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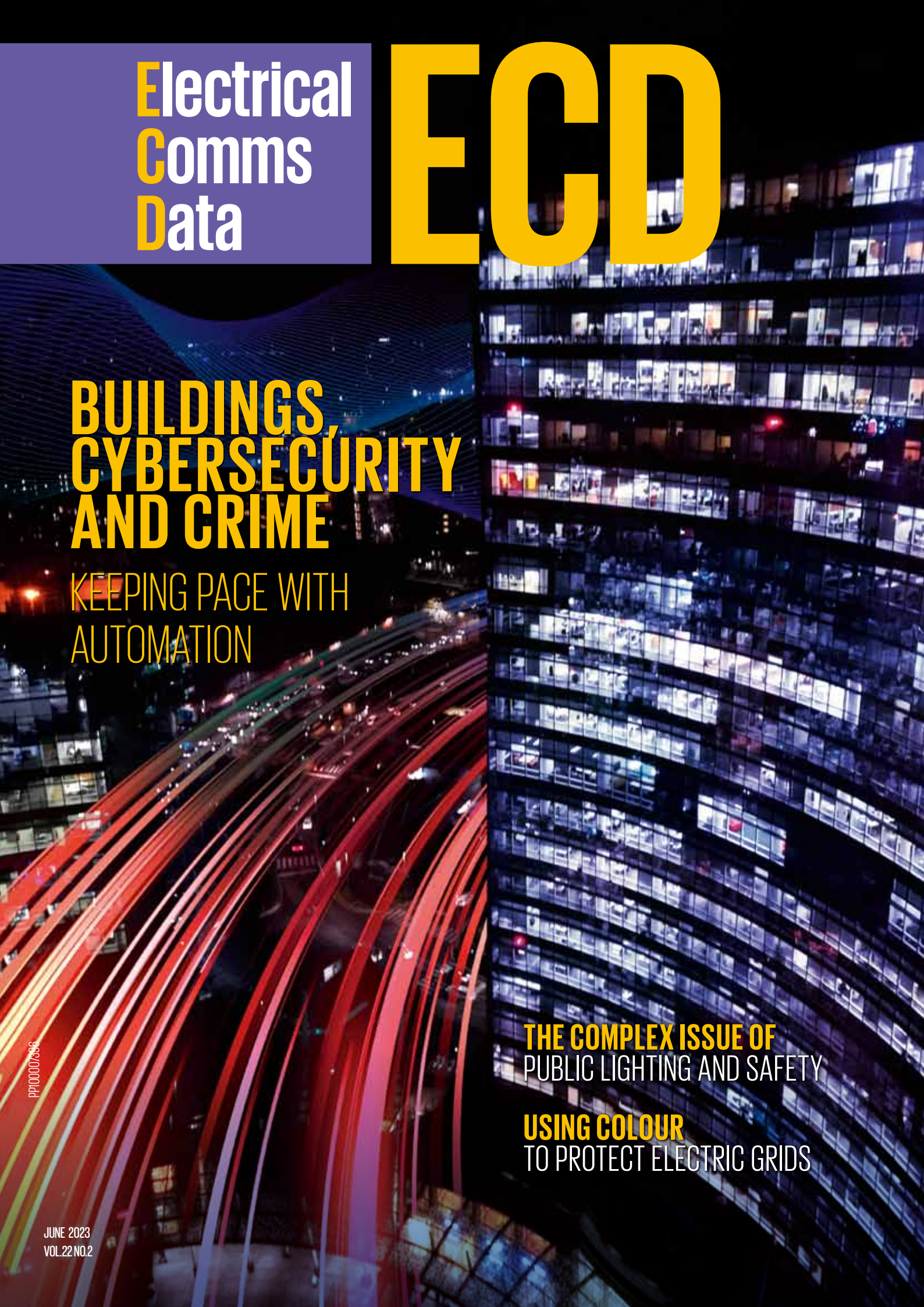
BUILDINGS, CYBERSECURITY AND CRIME

KEEPING PACE WITH AUTOMATION



THE COMPLEX ISSUE OF PUBLIC LIGHTING AND SAFETY

USING COLOUR TO PROTECT ELECTRIC GRIDS

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VOL.22 NO.2

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FROM THE EDITOR

Security has to be one of the most compelling aspects of infrastructure — it's a field that must be constantly dynamic, ever ready to evolve in response to new threats in a rapidly changing world.

Lighting is a major weapon in the infrastructure arsenal when it comes to the safety and security of public spaces, and something you might assume is pretty straightforward. Bright lighting should enhance security, yes? Recent research on street lighting and crime reveals a much more complex issue, where sometimes it's safer to switch the lights off. Researching the feature for this issue left me with a sense of just how powerful lighting can be in shaping our environment and affecting human behaviour.

With automation becoming increasingly commonplace, not only have threats to infrastructure multiplied, but the impact of one cybersecurity breach can be far more devastating than a physical break-in at a building or utility. (Think: multiple electrical substations and related infrastructure being shut down via a cyber attack on a centralised network.) In a fascinating and timely discussion of these issues, two industry experts share their insights. Craig Chapman from the smart building association KNX takes us through the various risks faced by smart homes and buildings, while later on in the magazine, Louise Monger from Schneider Electric discusses the manifold threats to building systems, and how we can plug these vulnerabilities.

Thankfully, there are always innovators looking to stay one step ahead of the game, and one such solution can be found in another of our articles, about the potential of layered colour patterns to shield critical infrastructure. It's as weirdly brilliant as it sounds, and might be coming to a utility near you.

Katerina Sakkas — Editor
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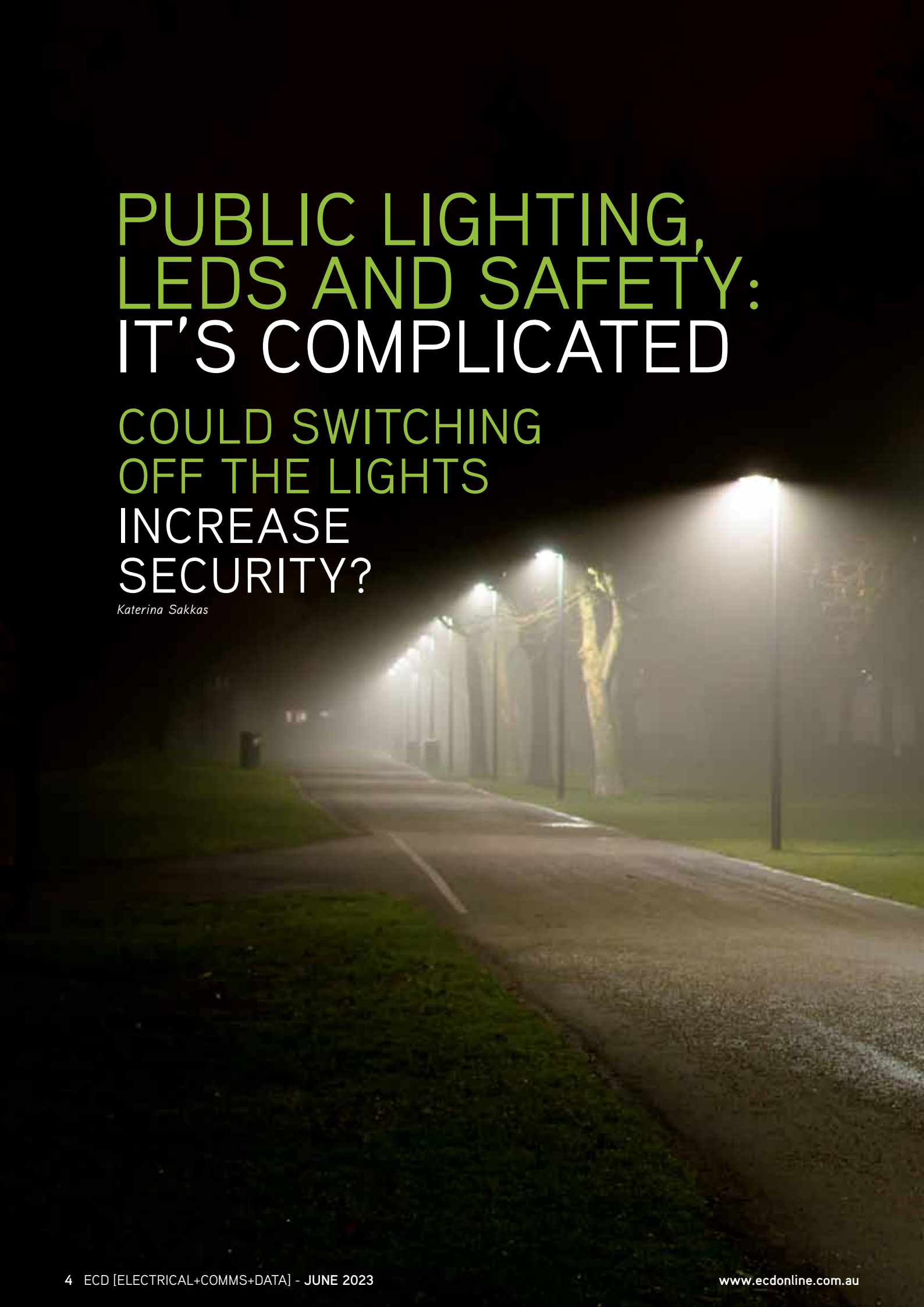
PUBLIC LIGHTING, LEDS AND SAFETY: IT'S COMPLICATED

COULD SWITCHING OFF THE LIGHTS INCREASE SECURITY?

Katerina Sakkas



Bright lighting might be one of the first things that comes to mind when thinking about security in public places, but scratch the surface and you'll find a much more complex picture.

Recent analysis of data from the UK has examined street lighting in relation to crime and made the surprising discovery that switching lights off at midnight, as is common in England and parts of Europe, might be linked to a reduction in certain types of crime.[1]

As part of this research project, academics from the UK, Singapore and New Zealand examined street lighting data from the (UK) Thames Valley Policing area between April 2004 and September 2013. They compared these figures to crime data from Thames Valley Police over the same 10-year period, covering offences of residential burglary, robbery, vehicle crime and violence, since these were the offences that would be most expected to be affected by changes to street lighting. Their findings were published in the *Journal of Quantitative Criminology*.

The lighting data accounted for all lighting changes implemented by the councils involved, including switching off lights between midnight and 6 am ('part-night' lighting or PNL), dimming (where lights remained on all night, but their illumination was reduced) and the replacement of orange sodium lamps with white lights.

For streets where part-night lighting was in place, the researchers made a startling discovery: in these semi-dark streets, there was a strong association with a reduction in total night-time crime and especially theft from vehicles. In contrast, dimmed light had no significant impact.

For street segments adjacent to streets with part-night lighting, the findings suggested that there was an increase in overall night-time crime of about 18%, mainly driven by increases in theft from vehicles. Interestingly, there was some evidence of a decrease in overall crime on streets adjacent to white light interventions, which appeared to be driven by decreases in violent crimes on these streets.

How lighting interventions affected crime 24/7

When the analysis was widened out to include the impact of lighting changes on crime occurring in the day as well as at night, it showed part-night lighting was strongly associated with a reduction in total crime and burglary along the streets where it was implemented. There was also evidence of an association between PNL and a reduction in violent crime. There was some evidence that dimming was associated with a reduction in robbery, while white light was associated with a decrease in all crime, driven by decreases in burglaries.

For adjacent streets, there was strong evidence of an association between PNL and reductions in total crime and violent crime. There was no evidence of associations between dimming nor white light and crime on adjacent streets.

When looking at the total impact of street lighting interventions (ie, the total net effect with both the intervention and adjacent streets combined), part-night lighting comes out on top in terms of crime reduction. PNL streets were associated with a reduction in total crime, burglary, theft from vehicles and violence. Dimming was only found to be associated with a net increase of theft from vehicles and white light was only associated with net reductions in burglary.

