded generation systems.

Are you able to go into some of the manufacturers that were used and the reasons for using them?

The suppliers for the core embedded generation systems were Solarwatt (panels), Fronius (Inverters) and Tesla (Battery System). All these products were chosen by the developer since all of these suppliers were willing to engage early, assist with early procurement and offer bulk purchasing.

We wanted to achieve as much consistency in the installed systems as possible to limit compatibility issues and have strategic spares available for potential replacements.

How many people worked on the installation, approximately?

The project management, design and installation teams comprised over 25 people

Image courtesy of Witchcliffe Ecovillage.

surplus above that to be exported to the grid and greater network.

Private metering within the site allows for any excess energy generated by individual residents to be shared among each other without having to go through a retailer. This also opens the door to allow variable pricing of energy for energy trading.

Peel Business Park

Peel Business Park, part of the WA Government's multimillion-dollar Transform Peel project, is an industrial estate 70 km south of Perth designed for a multitude of uses, including manufacturing and fabrication; transport and logistics; wholesale storage; warehousing; and agri-innovation.

How did this large-scale project, which I understand is the first of its kind in WA, differ from Witchcliffe Ecovillage?

Witchcliffe is comprised of small private strata clusters with small distributed microgrids, each with a network/utility connection per cluster. Peel Business Park, on the other hand, is a large-scale single microgrid with a private network operator having a distribution network licence that owns and operates the network. The private networks within Witchcliffe are owned and operated by each individual strata cluster through the strata body.

Did this model break new ground? If so, what was particularly innovative?

The most groundbreaking element of this estate was the engagement of a private network operator instead of the standard state utility to service the lots with power.

Why was the decision made to use a microgrid?

The real push was to achieve an industrial estate that moves towards net zero, provides a reduced energy price for future tenants within the development and reduces the costs associated with network upgrades to service the site with power.

Do you think this set-up will become more widespread on similar industrial estates?

I believe that as time goes on and connecting to standard utility networks becomes more complicated, private operators will take over. Private network operators with smaller, more manageable networks will roll out and tie in with the greater grids.

This will allow private network operators to embed more sustainable systems/controls within these networks and, at the point of connection, provide network utilities grid services to assist with network stability.

with various skill and experience levels coming together.

Did you encounter any challenges?

The biggest challenge was the process of obtaining all the relevant approvals. As the project was pushing the envelope in terms of sustainability goals, approval authorities did not have processes to handle what we had proposed.

A fair amount of time was spent consulting and engaging with all approval bodies to assist them in understanding our objectives, which eventually resulted in very positive discussions and opportunities to upgrade processes for future developments.

Could you talk about the advantages of energy sharing that were provided by this particular microgrid model?

As each cluster is, in effect, a private network microgrid, it has a single CT (current transformer) metered point of connection with a retailer and private metering within. All excess solar PV generation is shared among the residents within the cluster. Excess energy is then stored in the battery to be shared during the evenings, with any

Peel Business Park Microgrid.

Image courtesy of Development WA.

Industrial enclosures

The BBE series of IP66 industrial enclosures from Australian company Built Boards are engineered to a high international standard. They are crafted from powder-coated, galvanised steel and 316 stainless steel to deliver quality and strength.

Designed for installs that demand a tough IP66 enclosure, the durable series is available in 18 ready-to-install sizes, as well as custom sizes made to order, and now with the option of a powder-coated, galvanised plinth for freestanding installations.

Built Boards
www.builtboards.com.au

N-channel MOSFET

The DIT050N06-DIO model is an N-channel MOSFET. It is housed in a TO220AB package, ie, it comes with an integrated heat sink to effectively dissipate the heat generated inside the component. This process can be further improved by combining the transistor with a larger, thermally conductive surface, as well as by using a heat sink and an active cooling module (equipped with a fan). It will make the MOSFET suitable for handling high DC currents.

The DIT050N06-DIO model is able to handle currents of up to 35 A at a junction temperature of 100°C (90 A at peak). Its thermal tolerance range extends from -55 to 150°C. The maximum permissible drain-source voltage is up to 60 V, while the typical on-state channel resistance is 14 mΩ. The transistor also has a short switching time.

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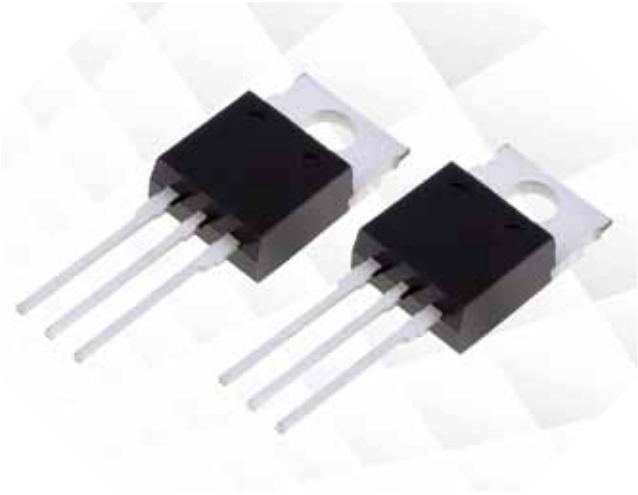
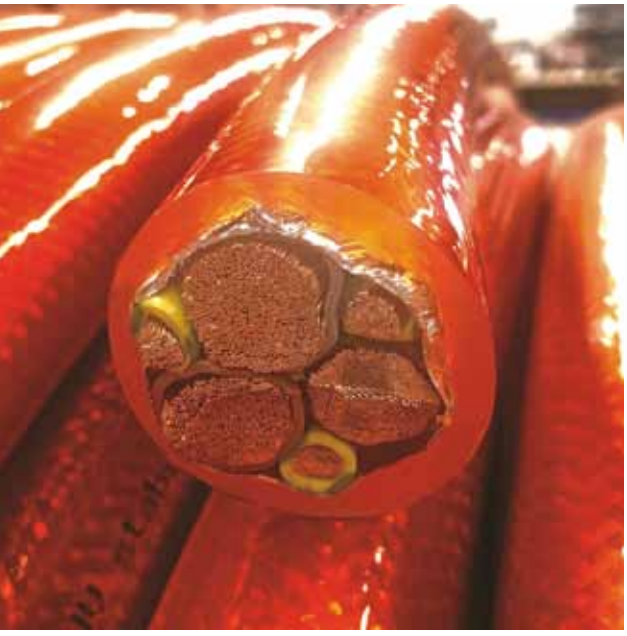




Drive cables

Treotham's Treoflex TA6 EMC/VSD cables have a transparent orange UV-stabilised outer sheath and XLPE conductor insulation. The distinctive orange pigmentation of the outer sheath offers UV resistance and allows the braid to remain visible.

Designed primarily to supply power to motors from variable frequency drives (VFDs), the Treoflex-UV drive cable range maintains full electromagnetic compatibility (EMC) throughout its rated life.

The cross-linked XLPE polyethylene conductor insulation improves current-carrying capacity. The flexible cables are suitable for both fixed installation and movable connection in industrial equipment, process lines and machines operating in dry or damp rooms. The symmetric construction of the cable (3+3PE) with conductors arranged every 120° helps to provide symmetry of supply voltages on the motor terminals.

Ranging in size from 1.5 up to 300 mm², the TA6 series provides a complete flexible cable solution with its multi-stranded conductors, cross-linked XLPE polyethylene insulation, double screening elements, foil plus braid and its protective UV-resistant outer sheath made from a special PVC. To assist with screen earthing and the fulfilment of electromagnetic compatibility requirements by the connection, the use of Skintop metal EMC glands is recommended.

Treotham Automation Pty Ltd
www.treotham.com.au

Image courtesy of Flinders University.

Flinders University nanoscale researcher Dr Xuan Luo, ENGIE Australia & New Zealand CEO Rik De Buyserie, Vice-Chancellor Professor Colin Stirling and researcher Dr Kasturi Vimalanathan at the V2G trial launch.

VEHICLE-TO-GRID TECHNOLOGY ARRIVES AT FLINDERS UNIVERSITY

Flinders University has received the latest addition to its already formidable renewable energy system: an electric vehicle charging station showcasing award-winning bidirectional vehicle-to-grid technology.

A collaboration between ENGIE and Flinders University, the state government-backed project brings 10 vehicle-to-grid (V2G) chargers online. The V2G charging bays will be used to feed renewable energy from compatible EVs back into the campus grid, creating a virtual power plant (VPP) to benefit the University's fleet, staff and students.

