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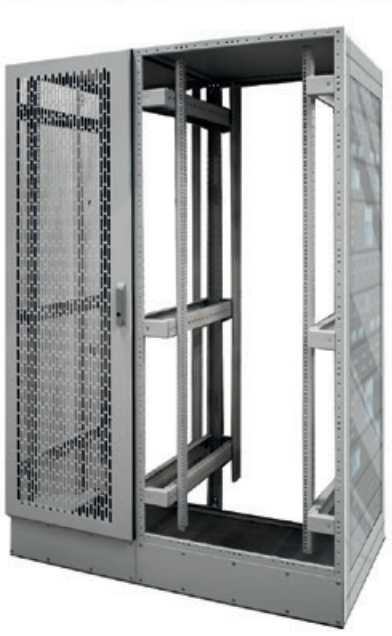

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CONTENTS

Electrical Review

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EDITOR'S COMMENT

Although Christmas has been lurking in the background since about September, it's now certainly in full unbridled swing. You can smell the mulled wine and almost taste the cheeseboard. Go to any main city centre and you can enjoy a bratwurst (and maybe some churros), whilst shuffling along at a snail's pace among a crowd of equally frustrated people, all in the name of festive cheer. It really is the most wonderful time of the year.

But although 'tis the season to be stressy, I urge everyone not to get bogged down in the commercial machine that is the festive period and try to focus on what matters. Time spent with family, friends and of course eating your body weight in Quality Street. And considering we have yet to reach the gripping conclusion of our yuletide general election, just in case, make sure you've stocked up on the strong stuff, half of us are going to need it. Jokes aside, I wish everyone the merriest of Christmases and I hope the hangover isn't too bad come the new year.

Claire Fletcher, Editor

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News

SELECT backs election campaign to push for late payment legislation

SELECT is getting involved in the upcoming general election by urging all candidates to back legislation that would end late payments on all public sector contracts and subcontracts.

Late payment is an issue SELECT has long campaigned against, with the Scottish trade body releasing research earlier in the year which showed that just 28% of firms surveyed were paid by public bodies within 30 days of invoice.

To push for real change, SELECT has partnered up with the Specialist Engineering Contractors' (SEC) Group, with both organisations calling on would-be MPs to commit to legislation that would enforce stricter payment standards.

This legislation could benefit more than just the electrical sector, with the construction industry as a whole plagued with late payments. The SEC Group argues that the next Government must upscale its efforts to stop payment abuse which results in broken buildings and broken lives.

Winter weighting adopted by some energy suppliers

Over the last few years, Cornwall Insight has recorded an increase in the number of suppliers implementing a winter weighting to their direct debit payments. This is where suppliers charge customers more for energy over the winter months and less in the summer months to help them manage their cashflow.

With the colder weather setting in, this year has proved no different with a few suppliers announcing their intentions to increase funds taken from customers to cover the higher costs that are incurred over the winter period.