But while PNL was associated with a reduction in theft from vehicles on the streets where it was implemented, there was also evidence of a similar increase in theft from vehicles on adjacent streets, suggesting there was spatial displacement of these crimes to better-lit streets nearby.

Possible explanations

In explaining their findings about PNL, the researchers referred to "rational choice theory", in which offenders engage in a cost-benefit analysis. Put simply, darkness makes it much harder for would-be car thieves to see what they're dealing with — how secure a vehicle is, for example, or whether it contains valuable goods — and to see what they're doing, for instance when removing items like hub caps. If they introduce an artificial light like a torch, this is likely to attract unwanted attention. So all in all, the costs would seem to outweigh the benefits in this scenario. This also explains the displacement of such crimes to adjacent streets without PNL.

The study's conclusion pointed out the complicated relationship between public lighting, security and crime: "The findings of this study suggest that the mechanism by which street lighting has been proposed to reduce crime — increased visibility at night — may be one that can also increase vehicle crime. This speaks to the inherent specificity in the opportunity structure of different crimes; environmental features make some types of crime more likely whilst simultaneously making other types of crime less likely."

Importance of community perceptions

In addition to more straightforward explanations for the effectiveness of public lighting, for example, deterring crime through making offenders more visible, much of the research into public lighting and security relates to community perceptions. In the 'community cohesion' model cited in the Thames Valley study, an improvement in lighting infrastructure carried out by a council might have the effect of making the community feel invested in and valued, which in turn increases "community pride, cohesion and informal social control" — leading to safer streets.[2]

But introducing bright LEDs to no-go areas won't necessarily create a perception of security.

In a background report[3] on public safety based on data gathered in its Annual Customer Satisfaction Survey 2019, the City of Yarra noted that "very bright and over-lit spaces do not necessarily correlate with observations of safety and can, in fact, increase perceptions that a site is unsafe.[4] By flooding a space with light, there can be a sharp drop-off of light beyond paths. This contrast can be disorientating and can make people feel less safe[5]."

The City of Yarra's report emphasised the importance of being site-specific when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it comes to security lighting, and noted that this sort of approach is hampered by the Australian Standard for public lighting, in which illuminance (the measure of light falling on a surface, or lux level) is the only unit of measurement required for compliance.

"The effect of utilising such a singular approach to inform what is considered acceptable under the 'Australian Standard' is that it limits buy-in to consider a more holistic approach to lighting design such as through a combination of lighting designs and techniques, to achieve a more responsive outcome in localised contexts."[6]

Pros and cons of white light

The uptake of LED streetlights in Australia over the past seven years has been exponential. According to a recent IPWEA article, 'A Stocktake of Australia's Progress Towards Smart Street Lighting', about 1.4 million of the 2.5 million streetlights in Australia have been converted to LEDs, totalling some 57% of the national portfolio of street lighting.

> "... VERY BRIGHT AND OVER-LIT SPACES DO NOT NECESSARILY CORRELATE WITH OBSERVATIONS OF SAFETY AND CAN, IN FACT, INCREASE PERCEPTIONS THAT A SITE IS UNSAFE. – CITY OF YARRA BACKGROUND REPORT ON PUBLIC SAFETY, 2020

This is up from about 6.5% of Australia's 2.3 million streetlights in 2016, when the IPWEA first started its Street Lighting & Smart Controls Program.[7]

The LED ramp-up shows no sign of slowing down. Ausgrid has installed 170,000 LEDs in 30 council areas since its LED streetlight rollout began in November 2018, with the program expected to be completed by the end of the 2025 financial year.[8] As part of the Western Sydney Energy Program, Endeavour Energy will replace mercury vapour lamps with LED streetlights across seven Western Sydney councils, with more than 52,000 fittings to be installed; completion is expected by 2024.[9]

The shift to LEDs in Australia brings with it undeniable environmental and economic benefits, as well as possible improvements in road safety (white-coloured streetlights have been associated with faster driver reaction times when compared to yellow sodium lights).[10] On the flipside, concerns have been raised about potential health and security issues, including interfering with the sleep cycles of animals and humans[11], and increasing property crime. (Though as we've seen, the latter issue is a complex one!)

Though criticised by Yarra City Council, Australia's public lighting standard (AS/NZS 1158) might ameliorate these concerns somewhat, as, according to Next Energy Lighting Director Graham Mawer, writing for the IPWEA, it "is unique in permitting extremely low lighting levels and long spacings between lights on residential roads". Mawer went on to say that "as society has become more attuned to the environmental impact of public lighting, Australia's comparatively lower lighting levels are coming to be viewed as a benefit in some quarters".[12] However, this uniquely dim street lighting is not helpful should residential streetlights need to be temporarily brightened, for example, in the event of a road traffic accident; this is where smart lighting could help.

A smarter approach

While Australia's LED street lighting transition has been enthusiastic, the country has been slow to adopt smart lighting controls, which would enable automated dimming and shutting-off of streetlights — as well as brightening.

If there's one takeaway from the existing research on public lighting and security, it's that there's no single solution to this multifaceted problem. Effective security lighting must take into account location, community and the type of crime that's occurring in a particular area; and be considered in tandem with other security measures, like cameras. Increasing the number of smart street lighting controls in Australia would enhance the responsiveness of public lighting — surely a useful measure when it comes to tackling the nuances of security infrastructure.

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Electrical Comms Data news

SEARCH ON FOR TOP TRADIES

The search for Australia's top tradies is on in the lead-up to the inaugural Australian Trades Small Business Champion Awards, to be held on Friday, 22 September 2023 at Western Sydney Conference Centre, Penrith.

The awards, which are the only ones in Australia entirely dedicated to trades, aim to support and celebrate the vital contribution that trade business owners make to the local community, through providing a service, generating employment for millions of Australians and boosting the economy.

From sparkies to pest control and carpenters to concreters, there are 44 industry categories that trade businesses can be nominated in, as well as individual awards for Apprentice Champion, Trades Entrepreneur, Trades Champion Leader and the Champion Tradie.

Categories include Data Technician, Electrical, Engineering, Lighting Consultant, and Solar.

Awards Founder and Managing Director Steve Loe said the awards were about giving Australia's tradies the recognition they deserve.

"Tradies are the backbone of Australian society and an integral part of the small business sector. A third of Australia's workforce are in a trade and the awards gives them the opportunity to be publicly acknowledged for their hard work and service," he said.

"A trades career can often mean early starts, long days and exhausting manual labour. It's a very physically taxing career and those who perform to a high standard deserve to be recognised for their contribution to the community and exceptional customer service," Loe continued.

Businesses will be assessed on criteria including customer service, quality of products, staff training initiatives, environmental sustainability and contribution to the community, by 30 judges representing a variety of trade industries.

Eligible businesses must be based in Australia, suit a listed category, be a Trade Retail or Service Business with 40 employees or fewer* or a Trade Manufacturing Business with 100 employees or fewer*.

Entries are now open, closing on 27 July, with finalists set to be announced on 16 August.

For more information, visit: www.tradesbusinesschampions.com.au.

* Eligibility is based on the number of equivalent full-time positions within the business. (80 staff who work half a week each, is equal to 40 full-time positions.)

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RISE IN POWERLINE SHOCKS PROMPTS AWARENESS CAMPAIGN

Energy Safe Victoria (ESV) has launched a campaign to increase awareness of the risks of working near powerlines, following a significant rise in incidents of this nature.

The Look up and Live campaign highlights the dangers of vehicles, such as tipper trucks, cranes and tractors, operating too close to powerlines — something that can lead to electrical shock or fatal electrocution.

ESV recorded that incidents had risen from 214 in 2021 to 260 in 2022 — a 21% increase.

The incidents included the death of a man in Malvern East in February 2022, who was electrocuted after making contact with powerlines.

There have already been 48 incidents recorded in January and February this year.

Of the 260 incidents in 2022, 165 involved overhead powerlines. The most common machinery involved excavators, with 88 incidents, followed by hand tools (28), tipper trucks (20) and rubbish trucks (17).

ESV CEO Leanne Hughson said powerline-contact incidents were all avoidable, with most cases caused by distraction, inexperience, tight deadlines, laziness and/or sun glare.

Hughson said the fact that someone had tragically lost their life should be enough for workers to take better care around powerlines.

"Unfortunately, distractions and the need to get things done quickly have unnecessarily cost Victorians their lives in recent years," she said.

"It's so easy to forget that the simple act of looking up, and checking the location of powerlines before you start work, could save your life."

Those operating heavy plant machinery that comes into contact with a powerline should stay inside the vehicle and call for help.

Those outside the vehicle should stay at least eight metres away, as they can still be shocked when approaching the vehicle.

Below are a few simple safety tips to avoid an incident:

- Understand No Go Zones, rules and distances for safety clearances near overhead powerlines.
- Ensure an Energy Safe-registered spotter is on hand when working near overhead powerlines.
- Display Look up and Live stickers on any machinery or equipment that is raised overhead.
- Remember that powerlines are more difficult to see at dawn and dusk and that electricity can jump gaps.
- Be extra aware in rural areas, as overhead powerlines are predominantly single conductor lines that are difficult to see and easy to forget.

For more information, go to https://esv.vic.gov.au/campaigns/look-up-and-live.

CASE STUDY

Turning a roof into a canvas: solar solution for remote sanctuary

When looking for a rooftop solar installation solution for its new microgrid project, South Australia's Arkaroola Wilderness Sanctuary chose S-5!, a US-based company specialising in metal roof attachment solutions. The microgrid has been designed and installed by off-grid specialist Apex Energy in order to securely power the site's scientific and environmental research for decades to come.

Images: Supplied.

Located 600 km north of Adelaide in the northern Flinders Ranges, the 610 km^2 Arkaroola site, which has strong Indigenous significance, was established as a wilderness sanctuary in 1968 by the Sprigg family, who continue to operate it with an emphasis on science, education and conservation. Arkaroola showcases unique wilderness, almost 2 billion years of geological history and world-class dark skies for astronomical observation.

Backed by a $1.3 million grant from the Australian Government, the microgrid project will power the entire location, which also includes a joint US-operated observatory.

The Arkaroola microgrid will be powered in part by a 61.6 kilowatt (peak) rooftop solar system on the sanctuary's Mawson Lodge. In planning and designing the solar system, Apex Energy carefully considered the need for a strong yet lightweight mounting system, which would both protect the aging substructure of the building and be reliable enough to stand the test of time, as future replacement or maintenance at the remote site would carry a high cost. The selection of the S-5! PVKIT rail-less solar mounting system was the obvious solution, cutting installation costs by 25%.

"The S-5! PVKIT offered the perfect solution for the Arkaroola microgrid," said Sean LePoidevin, Project Manager at APEX Energy. "The ability to install this rooftop system without rails meant lower freight costs (a systems savings of 750 kg), maximising the available rooftop space for solar; an easier installation; and ultimately a reliable and better-looking, low-profile rooftop system that blends with the stunning natural landscape."

With 20 accommodation rooms, ensuite bathrooms, kitchenettes, TVs and reverse-cycle air-conditioning units, Mawson Lodge's total power consumption can be considerable both during the winter peak season, when temperatures drop to near freezing, and in summer when temperatures can reach up to 40°C. This made it important to make full use of available roof space by including as many panels as possible.

Providing a faster and easier installation than a traditional rail system, the S-5! PVKIT along with the RibBracket attachment turned the roof into a canvas, allowing panels to be installed anywhere on the roofing sheet, not just on roof purlins. The ability to design a landscape-oriented system enabled Apex Energy to maximise the roof space and meant the array could be expanded by 7.3% to an impressive 61.6 kWp of generation capacity.