The University already has regular DC and AC chargers available to those who've made the switch to electric vehicles, with the entire network delivering the University's solar and wind-sourced energy.

The project has just won Flinders University the Sustainable Development Goals Initiative of the Year Award at the Triple E Awards in Barcelona.

Flinders and ENGIE's initiative is one of several funded under the SA Government's $3.2 million Smart Charging Trials. Data from the trials will frame and inform the future direction of EVs in South Australia in the pursuit of net zero emissions by 2050.

The trials complement South Australia's statewide EV charging network being rolled out by the RAA, delivering more than 500 charging bays to 140 sites in 52 locations.

"We are delighted to see this bold trial at Flinders hit its first key milestone, charging electric vehicles and feeding power back into the grid when needed, demonstrating how EVs can be harnessed to support SA's electricity system during peak demand periods," said Minister for Infrastructure and Transport Tom Koutsantonis.

"More and more electric vehicles will be hitting our roads in years to come as we travel towards net zero emissions. With trials like this investigating the possibilities for broad use of this technology we can be confident we are on the right track," Koutsantonis added.

"Flinders runs on 100% renewable energy, including 20% generated right here on campus through our massive solar arrays. Thanks to the South Australian Government's Electric Vehicle Smart Charging Trial we're taking another big step towards sustainability," said Flinders University Vice-Chancellor Professor Colin Stirling.

"With inspiring education and research into solar and battery technologies we're supporting South Australia's transition to a renewable world, underpinned by incredible research growth of 140% in just five years."

Embrace the New Energy Landscape for improved efficiency and sustainability.

Gone are the days when the electrical system of a commercial building was simply required to operate the lights and provide access to power. Now, in modern buildings, the electrical power system is complex, often incorporating features such as local energy generation, electric vehicle charging, energy storage, and connection to the grid.

Coupled with the desire of tenants and building owners to improve their sustainability and energy efficiency, a digital transformation of electrical energy and power management is critical to the delivery of a holistic approach to power optimisation. In short, a smart power distribution system is needed. This is the New Energy Landscape.

EcoStruxure and the New Energy Landscape

Currently, only around 10% of electrical distribution equipment is connected to software[1]. To truly optimise and improve the energy system of a commercial building, it is critical to collect energy and power metering data from strategic locations throughout each building's electrical distribution system — from the service entrance to the final distribution circuits. After all, you can't manage what you don't measure.

There are several ways to implement a metering system, but a good rule of thumb is: the more meters a building has and the more advanced those meters are, the more insight and potential savings can be found. Integrated and connected products, such as intelligent sensors, metering, protection, control, and communication devices, distributed across one or more facilities and seamlessly networked together, can help enable this.

Once the data has been collected, an overarching solution can be used to analyse critical data and discover meaningful insights, enabling actions based on real-time information and business logic. EcoStruxure platform is Schneider Electric's plug-and-play, open, and interoperable IoT-enabled system architecture. It is the foundational technology backbone that connects everything from the shop floor to the top floor to collect and analyse critical data and discover meaningful insights and enable actions based on real-time information and business logic.

Connecting with energy management software

Schneider Electric's EcoStruxure Power Monitoring Expert software provides access to real-time data and can send alerts from connected meters, circuit breakers, and other devices so you can keep an eye on the system and ensure it is operating efficiently. The software's advanced dashboards, energy visualisation, and analysis tools seamlessly integrate so you can easily interpret the findings and make informed decisions. You can also run energy modelling and forecasting to uncover abnormal or wasteful energy usage, allocate costs to evaluate operations and use baseline comparisons to validate savings from upgrades or other initiatives. It can also aggregate collected data across multiple processes or facilities and generate compliance reports that meet ever-changing energy efficiency standards.

For those wanting to proactively manage power

management and power distribution systems, EcoStruxure Power Advisor offers remote access, support and on-site maintenance. The software provides data analysis for energy performance reporting, sub-billing, and energy and emissions audits — all crucial components in many modern buildings.

The software can also provide Green Building Certification support by indicating how an EcoStruxure solution can help achieve points toward NABERS certification or other popular rating systems.

For those buildings where net-zero performance or even net-positive energy usage is the goal, Schneider Electric's EcoStruxure Microgrid Advisor offers dynamic control of on-site energy resources and loads. For example, the building may have its own energy source such as solar panels or wind turbines, as well as energy storage and a connection to the grid. In these instances, you might need software that can offer:

- Tariff management — using on-site renewable energy at the most advantageous time, based on variable tariff rates (i.e., self-consuming or selling renewable electricity to the grid when grid prices are high, and consuming or storing grid energy when prices are low).
- Carbon footprint reduction — maximising the self-consumption of on-site renewable energy production to reduce equivalent emissions.
- Peak shaving — consuming renewable energy to avoid demand penalties due to grid energy consumption exceeding a certain level for a given hour.

Schneider Electric's EcoStruxure Microgrid Advisor can automatically switch between energy sources, as and when different events are triggered. The software seamlessly connects to the energy resources to automatically forecast and optimise how and when to consume, produce, and store energy.

Achieving sustainability, net-zero and energy efficiency

To help your customers achieve their sustainability and energy efficiency goals, you need to offer a smart power distribution system, integrating energy management software that accurately tracks and analyses their electrical energy usage.

By monitoring and managing their assets, you can also help your customers to extend the life of their products and systems, while making their operations safe, efficient and resilient every day. Schneider Electric's EcoStruxure architecture is a comprehensive solution that helps turn your customer's climate ambition into action. With the support of experts at Schneider Electric, and through our EcoXpert program, you can audit, design, manage, and maintain energy-efficient commercial buildings, with a customised, cost-effective, turnkey solution.

To understand more about how Schneider Electric can help you take advantage of the New Energy Landscape, download our e-guide today.

[1] Global estimates from Schneider Electric Field Services organization in 2020.

Schneider Electric Pty Ltd
www.se.com/au

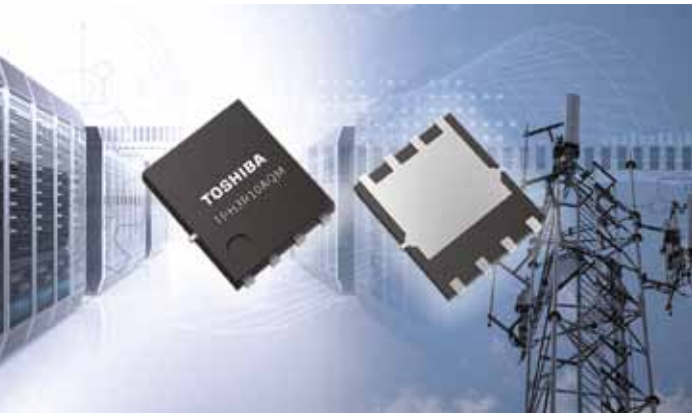
Power MOSFET

TPH3R10AQM is a 100 V N-channel power MOSFET fabricated with Toshiba's latest-generation process, U-MOS X-H. The product targets applications such as switching circuits and hot swap circuits on the power lines of industrial equipment used for data centres and communications base stations. (Hot swap circuits connect and disconnect components to a system without shutting down the system while the equipment is in operation.)

TPH3R10AQM has 3.1 mΩ maximum drain-source On-resistance, 16% lower than Toshiba's 100 V product, TPH3R70APL, which uses the earlier generation process. By the same comparison, TPH3R10AQM has expanded its safe operating area by 76%, making it suitable for linear mode operation. Reducing the On-resistance and expanding the linear operating range in the safe operating area reduces the number of parallel connections. Furthermore, its gate threshold voltage range of 2.5–3.5 V makes it less likely to malfunction due to gate voltage noise.

The new product uses the footprint-compatible SOP Advance(N) package.

Toshiba (Australia) Pty Ltd
www.toshiba.com.au



Optical fibre patch cords

Warren & Brown Technologies (WBT) has an extensive range of high-performance optical fibre patch cords available in single mode, multimode, simplex and duplex. All of WBT's patch cords are individually inspected and tested at the time of production and comply with ANSI, Bellcore, TIA/EIA and EIC standards.