"Rails are unnecessary on a metal roof," LePoidevin said. "Once you understand how to approach cable management, it really is a more common-sense solution with a multitude of benefits, from protecting the roof to cost savings and simplified logistics and installation. It makes sense from all angles."

The advanced microgrid has a total of four solar arrays with 120 kWh of battery storage and monitoring and control capabilities, which manage loads such as EV charging, air conditioning and hot water heating. The sanctuary had operated since the mid-1960s on diesel power, making it vulnerable to fluctuating fuel prices and road access issues, as well as presenting an ethical conflict for this conservation site.

"Being so remote, we have to generate our own electricity, and we've been doing that based on diesel fuel," said Doug Sprigg, sanctuary owner. "Arkaroola's about conservation; we really should be trying harder to move away from diesel, and that's what we're doing."

The Arkaroola microgrid will add another element to the sanctuary's education experiences, teaching visitors about remote energy technology and engineering through a display kiosk planned for the site.

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UNDERGROUND POWER ROLLS OUT IN DARWIN

Nakara, Wagaman and Larrakeyah are set to be the first of Darwin's northern suburbs to have their high-voltage overhead infrastructure powerlines undergrounded.

The rollout is part of the NT Government's $60 million investment over six years (2022–2028) to underground Darwin's power network.

Thirteen Darwin suburbs will receive underground power in the following order: Nakara, Wagaman, Alawa, Larrakeyah, The Narrows, Fannie Bay, Moil, Jingili, Stuart Park, Coconut Grove, Ludmilla, Parap and The Gardens.

The project will commence with works at Nakara in 2023; works on the final suburbs of Parap and The Gardens are scheduled to commence in 2026–2027. The order of suburbs was decided based on the weighted criteria of outage duration, population density and constructability.

To date, concept designs have been finalised and procurement action has commenced for designs for Nakara, Wagaman, Larrakeyah and Alawa.

"Delivering underground power to Darwin's northern suburbs is important work that will deliver more reliable and safer electricity to residents, schools and the many businesses in the area," said Member for Casuarina Lauren Moss.

"I'm very pleased to see designs completed with the rollout of underground power in the suburbs of Nakara, Wagaman and Alawa imminent."

The projected rollout in Darwin's northern suburbs follows the completion of underground power at eight schools in Darwin, with civil works at the ninth school, St John's College, due to start this month.

The schools with underground power complete are Wagaman Primary School, Nemarluk Special School, Alawa Primary School, Larrakeyah Primary School, Moil Primary School, Jingili Primary School, Parap Primary School and Stuart Park Primary School.

"The Territory Labor government is investing in safer and more reliable electricity across Darwin because we know underground powerlines suffer fewer weather- or vegetation-related outages. Maintaining underground power also costs less and this will have a long-term positive effect," said Minister for Essential Services Selena Uibo.

"The works completed at eight Darwin schools have provided added security and reliability of power supply with the network being more resilient to extreme weather and electrical storms."

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QLD ELECTRICAL SAFETY ACT TO BE OVERHAULED

The Queensland Government is in the process of overhauling its *Electrical Safety Act 2002* in response to the dramatic way electricity use has changed over the past 20 years, with many new technologies and products on the market that could not have been imagined in 2002.

These changes have created new safety risks which need to be managed.

In 2021, the Queensland Government commissioned an independent review of the Act undertaken by Dick Williams.

As part of his comprehensive report into the Act, Williams made a total of 83 recommendations. The recommendations address issues such as the scope of the Act and coverage of emerging energy generation and storage technologies, including solar power and batteries; electric vehicles; hydrogen-based electricity generation; storage technologies; off-grid generation; and regulatory, licensing and supply chain duties reform.

In the time since the final report was provided, the Office of Industrial Relations has undertaken a thorough analysis of which recommendations have regulatory or financial impacts to business, community and government.

The government is releasing the report and asking for feedback from all Queenslanders including through a targeted discussion paper on three key issues from the report as well as general feedback on all issues raised. This feedback will determine what changes will be made to the Act.

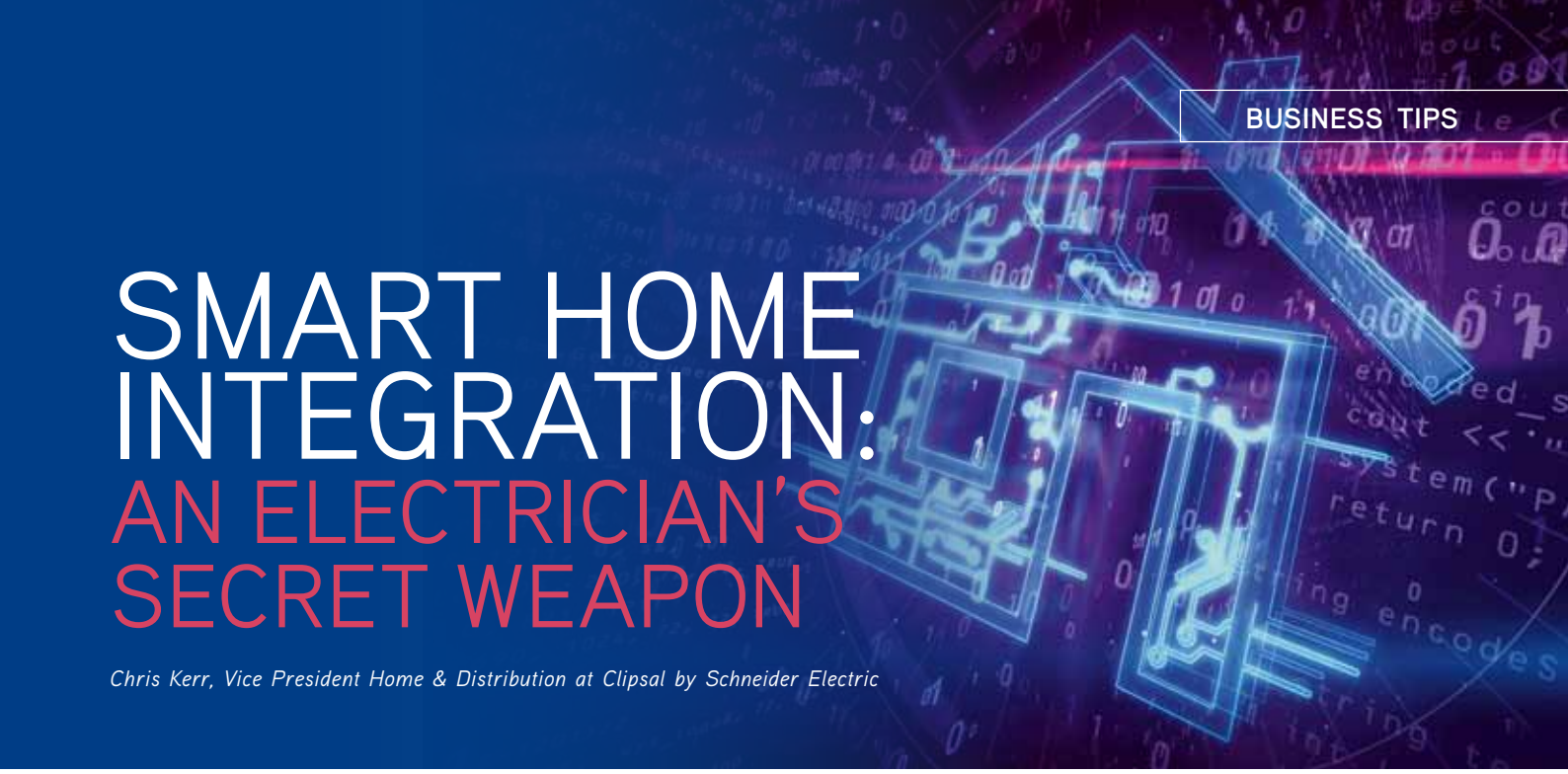
"The Palaszczuk government wants to ensure this Act is fit for purpose and keeps pace with changes in technology — that's why we want Queenslanders to have their say," said Minister for Industrial Relations Grace Grace.

"We know how much technology and electricity use has changed since 2002 and that's why we commissioned a review of the Act," she said.

"The key issues in the discussion paper include: the electrical safety considerations of new and emerging technologies; the changing landscape of electricity and the workforce; and electrical safety and electric vehicles."

Queenslanders can give their feedback on the discussion paper up until 27 June 2023, while feedback on all other issues will be open through to 15 August 2023.

For more information, visit: https://www.oir.qld.gov.au/public-consultation/electrical-safety-act-2002-review.



SMART HOME INTEGRATION: AN ELECTRICIAN'S SECRET WEAPON

Chris Kerr, Vice President Home & Distribution at Clipsal by Schneider Electric

Smart technology is on the rise in Australia, and when you look at the potential lifestyle benefits, it's not hard to see why people are making the switch. The scalability of smart home products means homeowners have the flexibility to adapt their home to their evolving needs and meet their energy saving goals.

With the 'tech savvy' among us investing in smart home automation for some time, technology is now more accessible and affordable for more Australians.

While the convenience of smart technology and new, affordable alternatives to extensive systems such as SpaceLogic C-Bus have driven more interest, there still remains a disconnect between the idea and reality of having a smart home.

A 2023 survey conducted by Telsyte shows that Australian households are expected to have an average of 33 connected smart home devices by 2026.[1] So while it is clear that Australians are beginning to adopt smart technology, the survey found that around half a million consumers only started their smart home journey during the past 12 months, which could open up further revenue for electricians throughout 2023 and into next year.

There is also an increasing need for affordable and accessible smart home technologies that are good for the environment and can be easily installed without extensive rewiring of a home. As technology diversifies and affordability of smart devices improves, this opens a potentially huge untapped market for electricians to offer a whole-of-home solution.

Obstacles for deployment of smart home technologies

Smart technology brands and manufacturers recognise the key role that electricians play in homeowners' adoption. Previously, these high-end home control systems were unaffordable and therefore out of reach for most Australian homeowners. Today, adoption is set to ramp up with the availability of affordable and scalable home automation systems, such as Clipsal Wiser Smart Home, giving all Australians the opportunity to contribute to and benefit from sustainable living by putting homeowners in control of their energy usage.

The convenience of smart technology is a key factor in its growing popularity; however, not all Australians have the knowledge to implement the technology. Telsyte found that 41% of Australian households need help to set up internet-connected devices.[2] It's clear that while knowing about smart technology is one thing, deploying it is another matter altogether. This points to a significant business opportunity for electricians who are now in a stronger position to grow their business by offering the latest digital solutions and services.

However, as important as it is for electricians to educate Australians on these digital home offerings, smart technology manufacturers must also recognise the key role electricians play in homeowner adoption.

Upskilling to meet the needs of consumers

To support trade partners and ensure electricians can assist Australians with all electrical enquiries, including smart homes, companies should continue to offer training and certification programs designed to make electricians the go-to for all solutions. Through these programs electricians can acquire design, installation and repair skills for digital deployments, setting themselves apart while also increasing their own skill sets.

Alongside an electrician's ability to upgrade their skills, they are in a unique position to assist homeowners with electric home design, providing an additional service that contributes to an overall enjoyment of their homes.

Consumers can now start small with a single device and upgrade their systems progressively based on their individual needs. This approach to smart home integration benefits electricians greatly with the cost of basic installation remaining low. The interoperability of smart technology facilitates expansion as demand rises; then, as customers progress to more advanced systems, the electrician's margins will likely increase.

A smart business move

The rise of smart technology and digitisation is creating exciting opportunities for Australian electricians to have more profitable businesses, while expanding their own technical knowledge. With Australian homes in varying stages of automation, electricians should be leveraging the scalability of products like Clipsal Wiser to ensure homeowners have everything they need to set their homes up for convenience, lifestyle and environmental benefits.