WBT manufactures and distributes optical fibre patch cords in many fibre types, lengths, sizes and connector options to suit numerous applications. Its optical fibre patch cords are all provided with a low smoke zero halogen (LSZH) sheath as standard. LSZH considerably reduces the amount of toxic and corrosive gas emissions during a fire.

Good-quality connectivity begins with high-quality patch cords. Sub-standard patch cords will affect the performance and reliability of the network and are often the most common source of failure within a network. The risk of network downtime due to unreliable cabling is one that should be avoided.

The quality and inspection procedures employed by WBT are designed to ensure only high-quality, individually inspected and approved patch cords are supplied. WBT's local Australian manufacturing facilities are equipped with a state-of-the-art optic fibre termination facility, which allows for full customisation of any type of optical fibre patch cord.

Warren & Brown Technologies
www.wbnetworks.com.au

Wall mount/desktop plastic enclosures

The Hammond Electronics 1557 family of wall mount/desktop plastic enclosures features a modern smooth style with rounded corners and top face. The enclosure's IP68 environmental sealing enables the unit to be installed in any environment. The 1557 can be used as a free-standing enclosure when fitted with the supplied feet, or it can be wall-mounted with either four visible fixings or two hidden ones.

Four plan sizes, each in two heights in black and RAL 7035 grey, are available in UL Listed IP68 polycarbonate. The sizes are 80 x 80 x 45 mm and 60 mm; and 120 x 120, 160 x 160 and 200 x 200 mm in heights of 45 and 70 mm.

PCB standoffs are provided in both the lid and base. For mounting heavier components, 2 mm aluminium internal panels are also available. The enclosure is assembled with corrosion-resistant M4 stainless steel screws threaded into integral bushes for repetitive assembly and disassembly. The IP68 polycarbonate versions are UV stabilised for outdoor use with a UL94-5VA rating and the IP66 ABS general-purpose versions have a flammability rating of UL94-HB for indoor use.

Hammond Electronics Pty Ltd
www.hammfg.com

CASE STUDY

Saving energy for a family business

Rising energy prices are prompting Australian homeowners and businesses to find new ways of reducing their energy consumption — this often means investing in a solar system.

Allprint Graphics, a family-owned business in Sydney, has been providing innovative graphic communications solutions for over 60 years. Looking to reduce its rising energy bills and carbon footprint, Allprint Graphics approached Solahart Sydney to analyse its energy usage and design a solar system to manage the business's energy costs.

Solahart Sydney is part of the Solahart/Rheem family and has provided families and businesses with solar products for over 70 years.

The Solahart team designed a 99.9 kW rooftop-mounted solar system incorporating over two hundred 450 W Solahart SunCell Plus panels, a FIMER PVS-100 string inverter, and a smart Solahart Energy Management solution to monitor solar energy production and energy usage.

FIMER's PVS-100 is an all-in-one high-power string inverter, suitable for large, decentralised rooftop installations. The PVS-100 inverter installed at Allprint Graphics has six MPPTs (maximum power point tracking regulators), enabling greater design flexibility and energy yield. The system can also be ordered with two MPPTs for applications where the inverter is located a long way from the solar panel array.

Rooftop solar installation at Allprint Graphics.

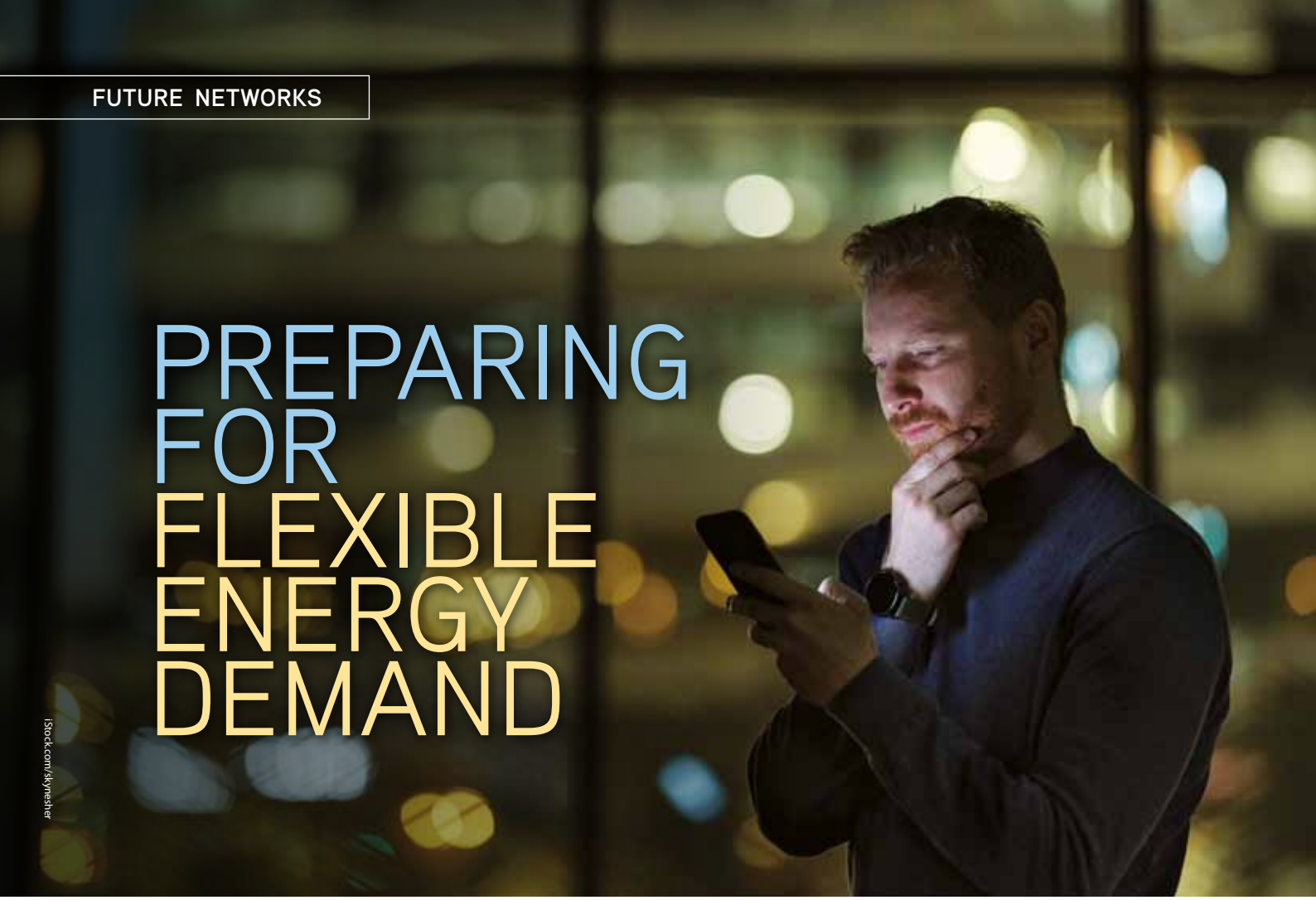
Image supplied by FIMER

"Solahart and FIMER have had a strong partnership delivering quality solar solutions to homeowners for many years," said Nathan Vale, Sales Manager at Solahart Sydney.

"We are proud to continue this partnership with FIMER by delivering premium solutions to our commercial customers."

Since the installation and commissioning in October 2022, Allprint Graphics' solar system has generated over 65 MWh of energy. The system is estimated to reduce the business's annual electricity consumption by 42%, annually saving more than $17,000 and offsetting approximately 128.5 tonnes of CO_2.

FIMER Australia
www.fimer.com/anz



PREPARING FOR FLEXIBLE ENERGY DEMAND

CSIRO will lead a new $11 million project designed to drive development of technology to support flexible demand for energy, empowering consumers to have more control over their electricity usage while saving money and easing pressure on the energy grid.

Flexible demand is an alternative to the traditionally rigid energy network infrastructure, offering a way to lighten the load on the grid during busy periods, reduce energy costs and lower peak demand.

However, the flexible demand approach is still nascent and requires new technologies, market processes and ways of engaging with energy users.

The Digital Infrastructure Energy Flexibility (DIEF) pilot project will address these issues, bringing together a consortium of project sponsors responsible for funding, research outcomes, coordinating artificial intelligence competitions and onboarding buildings onto the digital platform.

Members of the NSW consortium who are sponsoring the project include CSIRO, the NSW Government, Amber Electric, DNA Energy, EVSE Australia, Nube iO, Property and Development NSW, RACE for 2030 CRC, UNSW, UOW and Wattwatchers.