Smart home installation is a relatively untapped market in Australia and electricians across the country are set to play an increasingly important role in convincing homeowners to invest in scalable systems. This is a real business opportunity for the electricians of the future who are ready to upskill.

Visit https://www.clipsal.com/wiser/electrician for more information.

1, 2. https://www.telsyte.com.au/announcements/2022/11/8/matter-to-drive-smart-home-boom-despite-economic-headwinds

Schneider
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USING COLOUR TO PROTECT ELECTRIC GRIDS

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Inspired by a mysterious human sensory condition, an Oak Ridge National Laboratory (ORNL) researcher has invented a new way to hide sensitive electric grid information from cyber attack: within a constantly changing colour palette.

Peter Fuhr, who heads the Grid Communications and Security group at ORNL, was intrigued by synaesthesia. This lifelong condition causes some people to experience one sense through another, such as perceiving sounds as colours. Fuhr applied this concept to encrypting the 'language' of grid management software into colours.

Utilities use a computerised system for gathering and analysing real-time data to monitor and control equipment. That system communicates with hardware using strings of letters. With the ORNL approach, these letters can be translated into colour combinations displayed as bars, wheels or swirls. The colour patterns in turn are faded beneath another image, such as a colourful pointillist painting, or hidden between the frames of a video feed. The decoding key rotates with each sensor reading. It changes based on the Fibonacci Sequence, in which each subsequent number is derived by adding the two previous numbers.

Fuhr said the innovative approach has already drawn attention from private companies interested in licensing. The concept was tested in the field for six months using a secure link between ORNL and the public utility EPB of Chattanooga. The encoded colours are transferred using communication links among video cameras at EPB's electrical substations.

Image Credit: ORNL/U.S. Dept. of Energy.

ORNL researchers encoded grid hardware operating data into a colour band hidden inside photographs, video or artwork, as shown in this photo. The visual can then be transmitted to a utility's control centre for decoding.

> **WHAT MAKES CYBERSECURITY SO MUCH MORE CRITICAL IS THAT IF SOMEBODY CAN GET ACCESS TO THE SECURE NETWORK THAT OPERATES UTILITY EQUIPMENT, IT WOULD BE AS IF THEY'D BROKEN INTO ALL THE SUBSTATIONS AT ONCE. – JIM GLASS**

"It's not travelling the IT or operating network, which makes it even harder for bad actors to find," Fuhr said. "And it's on the video so briefly, it's just subliminal." The conscious mind doesn't register the image.

A central machine receives this sensor data about temperature, pressure, voltage, current and electromagnetic fields, then decodes it automatically. Anything suspicious will immediately alert the utility's central equipment control system.

To crack the colour code, Fuhr said, an attacker would have to locate the colour bar, know the equipment's protocol language and the sensor's IP address, and rapidly guess the right colour — or letter — combination at the correct point in the Fibonacci sequence.

These layered defences are important for utilities because remote tampering with substation equipment can quickly destabilise the power supply. For example, spoofing a thermal sensor to report a very low temperature might cause fans to shut off. That could cause overheated equipment to fail, triggering a blackout.

More than 100 attacks or incidents of suspicious activity were reported in 2022 at substations across the US. Although many were physical attacks on equipment, the 70% increase in their frequency has raised public concern and led utilities and elected officials to focus on the broader threat posed by cyber sabotage.

Jim Glass, senior manager for smart grid development at EPB, said it was vital for utilities to have a toolbox of cybersecurity approaches. "What makes cybersecurity so much more critical is that if somebody can get access to the secure network that operates utility equipment, it would be as if they'd broken into all the substations at once," he said. That's compounded by multiplying points of access to the system: sensors and digital equipment on power poles, smart meters — even smart home technology that utilities may be able to directly control.

Glass said Fuhr's invention is helpful because it could be combined with a variety of other types of security coding. "And it doesn't matter what the communication method is. You could secure or hide the data this way to make it very difficult for someone to intercept," Glass said.

Oak Ridge National Laboratory
https://www.ornl.gov/

Delta Product Launch

IPD and Delta Electronics Australia have partnered to deliver high-performing, reliable, uninterruptible power supplies to the Australian electrical market. The range is suitable for applications from 1.5 kVA to 4 MVA, providing the ultimate solution for your business. We help to provide you with peace of mind about your system's continuity and improve the total cost of ownership with this energy efficient solution.

A little bit about us

IPD is an ASX-listed company with over 70 years of experience delivering high-class electrical products to the Australian electrical market by powering, automating, and connecting industries. Delta Electronics is a renowned global leading technology manufacturer for UPS and is committed to providing innovative, clean, and energy-efficient solutions.

What is an Uninterruptible Power Supply (UPS)

Uninterruptible power supply (UPS), also known as a battery backup, offers reliable protection against power surges, power failures, frequency variation, under-voltage or over-voltage, harmonic distortion, and line noise.

Depending on the UPS device, when the UPS system is activated, it will switch to DC battery power and then inverts it to AC power to run the connected equipment for a period to allow for the safe shutdown of the connected equipment.

Line interactive UPS, the innovative technology, will correct minor power fluctuations without switching to the battery. Instead, it will utilise the autotransformer to regulate the power.

A double-conversion UPS has the technology to provide consistent and near-perfect power regardless of the condition of the incoming power by converting the incoming AC power to DC and then back to AC. This type of UPS will operate on isolated DC power and have zero transfer time as it never needs to switch to DC power.

Regular maintenance and battery tests should be completed on your UPS system to ensure it performs at its best.

Introducing the product range

IPD & Delta's range of industrial UPS systems spans across four product families, utilising different technology suitable for various applications offering reliability, flexibility, and reduced downtime for your operations. Delta UPS systems are compliant with IEC and are ISO certified.

Monitoring and management of your Delta UPS could not be more straightforward, with various communication interfaces, including USB, RS-232 and RS-485 ports, mini slot and REPO/ROO for remote management via innovative UPS management software to keep monitoring the stats and provide valuable information on the performance of the system.

Agilon

The Agilon is a single-phase UPS for applications under 1.5 kVA. It includes an integrated AVR stabilising output voltage, surge protection, and advanced communication capabilities. This product uses a microprocessor control to enable the accurate detection of power frequency at all times. The Agilon has standard USB communication ports enhancing the monitoring and manageability of the unit. This UPS family system is suitable for small and home office applications, including PCs, POS, fax machines and monitors.

Amplon

The Amplon family comprises of three products that will provide reliable protection for applications that are 1 kVa or higher. These products are available in single and three phase with a range of communication interfaces, including USB port, RS-232, mini slot, surge protection and REPO for enhanced monitoring and flexibility with an output factor of 0.9 and AVR efficiency of up to 96.5%, the Amplon family provides a versatile solution for your application while lowering your total cost of ownership. The Amplon is the optimum solution for security systems, network servers, ATMs, schools, etc.

Ultron

The Ultron UPS is a three-phase on-line UPS for 10 kVA or higher applications that combines reliable protection, cost-effective power, a compact design, and high-level performance for your small to medium-sized data centre and critical power backups. The Ultron has high AC-AC efficiency of over 96%, and in ECO mode, this increases to 99%. Additionally, it has a low input harmonic distortion of iTHD <2% that is highly compatible with upstream UPS power without additional filter or generator requirements. Its user-friendly interface, flexibility, and state-of-the-art communications make it the leading global UPS product in the market. The Ultron is the perfect solution for hospitals, media broadcasting, utilities, and manufacturing plants.

Modulon

Modulon family is a three-phase modular UPS system for power rating requirements above 15 kVA, providing power protection for critical infrastructure such as data centres and medium to large network equipment and is fully customisable to meet the requirements of your application. The DPH series within the Modulon family is a highly efficient UPS with the highest energy density within the global market. It is a fully rated power system with a self-synchronised power and control module that supports dual input through its vertical expansion offering.

Why should I purchase a UPS from IPD?

IPD's new range of UPSs from Delta Electronics Australia are the most reliable in the global market and with a diverse range to suit all applications from 1.5 kVA to 4 MVA. To purchase your next UPS, visit your local electrical wholesaler or contact us at customerservice@ipd.com.au or 1300 556 601.

For more information on IPD's range of UPSs, visit https://www.ipd.com.au/delta-ups.

www.ipd.com.au

Connectors

Time-efficient yet highly secured, HARTING's Han-Modular Push-In connection technology is a further development of the cage clamp connection with an additional field connection method.

Focusing on the speedy assembly of connectors with consistent quality and robustness, this technology caters to customers across a variety of market segments with differing requirements. By implementing the 'plug and play' assembly process, HARTING's Push-In technology eliminates human error and reduces assembly time. This termination technology is toolless, subtracting any additional preparation, thus saving time and resources. Aside from the ease of handling with this technology, its highly flexible character makes it suitable for ferrules, stranded wires and solid conductors. In addition, HARTING's Push-In technology is compatible with identical products with other termination technologies.

HARTING's virgin OCP-compliant AC connector, Han ORV3, is also available as complete power shelf v3 rack cable assemblies, providing data centres with an increase in productivity and efficiency through a reduction in complexity of the infrastructure.

Highly flexible yet meeting standard requirements, the Han ORV3 is time-efficient with the fast configuration of pre-assembled cabling solutions for power distribution of different current and voltage requirements. In addition, the Han ORV3 consists of different termination technologies (PCB and Crimp), increasing its flexibility during installation. Aside from its flexible characteristic, the Han ORV3 is also easy to maintain, yet safe to install with the use of electric shock-protected contacts, as well as space saving compared to traditional rack system solutions.

HARTING Pty Ltd
www.harting.com.au

Handheld indicator and data logger

Designed for measurement spot-checking and field calibration, the Indigo80 handheld device allows a high level of measurement performance for dewpoint, carbon dioxide, humidity, temperature, hydrogen peroxide vapour and moisture in oil.

Features include dual-probe support with the ability to measure multiple parameters simultaneously; advanced diagnostics and data logging (up to a month of data); and a menu-based user interface with graphic and numerical display. Available in 10 languages, it has a standard USB-C interface for data uploads and battery charging, and a durable aluminium body resistant to chemicals and dust.

Download the spot-checking and field calibration eGuide to learn about spot-checking and onsite calibration procedures, along with best practices for accurate and meaningful measurements. The articles in this guide provide a framework for measurement practices that improve processes and end-product quality.

Vaisala Pty Ltd
www.vaisala.com

Connectors for 10K mating cycles

Machine interfaces and system components that are connected and disconnected several times a day require high-performance connectors as frequent mating cycles are the norm.

For such conditions Treotham offers ILME's RSH and RDSH inserts, designed to maximise ease of use and minimise maintenance downtime. These inserts combine the special gold plating and lubrication features typical of the HNM (High Number of Matings) series with the benefits of the ILME proprietary SQUICH technology: toolless connection, fast wiring, high resistance to vibrations.

Key characteristics include special contacts with galvanic high-performance gold plating for 10,000 mating cycles; RSH inserts with 6, 10, 16, or 24 poles and ratings of 16 A, 500 V and 6 kV; RDSH inserts with the highest contact density of 9, 18, 27 or 42 poles and ratings of 10 A, 400 V and 6 kV; and probing points for multimeter measurements on each contact as well as an additional coding system (RDSH only).

Treotham Automation Pty Ltd
www.treotham.com.au

Q&A WITH CRAIG CHAPMAN:

KEEPING SMART BUILDINGS SAFE

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To gain an understanding of some of the security issues faced by the smart buildings sector, *ECD* spoke to Craig Chapman, Chairperson at the KNX National Group Australia.

What are the biggest security threats to smart buildings at the moment?

The biggest threat from a security perspective comes from homes and buildings that are directly connected to the public internet. A physical attack upon a home or building is much more of a challenge for any hacker, as opposed to sitting at their desk and performing a cyber attack against homes/buildings from a computer that is directly connected to the public internet.

Even with unsecured wireless communications inside a home/building, a hacker would need to be within the geographic vicinity in order to be able to eavesdrop on the installation, or to try to hack into and attack it.

An obvious exception to the above is public buildings, such as hotels, schools, hospitals, shopping malls, etc, where it is really important within all publicly accessible areas for sensitive infrastructure and network equipment to be kept under lock and key (eg, within a locked distribution board and/or a locked room or cabinet).

Nowadays, a lot of smart home/building networks and systems utilise a cloud connection for various remote access functions and connectivity. So, any communication between the cloud and the physical device network within the home/building is communicated over the public internet and stored within a cloud server. In general, it is always advisable that any communication over the public internet is performed using a VPN (virtual private network), or that data is offered via a web server installed in the home/building which is then accessed by a cloud server with TLS (Transport Layer Security).

iStock.com/sofiana indriani

Are you observing any trends in terms of security threats?

Irrespective of the many and various cyber attack motivations that we are experiencing in Australia (see the below response) and around the world, it is safe to say that cybersecurity within any home or building is absolutely topical for the times that we are living in and vitally important for everyone to consider and preferably address.

Are there any threats particular to an Australian context?

We are all probably familiar with some recent high-profile corporate cyber attacks in Australia, where hackers have accessed and stolen sensitive financial and identification data and even the passwords of customers. There are other instances where entire critical networks or sensitive equipment are taken over and made inaccessible to the network operator/original installer, linked with a ransom request. Most of these are never made public, for fairly obvious reasons. There are further examples where hackers have infiltrated and temporarily taken control of, or inflicted some form of damage on, an installation just for fun, or as some form of vendetta.

While smart tech comes with obvious vulnerabilities, is there also a role the IoT can play in making buildings more secure?

The context of IoT won't suddenly secure buildings against cyber attack.

Even with IoT, it is still paramount that the security protocols in place are observed by everyone involved with the building, including the building occupants. There is no use in having five deadbolts on a door, if an occupant still chooses to leave the door wide open. In other words, the building owner/manager must insist that security protocols and features within networks and products are properly employed by the installer and that strong passwords are utilised, as opposed to leaving networks and equipment in a default password state. This still happens more than anyone would like to admit!

And when a security algorithm is believed to be safe today, this does not necessarily mean that it will still be safe next week, or month, or year. Cybersecurity is a constant battle against weaknesses that get detected by hackers and hence, every system and every product must have a futureproof capability to be updated or upgraded to more modern and robust security measures in the future.

What does the KNX Association bring to the table in terms of mitigating these threats? Is KNX Secure part of this?

At the cradle of the KNX system, back in the 90s, the designers of the KNX system did not pay much attention to cybersecurity. At that time the connection of installations to the public internet was mostly non-existent and the wired installation was safely buried deep into the walls of the smart home or buildings of that time.

However, now that connection to the public internet is standard practice and wireless communication is much more widespread, a cybersecurity focus is an absolute must. In response, KNX extended its system several years back, with the possibility to protect KNX IP (= transmission of KNX messages across IP networks) with KNX IP Secure and KNX Data Secure for securing Twisted Pair and more important KNX Radio Frequency installations. Also with the KNX IoT extension, security has been built in by design, by using security mechanisms that are the work of the KNX Internet Engineering Task Force and will also be used by other smart home systems on the market.

So, in a nutshell: yes, KNX Secure was developed as a direct response and as an obvious next step to the question of cybersecurity for KNX networks and installations.

KNX Association is also taking this one step further by partnering with other Open Standards associations to develop common security standards for interoperability within buildings.

For more information about KNX Secure, visit: https://www.knx.org/knx-en/for-professionals/benefits/knx-secure/index.php.

To find out about how KNX Association is partnering with other Open Standards associations, visit: IP for Commercial Buildings | IP-BLiS (ipblis.org).

KNX National Group Australia
knx.org.au

Modular connector series

HARTING's Han-Eco is a lightweight, high-performance plastic modular connector series, providing a miniaturised solution with the ability to transmit data at fast speeds.

Through testing and analysis, the Han-Eco has been demonstrated to reduce energy consumption of IT equipment as well as reducing voltage losses at data centre units by about 50%. Compared to conventional CEE solutions, HARTING's Han-Eco is a climate-friendly connector supporting the minimisation of transmission losses while increasing power transmission within an area. With less installation space required, a long lifespan and prompt replacement maintenance, this connector enables cost-efficient and time-efficient operations.

HARTING's Han-Eco connectors are corrosion resistant and fire resistant according to UL 94V-0, and suitable in both indoor and outdoor settings.

Aligned with market trends for energy storage systems, HARTING's Han S is a front-mounting solution that is compatible with most battery modules.

Compactly designed with high power transmission, the Han S provides safe, uncomplicated and error-free connections with high flexibility through safe installation via protected locking and coding systems, being shock- and vibration-proof, and possessing different mounting possibilities.

HARTING's Han S is free of lead and halogens, complying with all relevant UL energy storage standards, including the new UL 4128.

Harting (HK) Limited
www.harting.com.au

Industrial power plug

The 4Cabling Phase Isolated Straight Plugs are designed to monitor current safely and easily. The product's 4Cabling patent-pending design (patent application number: 2021901960) isolates the wire within the housing structure, which allows the measurement of the current using a clamp-on meter.

Available in 20 and 32 A options, the Phase Isolated Straight Plugs are suitable for medium to large single-phase and three-phase loads, with an easy cable entry that makes them convenient to use. Features of this quick-assembly product include locking rings to ensure an IP66 rating, impact-resistant and UV-stabilised mouldings, high-quality resins, and premium-grade stainless steel and brass internal mechanisms, designed for reliable operation in harsh conditions. Additionally, the transparent pin surround provides quick and sure location of the plug in the socket and protection of pins.

The 4Cabling Phase Isolated Straight Plug is suitable for data centres or anywhere that power monitoring is required. It comes with a three-year warranty and fast delivery across Australia.

4Cabling Pty Ltd
www.4cabling.com.au

Home energy management system

The Schneider Home energy management solution includes a high-efficiency solar inverter, home battery for green energy storage, smart electrical panel, electric vehicle charger and connected sockets and switches — all controlled by the Schneider Home app.

The Schneider Home system intelligently orchestrates home energy by bringing together utility power, solar, back-up battery and EV charging. Its intelligent features include the ability to: monitor energy consumption by individual appliance, detect and navigate outages, and decide where to prioritise power during an outage to extend available backup power.

The system is modular in design and can be purchased as a full suite or incrementally as homeowners' needs evolve. Recognised by CES as a 2023 Innovation Award Honoree, the complete ecosystem will roll out over the course of 2023.

Schneider
www.clipsal.com

CASE STUDY

How a utility transformed its flood response

iStock.com/ BeyondImages

In a first for the electricity distributor, SA Power Networks has used LiDAR-related technology to respond to an extreme weather-related event. LiDAR (light detection and ranging) uses laser beams to measure distances and create 3D maps of the Earth's surface or objects. The data collected can then be used to create sophisticated modelling.

The utility partnered with leading infrastructure software platform Neara to inform, manage and accelerate its response to the River Murray flood event through digital flood impact modelling.

By utilising Neara's AI-powered modelling capabilities, SA Power Networks completed a report in 15 minutes analysing 21,000 powerline spans within the 341 GL/day flood area. This process would have taken many months to complete through manual business systems and resources.

Neara's 3D modelling allowed SA Power Networks to model impacts on electricity distribution network assets at various flood levels, predicting where and when powerlines may breach clearances or be inundated requiring electricity disconnection. As river levels have returned to normal, the modelling has been used to assist in planning reconnection of supply along the river.

"These digital insights allowed SA Power Networks to optimise our response and remediation efforts to restore power to impacted areas faster than using more traditional methods," said SA Power Networks Strategic Initiative Manager Paul Topping. "This innovative approach, based on digital insights, allowed for the re-energisation of powerlines within five days compared with the originally anticipated three-week time frame."

Topping said the data was also essential in ensuring the safety of community and SA Power Networks workers during the flood event.

"We are particularly proud of the fact that despite the very real risks associated with hundreds of kilometres of powerline and electricity infrastructure standing in floodwaters, we did not have one report of electric shock throughout the extended flood period," he said.

"As the state's main electricity provider, our role in this recent flooding disaster was to act quickly and efficiently to ensure residents remained safe and connected. We did this by adopting a unified approach to conduct network damage analysis, utilising Neara's data insights to change the way our flood response efforts were actioned.

"With Neara we refined the flood modelling process to conduct network damage analysis and reporting in the midst of what was a major environmental emergency. Visually simulating how our assets were behaving under flood conditions helped rapidly accelerate our re-energisation plan and stabilise the network to the benefit of thousands of residents," Topping said.

"Our flood modelling work with SA Power Networks continues to validate our platform as the global innovator for network resiliency in the face of extreme weather events," said Jack Curtis, Neara's Chief Commercial Officer.

"We are proud of the impact that our technology has on both our network customers, but also the communities that rely on them for safe and reliable power delivery. We look forward to further supporting SA Power Networks' efforts to keep communities connected."

Neara

https://neara.com/

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Inductors

The DR series comprises components with inductance ranging from 0.33 μH to 120 mH. The products included in this group exhibit good thermal tolerance (from -40°C to 125°C) and feature magnetic shielding. This makes it possible to use them in compact voltage converters (switching, resonant), which are deployed in a wide range of equipment, eg, computers, servers, LCD panels, consumer electronics and household appliances, as well as mobile devices.

The other application of inductors is noise and interference filters, which enable good operation of digital circuits and efficient communication using popular serial standards (SPI, I2C, etc).

Transfer Multisort Elektronik
www.tme.com/au/en/

Moulded case circuit breakers

Advanced digitalisation and automation are creating new challenges in electrical power distribution. Systems and components must be integration-capable, communicative and completely flexible to reliably protect electrical systems against faults and failures. Powerful components such as SENTRON 3VA moulded case circuit breakers help to provide the necessary safety and flexibility in digital environments.

The 3VA moulded case circuit breakers are accompanied by a large number of accessories, enabling the system to be precisely matched to a project's specific needs.

Highlights include a modular and highly variable system, simple integration into higher-level energy management and automation systems, a highly compact design, and condition monitoring based on forecast remaining service life and the health indicator.

The SENTRON 3VA moulded case circuit breaker is designed to support every stage of the engineering process, from planning to daily operation.

Contact your local APS Industrial representative for more information.

APS Industrial
www.apsindustrial.com.au

Online management system for the electrical industry

Drillcut has launched a 'whole-of-project' online management system for Australia's electrical industry. The system targets improvements to a project's supply chain efficiency, productivity, labour costs and cashflow.

Drillcut 360 enables electrical businesses to manage multiple aspects of a project, from downloading statements, generating quotes and requisition orders, and paying invoices to delivery tracking, intelligent search, learning and documentation.

The online project management system aims to address challenges such as: multiple deliveries; cost of labour; theft and onsite loss; outdated ordering processes; and poor job and workflow processes.

It also features product pages and is backed by a knowledge-sharing, innovation and industry collaboration hub known as DrillClub.

Drillcut
www.drillcut.au

Uninterruptible power supply systems

Providing near instantaneous power protection, UPS systems are designed to supply backup power to critical systems in the event of a power outage or disturbance. Uninterruptible power supplies are essential safeguards for industries to prevent data loss, equipment damage and downtime. IPD offers Delta's wide range of UPS products to suit the needs of different applications, offering protection for small and home offices, small commercial industries, data centres and communication rooms.