CSIRO's Energy Director, Dr Dietmar Tourbier, said the DIEF project would help improve the viability and uptake of flexible demand, delivering benefits to consumers and industry alike.

"Flexible demand is critical because it ensures grid stability, reduces costs, supports increasing renewable energy integration and enables a more sustainable and efficient energy system," Tourbier said.

"This project has the potential to create a new ecosystem of technologies and solutions that will give consumers more control over their energy bills and emissions."

The project was funded with a $3.75 million grant from the NSW Government, under the Net Zero Plan Stage 1: 2020–2030. The remaining funding (cash and in-kind) was provided by consortium members and in-kind funding from CSIRO.

The digital infrastructure for the project will be provided by CSIRO's Data Clearing House Platform (DCH), a software platform for owners and operators of existing or new commercial, industrial, government and mixed-use developments to connect with service providers to solve common data-related problems.

Up to 200 smart buildings, selected by the project consortium, will participate in the pilot and be connected to the DCH Platform.

The DCH Platform forms part of CSIRO's developing Smart Energy Mission, which is focused on building Australia's next generation of integrated and equitable energy systems.

Property owners participating in the pilot will be able to share data and build innovative software applications for sophisticated management of building carbon emissions. They can also identify opportunities for energy flexibility and productivity improvements resulting in reduced operating costs, energy use and improved comfort and occupant experience.

The data collected during the trial will be used to inform government on the creation of a flexible demand policy and asset register.

CSIRO Chief Research Consultant for Energy Dr Stephen White said the technology had many potential benefits.

"This technology will not only allow people to get data out of their buildings and make it accessible to their service providers, but they will also be able to receive data from external providers such as the electricity market and the Bureau of Meteorology," White said.

"When people process all this data, they can discover cost trends and plan accordingly."

Of the 200 buildings to be connected, the Data Clearing House expects to gain access to devices that consume over five megawatts of power from the grid (up to 0.08% of total demand in NSW). The power usage of these devices can be intelligently controlled to match up with periods of high renewable generation.

900 V gallium-nitride switcher ICs

Power Integrations has introduced a 900 V gallium-nitride (GaN) extension to its InnoSwitch3 family of flyback switcher ICs. The new ICs, which feature the company's proprietary PowiGaN technology, deliver up to 100 W with increased efficiency, eliminating the need for heat sinks and streamlining design of space-challenged applications. InnoSwitch3 designs also offer good light-load efficiency, making them suitable for providing auxiliary power in electric vehicles during low-power sleep modes. The AEC-Q100-qualified InnoSwitch3-AQ family suits EVs that are based on 400 V bus systems where the 900 V PowiGaN switch provides more power and increased design margin required for 12 V battery-replacement systems.

In the industrial space, extra power and increased efficiency are advantageous in applications such as appliances, three-phase motors and auxiliary power supply units (PSUs) in servers. The 900 V parts are pin-for-pin compatible with existing 725 V and 750 V InnoSwitch3-EP parts and offer an increased safety margin, which is helpful for countries with unstable line voltages.

The 900 V InnoSwitch3-EP and InnoSwitch3-AQ offline CV/CC flyback switcher ICs employ synchronous rectification, a valley-switching discontinuous conduction mode (DCM) and continuous conduction mode (CCM) flyback controller.

FluxLink communication technology enables the IC package to bridge the isolation barrier, increasing efficiency and eliminating the need for optocouplers. InnoSwitch3-EP devices incorporate multiple protection features including line over- and under-voltage protection, output over-voltage and over-current limiting, and over-temperature shutdown. Devices are available with standard and peak power delivery options.

Power Integrations

www.power.com/company/sales/distributors/apac

Siemens partner APS to manufacture and adapt critical technology for Australia's energy transition in Adelaide

Siemens and its national distribution partner APS Industrial (APS) have announced the opening of a new manufacturing facility in Adelaide.

The new facility will manufacture and assemble a range of critical technology, including Siemens' air circuit breakers (ACBs), and inject over 150 technology jobs into the local industry over the next 10 years.

Local Australian manufacturing will also help reduce current ACBs product availability lead times by as much as 50% and increase the footprint of locally manufactured systems.

Speaking at the announcement, Siemens Australia and New Zealand CEO Peter Halliday said, "This is the first time in the world that these Siemens products will be assembled and certified outside of a Siemens factory, giving the same quality assurances. This demonstrates the trust and ability of our national distribution partner APS Industrial. APS will adapt and assemble Siemens ACBs and peripheral equipment right here in Adelaide, which is good for jobs, good for industry and good for the economy."

The ACBs are a critical component of energy transition across industries, helping provide safe power supply, protecting valuable equipment at manufacturing sites, built environments, mine sites and any other infrastructure requiring a safe and secure source of electricity.

Joining senior management from Siemens and APS at the new facility, South Australian Deputy Premier Dr Susan Close welcomed the local investment saying, "Siemens and South Australia share a long history that goes back over 150 years. As South Australia continues to grow, we need like-minded partners like Siemens and APS that help build our sovereign capability and protect critical infrastructure and industry. This investment and commitment to future jobs further cements the technological prowess and capabilities of our state."

The facility will enable APS to accelerate the delivery of ACBs to switchboard builders and electrical contractors who install and serve the Australian and New Zealand markets.

Speaking at the launch event in Adelaide, APS CEO David Hegarty said, "This is a significant investment for all of us — APS, Siemens and for local industry. Five years ago, APS was formed as Siemens' master distributor in Australia and since then, we have grown significantly in size and scale as we've helped electrify and digitalise industries.

"One of the biggest challenges to the growth of our industries over the last few years has been global supply chain issues. The establishment of this new facility will reduce the reliance of global supply chains for a product that is critical to many applications and industries. We're proud to support local industry and jobs and keep giving them access to best-in-class global technology," added Mr. Hegarty.

The new facility is conveniently located in Clarence Gardens, just a short distance from Adelaide's CBD.

"Since we started our Australian operations in Adelaide in 1872 with the establishment of the Overland Telegraph, we've achieved several technology firsts with South Australia. I'm proud of our relationship with APS Industrial, and how this decision demonstrates an expansion of the Siemens footprint in South Australia and our long-term commitment to the state. With APS we are helping progress Australian industry and economy. We can't expect industries to innovate and continue growth trajectories without access to the right resources. This is a significant move that helps address one of the most critical challenges being faced by industry today," added Halliday.

APS Industrial
www.apsindustrial.com.au

Miniaturised axial gearbox

The miniaturised Galaxie gearbox from Wittenstein is a high-precision gearbox with axial power transmission that is said to offer true zero backlash throughout its entire lifetime. These characteristics are suitable for applications in medical and precision robotics, semiconductor and wafer handling systems or high-end machine tools.

Power transmission in the gearbox is axial, not radial. The single teeth in the tooth carrier, which are arranged in a gear ring, are axially driven by a polygonal disc with two high points into the flat wheel with special helical crown gearing, similar to a screwing movement. This axial kinematic is responsible for the compact outer dimensions of the Galaxie in the standard sizes typically encountered in robotics applications.

The teeth of the miniaturised Galaxie gearbox are fundamental to the axial function principle. They are designed as so-called 'crown' teeth, in other words they have more flanks per tooth and thus more flank surface, enabling almost complete surface contact when in mesh — in contrast to strain wave gearboxes with linear contact. In addition, the movement of the polygonal disc in the Galaxie means the majority of the crown teeth constantly contribute to torque transmission and torsional rigidity. The crown tooth concept also allows the gearbox to achieve ratios of i=60/61, which is a key performance requirement in robotics applications.

The entire Galaxie range ships in sizes from 90 to 300 mm outer diameter with maximum acceleration torques from 150 to over 7500 Nm.

Treotham Automation Pty Ltd
www.treotham.com.au

Automated honeycomb blinds

Window coverings are an important consideration for households wanting to reduce their energy consumption; they can also contribute to sound insulation, privacy and light control.

Luxaflex Duette Architella shades combine style and function with a contemporary look. The shades are specifically engineered with honeycomb-shaped air pockets that trap air inside, helping moderate temperature and reduce heat loss in winter when they are closed. These air pockets have the ability to reduce the heat transfer through a window, making them an energy-efficient choice.