The Agilon UPS family provides offline UPSs up to 1500 VA. Devices in the Amplon UPS family offer single-phase online UPSs with power ratings up to 10 kVA. The Ultron UPS range is a three-phase online UPS with power ratings of up to 4000 kVA. Three-phase online modular uninterruptible power supply systems from the Modulon UPS family offer scalability and redundancy in a single frame, with up to 600 kVA.

UPS systems allow operations to remain uninterrupted while reducing energy consumption and operating costs.

IPD Group Limited
www.ipd.com.au

THE NEED FOR SMARTER ENERGY SECURITY

A recent survey of senior professionals at US utility companies has found that energy security tops the list of the "most exciting" areas of smart utility development, ahead of climate-related and disaster management technologies.

Commissioned by Wi-SUN Alliance, a global association of companies driving the adoption of interoperable wireless solutions for use in smart utilities and smart cities, the survey[1] asked more than 250 respondents about changes in the utilities industry, including the most exciting smart/IoT (Internet of Things) technology developments in the next 12 months.

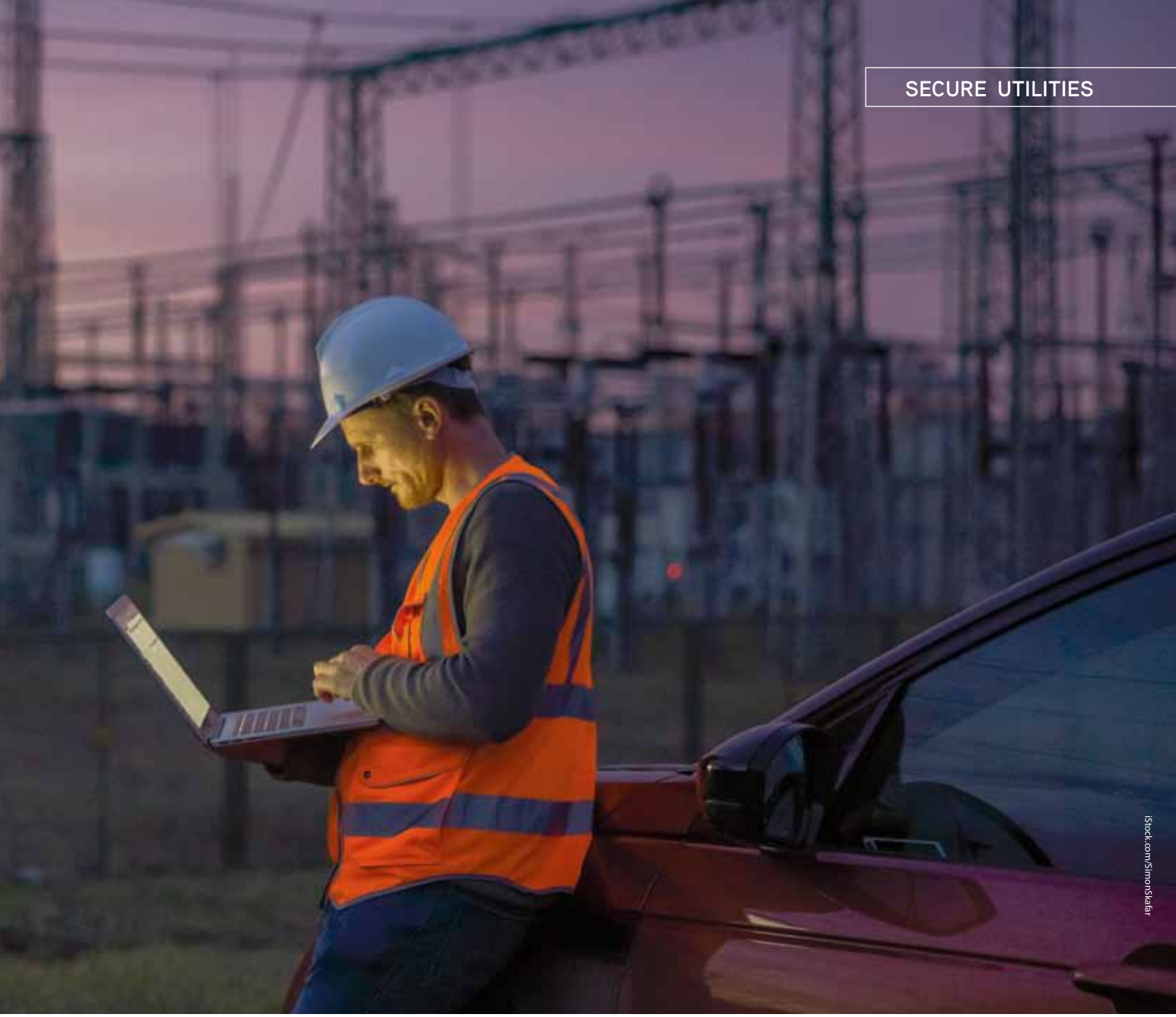
Energy security is seen as "very exciting" for 79% of respondents, more so than the development of smart buildings and infrastructure (75%), weather and climate (73%), and disaster management (69%) systems. This is at a time when concerns are high among policymakers and industry leaders because of major economic and geopolitical turmoil, such as the war in Ukraine, putting energy supplies at risk.

The energy sector is also facing a growing number of cyber attacks, with recent attacks aimed at aging SCADA systems, as well as an increasingly interconnected energy infrastructure that is opening up opportunities for attackers to access systems and disrupt operations. The US Government Accountability Office (GAO) recently noted that "nations and criminal groups pose the most significant cyberthreats to US critical infrastructure, according to the Director of National Intelligence's 2022 Annual Threat Assessment. These threat actors are increasingly capable of attacking the grid."

Jeffrey Tufts, Global Director of Utility Solutions at Cisco, a Wi-SUN Promoter member, said that energy security and particularly cybersecurity were what Cisco was being asked about most right now. "The need to secure energy infrastructure has never been more important and will be an area of significant investment — in terms of pilots and adoption — over the next year or two," he said.

Jeff Scheb, Director of Product Management at Landis+Gyr, a Wi-SUN Promoter member, agreed. "The global rise in cyber attacks means that everything is under scrutiny. As systems become more connected and automated, ensuring security across all network connection points is the first priority during design and implementation."

Scheb added that connectivity with smart buildings and infrastructure is important because "more grid-edge intelligence and connectivity are necessary to manage a dynamic energy distribution system".



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"Ensuring the security of our energy and water distribution networks is a critical factor in utility modernisation that cannot be overlooked," said Ty Roberts, VP of Product Marketing at Itron. "As utilities and cities face a growing risk of cyber attacks, investments in modern, highly secure and standards-based Industrial IoT (IIoT) networks can help safeguard critical infrastructure while providing a scalable platform for future growth."

Additional findings

The survey highlighted the need for "proven security and reliability" for smart utility networks, with 83% of respondents acknowledging that this is "very important", more so than "customer acceptance" (75%), "open standards" (69%) and "multi-vendor interoperability" (69%).

More pilot projects and implementations (75%) and greater cooperation between public and private sectors (72%) are important to help drive development and innovation in the sector, while 70% of respondents believe more government funding/legislation is important.

Almost three-quarters (74%) of survey respondents believe electric vehicle charging will be the biggest focus for utilities when it comes to smart grid deployments in the next 6–11 months. Outage management, advanced metering infrastructure (AMI) and distributed energy resources (DER) are also a priority for utility professionals (71%).

Around three-quarters (74%) of respondents acknowledge that a hybrid of two or more communications networks technologies — including cellular, power line communication, RF mesh and Wi-Fi — will be very important for future smart utility development.

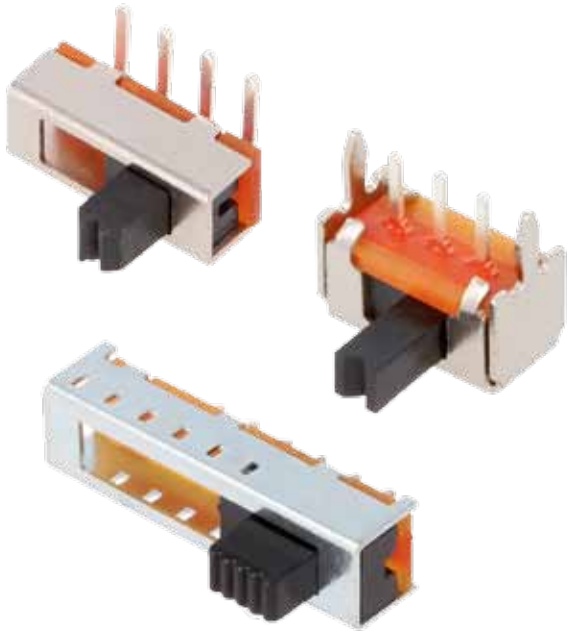
Barriers to IoT adoption

Wi-SUN Alliance's 'Journey to IoT Maturity' report, published in 2022, highlighted security as one of the top three barriers to IoT adoption for around a quarter of senior decision-makers across industries.

Phil Beecher, CEO and President, Wi-SUN Alliance, said: "While this figure was lower than our first report five years earlier, security is still very much a concern. We also saw a rise in concerns over data privacy — understandably, with more legislation around data protection. IoT initiatives are increasingly generating huge volumes of data, and while this information may be made entirely secure by design, risks remain."

1. Censuswide conducted an online survey of 250+ senior decision-makers working in IT, operations and production at US utilities in January 2023, supplemented by interviews at DISTRIBUTECH, an event for utilities, technology providers and industry leaders held in San Diego, California, from 7–9 February 2023.

Wi-SUN Alliance
wi-sun.org



Slide switches

The range of products by Knitter-Switch available in the TME catalogue has been extended to include new slide switches. These are both components designed for mounting on a PCB and screw-on versions. The latter are usually designed to be placed in custom-made slots in enclosures. They come in a wide range of dimensions: from 8 x 9.5 x 5 mm to 25 x 7.7 x 10 mm. Their contact pitch ranges from 2 to 5.08 mm.

Thanks to the wide range of sizes and the large number of operating positions, Knitter-Switch brand products can be applied in most typical settings. Moreover, models with a protective transparent rubber cap covering the front are available — such versions offer an ingress protection rating of IP67.

Transfer Multisort Elektronik

www.tme.com/au/en

Mini LEDs

Brightgreen's mini lights deliver the same illumination and lumen output as their larger siblings, without the bulk of traditional fixtures.

The range offers recessed downlights, surface lights, track lights, pendant lights and more. With the smallest recessed downlight in the range requiring a 30 mm hole (cut-out), the mini lights can fit into tight locations and their accompanying mini dimmable drivers go straight through the cut-out.

Brightgreen has miniaturised its LED chips and next-generation drivers (SAA-certified and RCM-compliant) to fit into these compact fixtures. The MINI Collection has the same Tru-Colour technology as Brightgreen's larger lights — providing 98 CRI, high TM-30 and CCT (correlated colour temperature) designed for a range of spaces.

Brightgreen Pty Ltd

www.brightgreen.com

Low-smoke halogen-free cables

Contractors working on public areas and buildings are now being advised to install materials that are non-hazardous to members of the public in case of fire. Specifiers are now profoundly aware that smoke and poisonous fumes can be a greater risk to lives and property than fire alone.

During a fire, components containing halogen wires and cables emit both smoke and toxic fumes which, when combined with moisture, become hazardous. Up to 80% of all deaths from fire come from inhaling toxic fumes and smoke.

For a cable to offer security during fire, it must pass three tests pertaining to halogen content, low smoke density and flame propagation. LAPP Australia's range of low-smoke halogen-free products is stringently tested to IEC and VDE standards, for the installation of cables in areas where human life or valuable property are exposed to a high risk of fire hazards.

The new ÖLFLEX ranges of low-smoke halogen-free cables and cable systems are designed for facilities ranging from high-rise buildings and public entertainment facilities, spaces and places, through to airports, rail and road terminals, recreational and tourist facilities, stadiums, ports and factories. They are also suited to fire hazard areas of process and production facilities in industries such as mining and energy, oil and gas, bulk handling and food processing, agribusiness, and utilities including water and waste handling.