The shades can be partnered with the Luxaflex PowerView Motorisation smart system, which is compatible with Apple HomeKit, Google Assistant and Amazon Alexa. This allows the blinds to be pre-programmed to function depending on time of day and the strength of the sun.

Luxaflex
www.luxaflex.com.au

Programmable logic controller

The Fatek M series modular programmable logic controller (PLC) is engineered with cutting-edge features and a modular design, offering flexibility and scalability for a wide range of industrial applications. The modular architecture enables easy expansion and customisation, allowing the PLC to adapt and grow alongside evolving automation needs. The Fatek M series PLC is equipped with state-of-the-art communication protocols, extensive I/O options (up to 2048 digital and 256 analog), enhanced security features, IoT-Cloud and remote access connectivity.

Coupled with the free Uperlogic programming software, the Fatek M series introduces a powerful combination that supports an IEC 61131-3 like programming language, including structured text (ST) and function blocks (FB). This integration provides engineers and automation professionals with a versatile and efficient platform for developing sophisticated automation solutions. Structured text offers a powerful yet readable syntax, allowing for the implementation of complex algorithms, mathematical calculations and precise control logic. With the Fatek M series and Uperlogic software engineers can deliver creative, tailored solutions that meet the requirements of diverse industrial applications.

Global Automation Asia-Pacific Pty Ltd
www.globalautomation.com.au

CASE STUDY

Powering a major Australian beverage company

Australian beverage company Asahi Beverages, owner of Carlton & United Breweries, is now powering the production of drinks such as Great Northern, Victoria Bitter, Schweppes, Cool Ridge water and Solo with energy supply arrangements linked to sunshine harvested in outback Queensland.

Asahi Beverages enlisted Flow Power, a fast-growing Australian energy retailer, to broker its new power purchase agreement (PPA), as a move towards the company's goal of having 100% of its purchased electricity sourced from or matched with renewable sources by 2025.

Clermont Solar Farm.

Under the deal, Asahi will purchase 40,000 megawatt hours each year from a state-of-the-art solar farm located in Clermont, Queensland — an outback town renowned for high heat and low rainfall.

This is enough energy to power more than 5700 homes and nearly 81,000 beer fridges annually.

The 500-acre, single-axis solar tracking system farm at Clermont follows the sun's trajectory for optimal energy generation, delivering one of Australia's highest per-unit energy yields.

Clermont, which is owned by solar power company WIRSOL and commenced operations in mid-2019, makes use of Queensland's extensive existing grid infrastructure.

In July 2022 Flow Power secured an 8.5-year PPA for 25.22 MW from Clermont. The deal with Asahi Beverages accounts for around 80% of Flow Power's offtake.

Alongside the large-scale generation certificates (LGCs) it has obtained from Flow Power, Asahi also draws significant energy from onsite solar panels at its Yatala brewery on the Gold Coast. This is reportedly the biggest solar project at any brewery in the country, generating enough solar power to brew the equivalent of around 150 million stubbies or cans each year.

"Asahi and Carlton & United Breweries have been producing iconic beverages in Australia for years, so to harness even more of the Queensland sun to help us make Australia's favourite drinks means consumers can enjoy their preferred bottle or tinnie in a more sustainable way," said Asahi Beverages Group Chief Procurement and Sustainability Officer John Tortora.

The PPA with Flow Power allows Asahi Beverages to continue to procure renewable energy, while also reducing purchasing costs and securing power supply over the long term.

"We are proud to be supporting our long-term customer, Asahi, in continuing to improve the sustainability of their operations and leading the way in industry," said Flow Power COO Byron Serjeantson.

"Every year we see increasing numbers of businesses making the smart switch to renewables and reaping the benefits through Flow Power's innovative renewable products and intelligent tools to better manage their energy. Together with these customers, we are delivering on our key goal to accelerate the renewable energy transition."

Flow Power
www.flowpower.com.au

Powering a lead and silver mine in Western Australia

Abra Base Metals Mine is a new high-grade lead-silver mine currently being constructed between Meekatharra and Newman in Western Australia (approximately 1,000 km northeast of Perth).

Due to the remote nature of the mine, ensuring reliable energy to power the site was critical. Galena Mining wanted to incorporate a power station that would help lower the mine's operating costs and reduce its carbon footprint.

The hybrid thermal and renewable power station is owned and operated by **Pacific Energy,** an industry leader providing remote, off-grid energy in Australia. The hybrid power station is a 21 MW fully integrated system combining a 6 MWac solar farm, 2 MW Battery Energy Storage System (BESS) with a 10 MW high-efficiency/low emissions gas generation plant and 1,100 kl LNG storage and regas facility.

Pacific Energy's subsidiary, **Hybrid Systems Australia**, designed, constructed and commissioned the solar farm and BESS solution, which incorporates the following:

- 15,024 mono facial 460W panels with a NEXTracker single-axis tracking system
- 2 x 4.6 MW (4,565 kVA) FIMER PVS980-58 Central Inverters
- 2 MWh Battery Energy Storage System

In mid-2021, FIMER was engaged by Hybrid Systems to provide an 8.8M VA solution to meet the site's energy requirements. FIMER provided several solutions, but the PVS980 4.6 MW solution was selected for its cost-effectiveness and performance capabilities.

"We were extremely impressed with the capability and responsiveness of FIMER's local and global product team throughout the project, specifically the product selection process and the commissioning of the products. Their level of communication provided us with comfort that our requirements had been met and we could meet our project milestones," said Daniel Jackson, Hybrid Systems General Manager Operations.

FIMER's PVS980 solution has a large install base worldwide, with many located in harsh environments. The Abra Base Metals Mine is in the Australian desert, where summer

Product spotlight: FIMER PVS980-58 5 MVA

The next generation, high power, central inverter from the PVS980 family raises the performance, cost efficiency and ease of installation to new levels. The inverters are aimed at system integrators and end users who require high-performance solar inverters for large, solar power plants.

PVS980 central inverters are now available from 909 kVA up to 5000 kVA, and are optimised for multi-megawatt power plants.

Like other FIMER central inverters, the PVS980-58 has been developed on the basis of decades of experience in the industry and a proven technology platform. Unrivalled expertise from the world's market and technology leader in frequency converters is the hallmark of this solar inverter series.

FIMER's compact skid houses all the electrical equipment that is needed to rapidly connect a solar power plant to a medium-voltage (MV) electricity grid, or to a high-voltage point of connection through HV step-up grid facilities.

temperatures can reach 45–50 degrees Celsius. The performance of the PVS980 inverter when derating at high temperatures was an essential requirement. FIMER's proven technology allowed the teams to plan for and ensure the size of the inverter could still provide sufficient generation when derated at temperatures above 35 and 50 degrees Celsius.

Jason Venning, FIMER Australia's Country Manager, highlighted this, saying, "FIMER's PVS980 inverters have proprietary technology using self-contained two-phase thermo-syphon heat exchangers, which are totally passive and provide high performance with a low-pressure drop, with an efficiency equivalent to liquid cooling and with the simplicity of an air-cooled system. This enables the inverters to be installed in high temperatures while still providing reliable performance."

The PVS980-58 5MVA is also extremely durable and is equipped with extensive electrical and mechanical protection to provide a long and reliable service life of at least 25 years.

FIMER's PVS980 was delivered in January 2022 in time for the solar farm's construction. During this time, FIMER provided technical training to Hybrid Systems and Pacific Energy engineers to commission and maintain the PVS980 units. One of FIMER's technicians visited the site in early November to commission the two central inverters and certify their staff to become authorised technicians.

The solar farm will meet nearly 30% of the mine site's power needs. The solar generation and battery energy storage solution has an expected annual output of over 16,602 MWh and will reduce CO_2 emissions by approximately 11,800 tonnes per annum.

FIMER Australia
www.fimer.com/anz

CASE STUDY

Managing powerline safety through geospatial data

Energy Queensland, through its electricity network businesses Ergon Energy Network and Energex, serves communities across the state, from the Tweed River to Torres Strait and from Brisbane to Birdsville, supplying electricity to approximately 2.3 million households.

When looking for a solution to manage the safety of its powerlines, the energy network selected geospatial data company Fugro.

With its ROAMES technology, Fugro offers asset management services that enable Energy Queensland to identify and report conductor clearance (minimum legislative distance between conductors to ground or structures) issues for all overhead powerlines, thereby reducing the risk of public contact.

The ROAMES solution utilises advanced LiDAR (light detection and ranging) sensing technology and aerial data capture to gather comprehensive information for Energy Queensland's operations. This geospatial data empowers the company to efficiently manage critical safety clearances across the extensive overhead network and ensure reliable power supply to communities and customers throughout the region.

"Fugro's ROAMES solution has proven to be efficient in the provision of survey services for Energy Queensland's network, which is critical in managing such an important safety risk for our customers," said Carmelo Noel, General Manager Asset Standards for Energy Queensland.

iStock.com/Wendy Townrow

"Their understanding of our requirements and their commitment to innovation have been instrumental in our decision to once again select the ROAMES solution. We look forward to utilising their expertise to drive operational efficiency and deliver value to our stakeholders, communities and customers."

"We are thrilled to continue our longstanding partnership with Energy Queensland," said Jan Kema, Fugro Service Line Manager, Power. "We look forward to providing our network-wide wire clearance analysis to Energy Queensland; providing the building blocks for better asset management and regulatory compliance and, ultimately, a safer network for customers."

Fugro
www.fugro.com/

Fibre-optic switch contact signal repeater unit

The Omniterm FCX is a fibre-optic switch contact signal repeater unit that transmits a switch contact status signal bidirectionally up to 20 km. With a safety integrity level (SIL) 2 rating, the FCX is designed to be built into safety-critical systems. The unit uses 1oo2 architecture and is suitable for the controlled, emergency shutdown of electrical substations and other safety-critical applications.

The transceiver is compatible with either 850 nm multi-mode or 1310 nm singlemode fibre-optic cabling; the latter can send switch contact signals up to 20 km of range. The FCX is powered from a 10–30 VDC power supply and the device can operate in a range of 0–60°C.

The FCX can also figure in mining and materials handling as well as nuclear radiological safety warning signals and monitoring functions. The SIL-2 rating indicates to system designers that the risk associated with transmitting switch contact signals over long distances can be limited to appropriate levels.

Omniflex (Australia) Pty Ltd
www.omniflex.com.au

Flicker-free LED downlight

LED lights can flicker in parts of NSW and Qld, especially when used with a dimmer. This may occur due to the impact of the ripple control signals being injected into the distribution network by electricity providers. Many residential LED downlights have invisible flickering, which occurs at a frequency that cannot be perceived by the naked eye.

Legrand HPM's new Flicker Free Zyla Plus LED Downlight is specially designed to be free of visible and invisible light flickering. The light has a trailing edge dimmer.

With a supply voltage of 230–240 V (~50 Hz), a power input of 7 W and an average lifespan of 35,000 hours, the Zyla Plus tri-colour range comes in warm white (783 lumens, 3000 K), cool white (818 lumens, 4000 K) and natural white (791 lumens, 5000 K).

The downlights are IP44-rated and have an IC-4 and IC-F insulation rating.

Legrand Australia P/L
www.legrand.com.au

iStock.com/lovelyday12

WIND AND SOLAR REMAIN CHEAPEST TO BUILD

The latest GenCost report shows that renewables, led by wind and solar, have retained their position as Australia's cheapest new-build electricity generation, despite a 20% average rise in technology costs.

GenCost is an annual collaboration between CSIRO and the Australian Energy Market Operator (AEMO) that actively consults industry stakeholders to revise domestic electricity generation and storage, as well as hydrogen production costs.

The 2022–23 report marks the first time that all technology costs have increased from the previous year since GenCost commenced in 2018.

The report highlights industry concerns that the rapid pace of the global energy transition will contribute to escalating cost pressures. This is attributed to the immense scale of manufacturing, raw materials and labour required to develop and deploy clean energy technologies consistent with net zero goals.

According to GenCost's modelling, technology cost pressures felt in Australia will revert to normal levels by 2027, but are delayed to 2030 in global scenarios where the speed of the energy transition is highest.

CSIRO's Director of Energy, Dr Dietmar Tourbier, said GenCost's rigorous scientific and engineering analysis represents Australia's most comprehensive projection of electricity generation costs.

"Australia's energy challenge lies in the transformation of our existing energy system, while ensuring the continuing delivery of sustainable, reliable and affordable energy as we strive to achieve net zero emissions by 2050," Tourbier said.

"This imperative is not only essential for environmental stewardship, but also to maintain Australia's economic competitiveness in the global market."

CSIRO's Chief Energy Economist and GenCost lead author Paul Graham pointed out that the COVID-19 pandemic had resulted in lingering global supply chain constraints that impacted the prices of raw materials required in technology manufacturing as well as freight costs.

The Ukraine war has further exacerbated global supply chain inflationary pressures by raising energy input costs for all industries.

"During the recovery from these global events, various input costs are showing signs of moderation; however, there is an expected delay due to future price uncertainties and the robust demand associated with the global energy transition," Graham said.

"GenCost analysis anticipates that technology costs have mostly peaked and the risk of cost pressures extending beyond 2030 will be mitigated, as the global manufacturing capability established by that time will adequately meet deployment needs."

The updated analyses also found that:

- Technology cost rises were not uniform due to variations in material inputs and exposure to freight prices
- Globally, renewables led by wind and solar are the fastest-growing energy source
- Batteries are set to play a crucial role in supporting both variable renewable generation in the electricity sector and the rapid expansion of electric vehicle deployment in transport.

AEMO's Executive General Manager – System Design, Merryn York, said GenCost provided important data for AEMO to plan the least costly investments needed to fill the gaps from coal generation that is reaching end of life.

"As coal-fired power generation leaves Australia's grids, we need investment in generation to fill those gaps," York said.

"And as more variable renewables deliver our energy for consumers and decarbonisation, we need investment in firming — which is on-demand energy to smooth out the peaks and troughs from renewable generation.

"This is important to deliver the transition while maintaining reliable, secure and affordable energy supply for consumers," York concluded.

CASE STUDY

How AusNet is mitigating storm risk

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As the climate changes, effective management of weather-related risks is becoming more and more complex, with increasing financial, operational and regulatory impacts across a variety of industries.

For this reason, electricity distribution and transmission provider AusNet has selected DTN, a global data, analytics and technology company, to help improve its outage response management.

DTN Storm Impact Analytics applies sophisticated machine learning models using a combination of the company's historical outage and weather data, along with other impact data such as vegetation and geography, and the utility's specific risk thresholds, to create a tailored weather risk and response based on real-time weather forecasts. Specific to a utility's infrastructure and distribution network, critical insights are available well before a weather event.

"After two major disaster events — the 2019/2020 bushfires and June 2021 storms — we knew we had to change how we responded to big emergency events in Australia," said AusNet Emergency Operations Specialist Sally Jacobs.

"We needed reliable and actionable insights which looked at the potential impacts to our service areas, tailored to our industry. DTN Storm Impact Analytics enables us to more confidently anticipate and respond to weather impacts on our network."

These planning insights inform both advanced warning and scenario modelling that provides incident commanders with the confidence to decide when a response is needed, and if so where to allocate and stage engineers in optimal places, so that they are positioned and equipped to request additional crews, monitor the situation or resolve a particular issue.

"Utility companies are committed to improving service and seeking solutions that can help them adapt to environmental threats," said Nic Wilson, DTN Director of Product Management – Weather Risk. "AusNet is furthering their commitment by investing in innovative technology that improves their responses to unplanned outages and restores power as quickly as possible for Victorians."

Storm Impact Analytics is part of the DTN Storm Risk solutions suite for energy companies. DTN said its outage planning and response platforms and weather intelligence application programming interfaces (APIs) are used by utilities around the world to help anticipate and manage weather incidents that put extreme pressure on the management of power grids. These solutions are tailored to support utilities of all sizes as they improve emergency preparedness and outage restoration planning.

DTN
www.dtn.com/weather/utilities-and-renewable-energy/storm-risk

Insulated gate bipolar transistor

Toshiba has launched a 650 V discrete insulated gate bipolar transistor (IGBT), GT30J65MRB, for the power factor correction (PFC) circuits of air conditioners and large power supplies for industrial equipment.

Power semiconductors have become important devices in energy conservation. In industrial equipment and home appliances, which consume considerable electricity, demand for highly efficient switching devices is growing due to the increasing use of inverters in air conditioners and the need to lower power consumption in large-scale power supplies for industrial equipment. This has created demand for low-loss switching devices and higher switching frequencies in PFC circuits.