LAPP Australia Pty Ltd

lappaustralia.com.au

Industrial enclosures

SOLID-BOX, OKW's new two-part robust industrial enclosure, is available from stock in anthracite grey (RAL 7016) and light grey (RAL 7035). Three standard sizes are offered: 135 x 115 x 50 mm, 180 x 145 x 60 mm and 225 x 175 x 70 mm (L x W x H).

A recessed area in the top panel provides a secure location for a membrane keypad, décor foil or product label. The enclosure range is made of high-quality, flame-retardant V0 material (PC+ABS-FR) with an improved heat distortion temperature (Vicat/B 120 = 110°C). To protect the electronics from moisture, dust and dirt, the interior is sealed to IP 66 and IP 67. The sturdy enclosure design also allows increased resistance to impact and shock stress according to IK 08.

The top and bottom parts are securely assembled using rust-proof and captured Torx screws outside the sealed interior. The enclosure assembly screws, as well as the channels for direct wall mounting, are concealed by four snap-on design trims. The bottom part of the enclosure has two deeply recessed surfaces for installing and protecting interfaces and cable connections.

As a wall-mounted and desktop enclosure, the SOLID-BOX is designed for robust electrical and electronic applications, including smart factory automation, IIoT, HVAC, plant and safety engineering, building management systems, and test and measurement. For desktop use, a set of non-slip rubber enclosure feet is also available. To prevent the top part from falling during installation, or in the event of subsequent servicing, SOLID-BOX can be specified with a lid retention device. A hinge set is also available to aid the user if the enclosure has to be opened regularly (both of these items are included in the range of accessories).

Fastening pillars inside the enclosure allow the installation of PCBs, DIN rails and mounting plates. The larger versions also include pre-moulded mounts for VESA standard holders (version 145 for VESA 75 x 75 mm, version 175 for VESA 100 x 100 mm).

ROLEC OKW Australia New Zealand P/L
www.rolec-enclosures.com.au

Waterproof computer

The POC-465AWP is a fanless Neousys PC that was created to address common environmental concerns. The letters AWP stand for accessibility, water resistance and security.

The POC-465AWP's airtight system, which has IP65-rated waterproof protection in a stainless steel and aluminium chassis, inhibits internal PCBA corrosion in environments with high salinity or humidity. The hermetic enclosure is also suitable for filthy or dusty, air-polluted situations like a farm or mining site. The system has a wide working temperature range of -25 to 70°C and a heat dissipation design to reduce thermal throttling.

The POC-465AWP has M12 connectors to allow connection in challenging, shock- and vibration-prone settings. Aside from two separated RS-232 and RS-422/485 connections, the system offers two isolated 2.5 Gigabit Ethernet interfaces. The motherboard is shielded from voltage spikes that could harm internal components thanks to the separated architecture. Also, it contains a VGA, two USB 2.0 ports, an M.2 M key to enable SATA SSDs, as well as a mini-PCIe slot for wireless connectivity like Wi-Fi, LTE, CANbus, etc.

The PC is suitable for outdoor applications like wildfire detection and unmanned vehicles, with an ultra-compact size that fits into small locations.

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

Data connectors

Belden's connectivity portfolio for Ethernet-based and fieldbus protocols offers secure transmission of analog and digital data under challenging environmental conditions. The M8 D-Coded connector products meet the growing need for miniaturised components to support cyber-physical integration in the IIoT. M8 D-Coded connectors are 30% smaller than M12 circular connector products and provide new flexibility to build Ethernet-based data networks in tight spaces.

The field-attachable RJ45 connectors in metal housing with IDC wire connection technology enable uncomplicated assembly without additional installation tools in CAT 6 and CAT 6a variants. The moulded connector types include individual cable lengths. They provide data transmission up to 10 Gbps with good network availability.

Belden Australia Pty Ltd
www.belden.com

Power tool battery cover

BattShell is a hard-wearing power tool accessory, designed to protect and personalise cordless power tool batteries and make them easily identifiable against the generic black appearance of most popular brands. It is made from high-density polycarbonate through custom high-pressure injection moulding.

The first BattShell product release includes sizes for select Makita 18 V and Milwaukee 18 V models, with more battery sizes scheduled for introduction during 2023.

The shells are designed to fit snugly over the power tool battery with strategically placed air vents to disperse heat for safety. The covers are designed to withstand the toughest conditions of construction work, with an industrial-strength capacity to protect batteries from damage.

BattShell is available in over 20 bright, distinctive colours to help tradies quickly identify their batteries on a busy worksite. The product comes with complementary side stickers of varying designs and offers over 400 design combinations. BattShell can accommodate corporate branded or personalised sticker designs for orders of 25 units.

The current BattShell range includes sizes that fit Makita 18 V 3.0, 4.0, 5.0 and 6.0 Ah; and Milwaukee 18 V 4.0 and 5.0 Ah, with 6.0 Ah planned for release soon.

BattShell is Australian designed and manufactured.

BattShell
battshell.com

iStock.com/Maryviolet

HOW ENERGY UPGRADES CAN BOOST HEALTH AT HOME

While it's not a surprise that upgrading homes to make them more energy efficient results in lower household bills, a new study by Sustainability Victoria and UTS has found that even relatively minor adjustments to aging housing stock can also lead to better health and quality of life — particularly for vulnerable Australians.

The study, which involved Sustainability Victoria delivering free retrofits to 1000 households in Melbourne's western suburbs and the Goulburn Valley, is said to be the first in Australia to quantify the broader impacts of such home improvements. It has important policy implications — the upgrades, costing on average $2809, have been found to pay for themselves within three years, thanks to energy and healthcare savings.

Academics from two research groups at UTS — the Centre for Health Economics Research and Evaluation, and the Institute for Sustainable Futures — were engaged by Sustainability Victoria to conduct a three-year trial of two sets of households.

The first set received the upgrades — such as insulation, draught sealing and space heating — before winter, the second after winter. All the participants were on a low income and had a chronic health condition, and most were elderly.

The trial found that temperatures in the first set of homes increased by 0.47°C in the morning, the coldest period of the day, reducing by 43 minutes the time that residents spent in conditions below the World Health Organization's recommended 'healthy winter indoor temperature' of 18°C.

Residents reported feeling warmer and noticed less condensation, meaning less likelihood of damp and mould, and experienced improved mental and physical health, including less breathlessness.

"We also saw improvements around important aspects of quality of life, such as reduced anxiety and increased feelings of safety and comfort," said Rosalie Viney, Director of the Centre for Health Economics Research and Evaluation.

Residents' gas bills over winter dropped by $85 (meaning lower greenhouse gas emissions), and they used fewer medical services than the second group, resulting in an $887 saving to the healthcare system. The study found that the upgrades would save nearly $5000 over 10 years.

One study participant, Heather, told Sustainability Victoria that her family now visited her in winter, thanks to her house being warmer. Another, Carol, said: "If I can keep myself healthy and warm, my anxiety stays away. If I'm mentally okay, then my physical [health] is much better."

"There's an absolutely critical need for Australia to improve the quality of its existing homes," said research lead Kerryn Wilmot, from the Institute for Sustainable Futures. "Nearly half of Australian homes are estimated to have an energy rating of below two stars, compared with the seven stars mandated for new homes. It's crucial that we start overhauling substandard housing stock in Australia — especially for vulnerable members of the community."

Fibre to the antenna modular system

The CONEXIO portfolio from R&M consists of cabinets, dividers, cable head terminals and connectivity technology for Fibre to the Antenna (FTTA), Power to the Antenna (PTTA) and Hybrid to the Antenna (HTTA). CONEXIO is designed as a modular system.

For its HEC outdoor connectors, R&M uses quick mounting technology with a quarter-turn fastener and quick-release mechanism. The connectors can be coupled blindly and without any special knowledge, simplifying the connection of fibre-optic cables to mobile communication masts. HEC connectors are also suitable for connections in FTTH aerial deployment.

R&M

www.rdm.com/solutions/public-networks

5G RedCap modules

The Rx255C series is a range of 5G RedCap (Reduced Capability, also known as NR-Light) modules from Quectel Wireless Solutions.

Based on the Snapdragon X35 5G Modem-RF System from Qualcomm Technologies, Inc., the new modules feature good wireless performance and low latency communication with 5G. They are designed to help drive the reach of 5G technology into a variety of business applications and mobile broadband scenarios, such as entry-level broadband, compute, industrial automation, smart city, smart energy and smart wearables.

Meeting the 3GPP Release 17 standards, the Rx255C series supports 5G standalone (SA) mode and a maximum bandwidth of 20 MHz on the sub-6 GHz frequency band. Targeting all markets worldwide, the 5G RedCap modules are backward compatible with LTE networks and cover nearly all the mainstream carriers worldwide. They provide a theoretical peak downlink data rate of around 220 Mbps and uplink data rate of around 100 Mbps, sufficient to meet the demand for data speeds in IoT applications such as robotics, DTUs (database transaction units), drones, smart ports, smart grid, AR/VR wearables and educational laptops.

The Rx255C series supports L1+L5 dual frequency GNSS. It also provides a wide range of interfaces such as PCIe 2.0, USB 2.0 and supplementary functions including VoLTE (Voice over LTE) and DFOTA (delta firmware upgrade over the air).

Quectel

www.quectel.com

Voltage attenuator

ICP DAS's DNM-848VI series voltage input attenuator is designed for measuring high voltage in industrial settings. The device can attenuate input voltages of up to ±10 V / ±80 V / ±150 V down to ±10 V.

The DNM-848VI series voltage input attenuator also features 3000 VDC intra-module isolation and 3000 VDC channel-to-channel isolation, reducing noise interference. This makes it suitable for a wide range of industrial applications, from power generation to transportation systems. It is compatible with a variety of analog input modules, allowing it to integrate with existing industrial automation systems to facilitate data collection and analysis.

ICP Electronics Australia Pty Ltd

www.icp-australia.com.au

Supporting grid resilience in Victoria

Victoria has secured the help of grid resilience technology company Reactive Technologies (Reactive) in order to ready its grid for the state's energy transition.

Reactive has secured AU$1.43 million from the Australian Renewable Energy Agency (ARENA) for a trial project to provide real-time, accurate grid inertia measurements. The Victorian Government's Department of Energy, Environment and Climate Action (DEECA) also provided funds for the project.

With two-thirds of its coal-powered stations expected to close by 2040, Australia needs accurate grid inertia measurements in order to connect more renewables to its grid. Grid inertia — the ability of generators to maintain a steady power supply in the face of disruptions — becomes harder to track and measure with legacy tools as more renewable generators are added to a grid. To meet this challenge on grids around the world, Reactive's GridMetrix tool provides new levels of visibility into grid functions, replacing estimates and modelling of inertia and enabling operators to predict and plan for guaranteed sources of inertia to keep the power grid stable.

Reactive secured the funding for the project through ARENA's Advancing Renewables Program, which supports initiatives that optimise the transition to renewable energy. The trial will be deployed with the Australian Energy Market Operator (AEMO) and supported by DEECA, Melbourne Energy Institute (University of Melbourne) and French renewable energy company Neoen.

The trial will operate over a range of conditions including high solar, high wind and high demand periods across Victoria. Neoen's Victorian Big Battery, a utility-scale energy storage installation, will send a small signal into the grid that Reactive's Extensible Measurement Units (XMUs) will measure. Following the XMUs' measurement of the signal, Reactive's patented GridMetrix software will analyse the data and allow AEMO to view inertia values in real time on the GridMetrix dashboard.