Toshiba's new IGBT has a low switching loss (ie, turn-off switching loss) of 0.35 mJ (typically). The IGBT also has a built-in diode with forward voltage of 1.20 V (typ).

For PFC circuits of air conditioners, GT30J65MRB is Toshiba's first IGBT for PFC designed for use below 60 kHz, achieved by reducing switching loss to secure higher frequency operation.

Toshiba (Australia) Pty Ltd
www.toshiba.com.au

High density splicing and fibre management with WBT's 7106 series!

In today's ever-evolving world of data centres and telecommunications networks, the demand for higher capacity and increased efficiency has never been more pressing. As we continue to witness unprecedented data growth, innovative solutions are essential to meet the challenges of the future. The 7106 Series Ultra High Density Fibre Termination Panel (FTP) is one such groundbreaking solution that deserves attention.

The 7106 Series FTP is a game-changer, offering unparalleled density and usability. With the capability to house up to 144 fibres LC or LC/A ports, splice and patch in just 1RU, it sets a new standard for compactness and efficiency. This exceptional density is achieved through its compatibility with ultra-high density rollable ribbon fibre, such as 864F, 1,728F, and 3,456F, enabling direct splicing onto MTP connectivity and reducing the need for additional connectors.

One of the standout features of the 7106 Series is its single row fibre access and innovative double pivot function, which simplifies patching and grants easy access to ports. Striking a perfect balance between density and usability, this FTP ensures that network administrators can efficiently manage and maintain their infrastructure without compromising on accessibility.

The design of the 7106 Series also emphasizes convenience and flexibility. Each 1/4″ RU panel row pivots and slides out separately, granting finger access to each port and easing the splicing process allowing 36 fibres, LC/A or LC per row and a total of 144 fibres per RU which helps future proof your fibre infrastructure network for the next wave of growth.

What further sets the 7106 Series apart is its compatibility with WBT's Optical Distribution Frames (ODFs) and patch cords. Fully loaded with adaptors and stripped pigtails, this streamlines the ordering process, making deployment swift and hassle-free. This adaptability ensures that the 7106 Series can seamlessly integrate into existing infrastructure or be deployed as part of a comprehensive end-to-end network solution.

The 300mm deep narrow depth feature of the 7106 Series provides a significant advantage over its competitors. While other products demand mounting in 600mm or 800mm deep racks, this FTP's compact and shallow design optimizes space utilization, making it an ideal choice for 300mm deep ODFs. This solution provides unmatched density and usability making it a remarkable achievement that contributes to the efficient utilization of resources in data centres and telecommunications networks.

In conclusion, the 7106 Series Ultra High Density Fibre Termination Panel is a groundbreaking achievement in the world of connectivity solutions. As data demands continue to grow, innovations like this are vital to keep pace with the ever-evolving technology landscape. With its exceptional density, usability, and industry-leading innovation, the 7106 Series is poised to revolutionize the way we manage and deploy fibre connectivity in data centres and telecommunications networks!

For more information: https://wbnetworks.com.au/7106-series-ftps-1ru-144-fibre-for-odf-and-equipment-rack.html.

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WHY AUSTRALIA NEEDS A NATIONAL APPROACH TO HOME THERMAL EFFICIENCY

Improving the thermal performance of Australian homes is an urgent priority to ease cost of living pressures, improve wellbeing and reduce energy consumption and emissions, according to a recent report led by RMIT University.

Commissioned by RACE for 2030, the report assessed current challenges related to home thermal efficiency improvements. The thermal efficiency or performance of a building refers to how successfully a dwelling can be both energy efficient and comfortable for occupants during different seasons.

The report made several recommendations to help Australia reach its goal of net zero by 2050, such as improving how new homes are built, as well as how households prioritise and undertake thermal upgrading of their homes. It also recommended making home energy assessment information widely available and focusing on new research to inform and accelerate progress.

Lead researcher and Inaugural Director of RMIT's new Post-Carbon Infrastructure and Built Environment Research Centre Professor Priya Rajagopalan said the thermal performance of a home is often overlooked, with factors such as cost, design, location and convenience considered more pressing to buyers and builders than its thermal performance.

"A thermally efficient home is also an energy-efficient one given that heating and cooling represents up to 50% of energy used," said Rajagopalan, who is also Associate Dean of RMIT's School of Property, Construction and Project Management.

"A poorly constructed building shell uses more energy to keep people warm or cool, which leads to an increase in carbon emissions and expensive power bills."

A 2022 study by Sustainability Victoria also indicated thermally comfortable homes can lead to better health outcomes for occupants.

Changing how we build new homes

While the introduction of the new seven-star energy efficiency building standards is a necessary step to improve new homes, Rajagopalan said more needs to be done during the design and construction stage of building to ensure each home is thermally efficient. She said involving thermal assessors early in the design process would make a difference as they are usually brought in at the end of the design process, which is often too late to make cost-effective improvements.

"Designers rely on energy rating tools to help them make sure the designs are thermally efficient and meet minimum standards, but often what is designed in the software doesn't translate fully in the real setting. Improved training of all trades, highlighting the consequences of poor construction practices, is essential to make sure they are delivering as per the specifications," she said.

"There might also be unexpected air leakage or moisture entry in the physical build that the software is unable to predict.

"So not only do we need to make assumptions in rating tools as close to reality and involve thermal assessors earlier in the design phase so they can point out issues before it is too late, but we also need to ensure that what is designed is then actually built." ›

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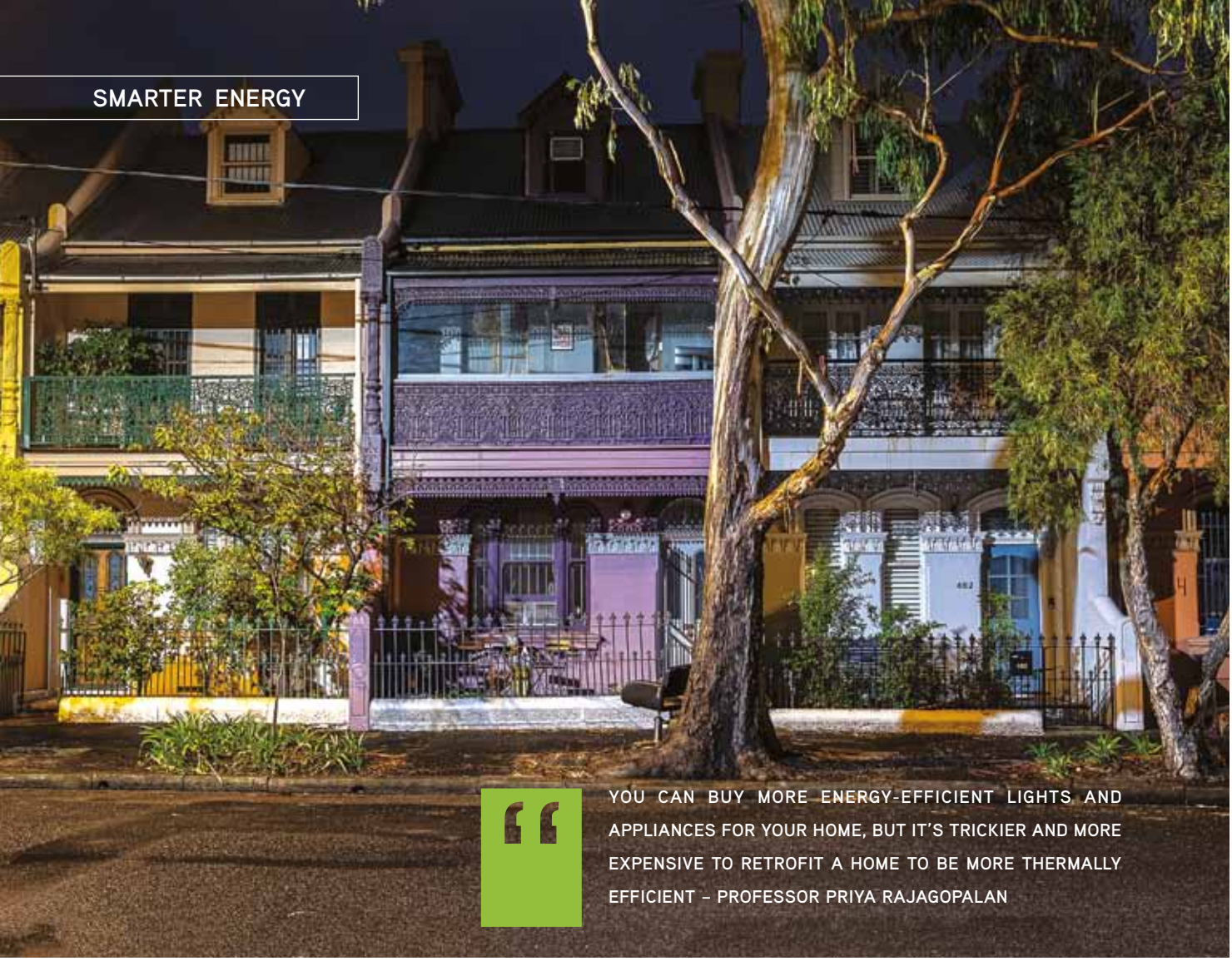

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> YOU CAN BUY MORE ENERGY-EFFICIENT LIGHTS AND APPLIANCES FOR YOUR HOME, BUT IT'S TRICKIER AND MORE EXPENSIVE TO RETROFIT A HOME TO BE MORE THERMALLY EFFICIENT – PROFESSOR PRIYA RAJAGOPALAN

Rajagopalan said that while high-performance windows and insulation were essential to the thermal efficiency of a building, cost remained a barrier for some. However, she added that though high-performance windows could cost more upfront to install, "eventually, it could save you thousands on energy bills and improve thermal comfort".

Rajagopalan said messaging needed to focus on the range of benefits — including better health, wellbeing and quality of life — instead of just focusing on upfront costs and short-term payback savings.

Retrofitting existing homes

Australia has 10 million existing homes, most of which have poor energy and thermal performance. Rajagopalan said government assistance was urgently needed in designing and rolling out an affordable thermal performance assessment program necessary to start the retrofitting process of existing homes. "You can buy more energy-efficient lights and appliances for your home, but it's trickier and more expensive to retrofit a home to be more thermally efficient," she said.

Rajagopalan said there was already a lot of information about retrofitting homes, but the reliability and accuracy of the information varied. A potential solution was creating a 'one-stop shop' on how to embark on retrofitting a home and the benefits of a thermally efficient home from verified sources.

"This will help manage home energy upgrades from start to finish and offer a smooth customer journey to ensure better outcomes," she said.

Policy changes needed to help renters

Rajagopalan said Australian renters are at a disadvantage as they have little control over the thermal or energy efficiency of rental properties.

"Even with government subsidies for retrofitting rental properties to improve thermal or energy efficiency, these don't necessarily translate into action by landlords, or deter them from increasing rents after upgrades," she said.

In August last year, France introduced a climate and resilience law preventing landlords from increasing the cost of rent on properties with poor energy efficiency ratings (ranked F or G). From January 2023, it has been illegal to rent the absolute least energy-efficient properties in France. More recently in Australia, Victoria introduced basic standards for rental homes that included window coverings, adequate ventilation and energy-efficient heaters. In the ACT, all rental homes were required to have at least R5 insulation in ceilings, which can help a home retain heat in winter and reduce heat entering in summer.

Rajagopalan said she would like to see higher standards across the country to help ensure all renters lived in thermally comfortable and energy-efficient homes.

"Effective policies that improve the thermal performance of over three million rental accommodations across Australia can contribute to easing the deepening housing crisis and help towards improving the quality of life of residents, majority of which are lower income population," she said.

"We need to make sure the public know thermally efficient homes have significant health, wellbeing and social benefits, as they are not talked about enough.

"It might even put some pressure on designers, builders and policymakers to build better-performing homes and roll out a retrofit program for homeowners and renters."

"H2: Opportunity Assessment Enhancing home thermal efficiency" was prepared for and published by *RACE for 2030 CRC*. The research was led by RMIT University in collaboration with CSIRO and Climate KIC Australia.

Smart switches and sockets

Arteor with Netatmo is a collection of smart switches and sockets for the connected home, allowing for control of lights, appliances, blinds and shutters from anywhere using the Home+Control app, voice control or traditional switch.

Simple, adaptable and intelligent, Arteor with Netatmo has been designed to integrate many functions without complicated wiring, creating a customisable solution. An existing Arteor with Netatmo installation can be extended with new wireless switches used for multi-way switching without the need to run wires into the wall.

With multiple control possibilities, up to four scenarios and schedule routines can be created in the one switch. As this collection is part of the 'with Netatmo' ecosystem, users can manage their home and monitor their energy consumption via the Home+Control app.

Legrand Australia P/L
www.legrand.com.au

Fanless industrial compact PC

Designed to address the burgeoning electric vehicle (EV) market, ARCHMI-810BP/R/H is the latest addition to APLEX's ARCHMI industrial computer family.

Powered by Intel's Elkhart Lake platform Celeron J6412, the ARCHMI-810BP/R/H is fanless and equipped to handle applications in AIoT automation such as smart factories, smart manufacturing and smart transportation. It supports Windows 10 IoT and Windows 11 operating systems, making it adaptable to a range of project requirements.

The computer's multiple I/O interfaces include 2 x USB 3.2, 2 x USB 2.0, 1 x COM, 1 x DP and 2 x 2.5GbE LAN, as well as expansion card options.

It features an IP66-rated front bezel, resistive touch and projective capacitive touchscreen, and an aluminium die-casting chassis. The operating temperature ranges from 0 to 50°C, extendable from -20 to 60°C, making it resilient in challenging environments.

With additional features like auto-dimming, optical bonding, AR coating and high brightness solution, the ARCHMI-810BP/R/H suits both indoor industrial applications and semi-outdoor applications such as EV charging stations, kiosks and ATMs.

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

Charging station

Schneider Electric's EVlink Pro AC charging station has been made to support a growing demand for electric vehicles and charging infrastructure, providing solutions for contractors that offer services to developers across all types of commercial property. From hospitals to retail stores and multi-unit dwellings, the charging station is designed for sustainable and efficient buildings of the future.

As well as being a sustainable charging option for drivers, the EVlink Pro AC offers design flexibility to builders and contractors. The scalable, modular design with TS2 socket (or attached 5 m cable) includes wall-mounted or floor-standing options, giving it a customisable look and feel for different installation needs.

EVlink Pro AC is also compatible with Schneider Electric's EcoStruxure EV Charging Expert, which monitors, controls and maximises EV charging based on the available power.

Schneider Electric
www.se.com/au

iStock.com/Daniel Balakov

PROTECTING CRITICAL INFRASTRUCTURE WITH AI

International experts in artificial intelligence have proposed using AI to help protect critical infrastructure including power, water and communication networks.

Scientists from Flinders University and Brazil have worked on a new model to provide early identification of software virus attack, hacker activity or general system failure in vital networks millions of people rely on every day.

"We have developed a novel algorithm to detect failure in data networks that is robust to inconsistencies in the sensor data. This algorithm is capable to signal the start of major disruptions that could have far-reaching consequences," said Dr Paulo Santos, Associate Professor in Artificial Intelligence and Robotics at the College of Science and Engineering at Flinders University.

"This could be advanced to be an effective safeguard against equipment failures in data networks of electrical systems and could replace more traditional diagnostic methods both in power and other critical infrastructure.

"It is one of the first complete investigations of this system of testing paraconsistent analysers in a large simulation of a complex electrical system," Santos said.

One example of a critical systems breach was the 2010 Stuxnet worm attack, designed to target and disrupt industrial control systems — particularly those used in Iran's nuclear program.

Santos, with co-authors Hyghor Miranda Côrtes from Centro Universitário da FEI and João Inácio da Silva Filho from Universidade Santa Cecília Brazil, have published the findings in a new article in the journal *Expert Systems with Applications*.

The researchers said that AI can be used to improve software applications and other fault diagnostic systems that help prevent errors in complex engineering systems or manufacturing plants, and other critical infrastructure.

Data analysis, machine learning and rule-based learning are already used to develop fault diagnostic systems; however, the team has expanded on these approaches to add an 'evidence filter' to the process of system diagnostics to take into account conflicting evidence by considering a degree of trust in the sensor data, Santos said.

"With further development, this new model of analysis, which we call 'Cubic Paraconsistent Analyser with Evidence Filter and Temporal Analysis' (or CPAet), could be consolidated to address ever more sophisticated technological failures in critical systems which support major industries, entire urban networks, and so on," he said.

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