"We are proud to have earned this funding from ARENA, and we are eager to show how powerful our technology is when it comes to facilitating a swift and smooth transition to net zero carbon grids without sacrificing reliability or resilience," said Marc Borrett, CEO of Reactive Technologies.

"Australia is one of many countries around the world that is taking admirable steps toward accelerating their energy transition and have rightly identified measurement of inertia as a crucial component of that transition. We applaud the roles the federal and Victorian governments are playing in this project and look forward to deepening our collaboration with ARENA and other Australian government agencies as we begin our work."

"Continuous measurement of inertia will become highly valuable as it will allow less conservative grid operation and ultimately the ability to accommodate more non-synchronous generation such as solar and wind," said Darren Miller, CEO of ARENA. "Reactive Technologies' measurement tools could change the way the NEM is managed. With real-time data available to AEMO, they could also then optimise customer-side generation, which has been proven to contribute as much as 30% of total inertia to the National Grid in the United Kingdom."

Reactive Technologies was founded in Finland and the UK and has deployed its technology in the UK, Japan, Italy and New Zealand. The company expanded to North America in 2022.

Reactive said it gives utilities and grid operators critical intel for maintaining resilience as they add renewables and DERs (distributed energy resources) and will continue its global expansion as more countries move to accelerate the transition to a zero-carbon power grid.

Q&A WITH LOUISE MONGER:

THE RAPID EVOLUTION OF BUILDING SECURITY

In this interview, Louise Monger, Vice President of Digital Buildings, Australia at Schneider Electric, discusses the many vulnerabilities of automated buildings — and what can be done to protect them.

What are the biggest security issues you are seeing in the building automation industry right now?

One of the biggest security risks facing building managers and their tenants right now is data breaches. Encouragingly, we are seeing new laws implemented to hold large organisations accountable for the way they handle personal information. Yet many organisations are struggling to implement efficient and secure systems.

While laws like the GDPR (General Data Protection Regulation) only apply to Europe, the regulation is applicable to anyone processing data for European citizens.

To meet these regulations, organisations are resorting to outdated methods of handling and processing personal information, due to a lack of support for secure integration between systems. For example, passing employee information around on spreadsheets in order to integrate the security systems has become a norm in the industry. It's safe to say this is not best practice.

Concern for the handling of personal information and potential data breaches is exacerbated by the fact we're seeing an increase in cyber attacks, both in terms of their frequency and sophistication. Criminals are now using advanced techniques like artificial intelligence, machine learning and automation to carry out targeted attacks, resulting in data breaches, ransomware incidents and, in many cases, huge financial losses.

This is only set to get worse with the proliferation of new tech, which is expanding the attack surface from the growing connectivity of devices and systems. For example, the Internet of Things (IoT), cloud computing, mobile devices and interconnected networks have introduced new avenues for attackers to exploit.

Against this backdrop of increased regulations, data breaches, sophisticated cyber attacks and new technology, it's imperative that industry leaders take action on their security solutions. It's never been more important to consider technology and software partners that can develop tailored solutions for end-to-end cybersecurity.

Has the security landscape changed in recent years? If so, what changes have you observed?

The security landscape has undergone significant changes in recent years and continues to evolve quickly where new threats are emerging.

From increased frequency and sophistication of cyber attacks, through to AI-powered security solutions, there have been various large-scale changes to the landscape in the past few years that have completely reshaped the industry.

> REGULAR MAINTENANCE, UPDATES AND MONITORING ARE CRUCIAL TO ENSURING THE CONTINUED EFFECTIVENESS AND RELIABILITY OF AUTOMATED SECURITY SYSTEMS. – LOUISE MONGER

Aside from AI and increased sophistication of cyber attacks, there are four other huge changes to consider:

1. Supply chain security

Firstly, there is an increased emphasis on securing the software supply chain. Cybercriminals recognise the potential vulnerabilities in the supply chain and target software updates, third-party components and dependencies to infiltrate systems. Incidents like the SolarWinds attack [the hack on a software company that affected thousands of organisations, including the US Government] have highlighted the risks associated with compromised supply chains. This major cyber attack incident in the past two years opened the industry's eyes to threat actors constantly adapting new strategies as they learn more information.

2. Regulatory changes and data privacy

Governments and regulatory bodies worldwide have implemented or strengthened data privacy and protection regulations. Organisations now face more stringent requirements in handling and safeguarding personal data. For example, the rapid popularity of ChatGPT also made way for conversation around its threats and a review of laws to make AI work in our favour to protect critical infrastructure.

3. Shift to cloud and hybrid environments

The adoption of cloud computing and hybrid environments has introduced new security challenges. Securing data stored in the cloud, managing access controls and ensuring compliance with regulations require specific security measures and expertise.

4. Evolving threats to critical infrastructure

Finally, there is increased recognition of the vulnerability of critical infrastructure systems, such as power grids, transportation networks and healthcare systems, to cyber attacks. Sophisticated threat actors and nation-state adversaries are targeting these systems, raising concerns about potential disruptions and cascading effects.

Overall, there is a growing awareness of cybersecurity risks across industries and society. Organisations are investing more in cybersecurity measures, threat intelligence sharing and collaboration with industry peers, government agencies and cybersecurity communities to better understand and address emerging threats.

Can automation make buildings more secure?

Automation is key to making buildings more secure. Although it's important to note that while automation can enhance security, it should be implemented alongside robust cybersecurity measures to mitigate potential risks associated with interconnected systems. Regular maintenance, updates and monitoring are crucial to ensuring the continued effectiveness and reliability of automated security systems.

There are various benefits for building automation but there are three core tools to focus on:

Firstly, automation can be utilised for advanced access control systems that enhance building security. This includes the use of electronic access cards, biometric authentication and facial recognition to control entry to restricted areas. Automated systems can track and monitor access events in real time, providing detailed audit trails and alerts for unauthorised access attempts.

Automation is also integral to building security through alarm and intrusion detection. Automated alarm systems can be integrated with various sensors, such as motion detectors, door/window sensors and glass break detectors. These sensors can trigger alarms and activate response protocols when unauthorised access or suspicious activities are detected. At Schneider, our access control system covers the alarm system and intrusion detection, minimising the risk of breaches or intrusions going unnoticed.

Finally, automation can facilitate incident reporting and security analytics by automating the collection, aggregation and analysis of security-related data. By leveraging data visualisation tools, security teams can gain insights into patterns, trends and potential vulnerabilities. This enables proactive security measures and decision-making based on data-driven intelligence.

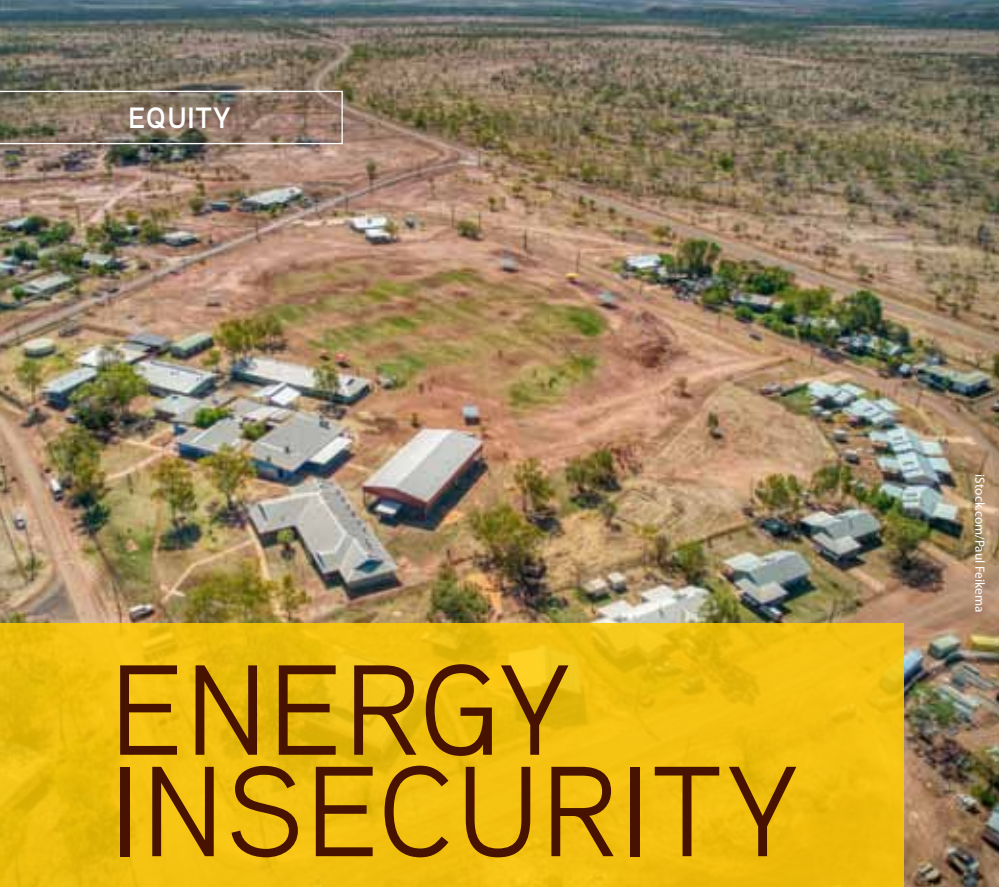
Does the choice of lighting system have an impact on a building's security?

The choice of lighting systems can have a huge impact on a building's security. This is due to the fact it helps to remove basic problem areas. For example, alerting residents to unknown 'unlocked' doors which can then be fixed by security experts. Good lighting in public areas of a precinct leading to a building also reduces crime opportunities, particularly for anyone coming to or leaving an office space.

Lighting can also help in conjunction with security monitoring of public parks under buildings, further increasing user safety confidence.

Schneider Electric
www.se.com/au

Louise Monger is Vice President of Digital Buildings, Australia at Schneider Electric and a member of the executive zone Pacific team. With over two decades of experience in electricity and real estate tech, she brings a high level of commercial, operational and technology expertise to Schneider. A respected thought leader in the real estate technology industry, she has spoken on many panels both domestically and internationally and is also a known voice on diversity and inclusion in the industry.



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ENERGY INSECURITY IS A PRESSING ISSUE FOR REMOTE AUSTRALIA

Recent research from the Australian National University (ANU) has found that at the height of the COVID-19 pandemic, residents of remote Indigenous communities who prepay for access to electricity were hit especially hard, experiencing unrelenting energy insecurity.

While most Australians were protected from disconnection during the pandemic, these protections largely overlooked or were ineffective for more than 10,000 households in remote or regional communities that elect or are mandated to use the prepay system, according to the study's co-author, Dr Simon Quilty.

"This group continued to be disconnected from energy services at rates similar to that experienced before the pandemic, even as they were instructed by authorities to socially distance and isolate at home," Quilty said.

"Our paper shows disconnection for non-payment persisted even as case numbers increased during the hot summer months, when extreme heat amplifies disconnection rates."

According to the researchers, regular disconnection for prepay customers is an issue that has been long overlooked — the pandemic served to compound the problem.

"This contributed to a lack of visibility of energy insecurity and available protections for this already vulnerable group during the pandemic," said lead author Brad Riley from the ANU Centre for Aboriginal Economic Policy Research.

"Now that remedial measures have come to an end, there is a need to think carefully about why prepay customers were, and continue to be, treated differently in relation to available protections.

"Those most disadvantaged during COVID-19 were in many cases the same households who were experiencing energy insecurity prior to the pandemic."

Quilty added that COVID-19 has magnified pre-existing health and socio-economic inequities.

"There is a need to pay closer attention to the rationales of energy policy exceptionalism if we are to mitigate energy insecurity among specific groups, such as Indigenous Australian prepay customers, including during times of crisis," he said.

"Equity concerns must be front and centre in the energy transition, especially as First Nations are among those who are most impacted by climate change."

The research has been published in *Energy Research and Social Science*.

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