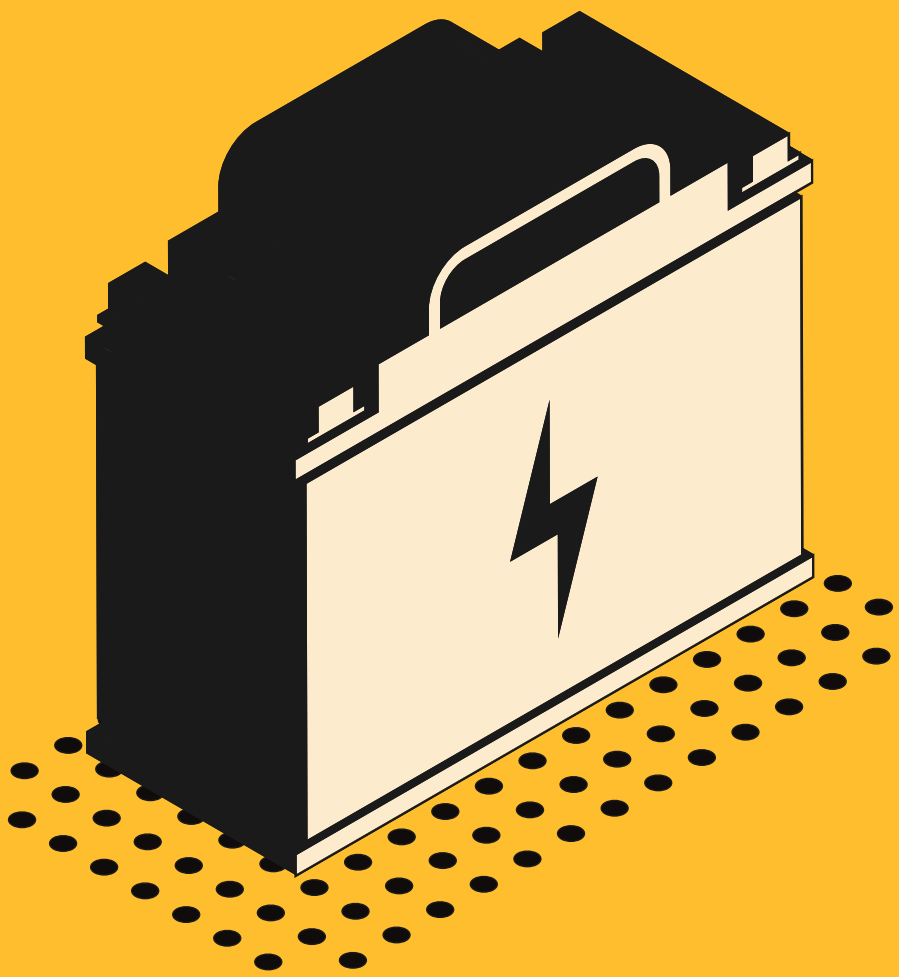
Kate Hill, senior analyst at Cornwall Insight said, "Suppliers implementing such an uplift tend to be on the smaller size and while some apply the weighting to customers joining at a specific time, this year, most are taking a blanket approach to implementing winter weighting irrespective of when a customer's tariff began (except for Igloo Energy) which could result in higher credit balances."

ELECTRICAL APPRENTICE OF THE YEAR COMPETITION WELL UNDER WAY

More than 350 electrical students across the UK have already taken part in the first stage of the Electrical Apprentice of the Year competition — an online exam comprising of 40 multiple choices questions.

Stage one will close on Thursday 12 December 2019. The top performing 20% of students will then progress to the next stage which is a written practical exam. Stage three will see eight finalists take part in a series of practical tests at the Grand Final on Tuesday 2 June at The Scolmore Group headquarters in Tamworth.

Pioneering #BatteryMaintenance4.0



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BUSINESS OWNERS DEPRESSED DUE TO LATE PAYMENT, SAYS STUDY

A new survey has revealed that nine out of 10 business owners across the construction industry suffer a range of mental health issues due to payment and other business pressures.

The survey, run by ECA and BESA in association with 25 other construction trade bodies, found that business owners have an array of significant mental health problems due to the pressures of late or unfair payment, including: stress (80%); depression (36%); extreme anger (38%); anxiety and/or panic attacks (40%); insomnia (36%) and suicidal feelings (10%).

EIT InnoEnergy takes start-up search global to tackle climate change

Sustainable energy accelerator EIT InnoEnergy has issued a global call for start-ups across the entire sustainability value chain, to meet the challenge of decarbonisation.

Elena Bou, innovation director at EIT InnoEnergy commented, "We are at an environmental crossroads. Action needs to be taken today to ensure we reach our global carbon reduction targets – which is why we've expanded our call beyond Europe.

"Delhi has just declared an air pollution emergency and in the US, the number of polluting motor vehicles on the roads has grown steadily to more than 270,000. We are reaching a tipping point – we need to tackle climate change together, and through our trusted ecosystem of more than 460 partners, we can do just that."

EIT InnoEnergy's current call for start-ups will offer innovators worldwide the potential to improve conditions not only in Europe, but in their home countries too. The process will see the top 20 innovators receiving business support to accelerate commercialisation, with the winner receiving €100,000.

Start-ups from Asia and the US are of particular interest, where clean air and vast internal combustion engine vehicle uptake are causing a noticeable impact on society.

Climate change potentially benefitting the efficiency of wind farms

After analysing data from 9,000 weather stations going back to 1970, an international research team, led by Dr Zhenzhong Zeng, a professor at Princeton University, has found that while wind speeds were on the decline for more than 30 years, they have since picked up. In fact, there has been a rapid increase over the last 10 years.

The reason behind this isn't exactly clear, although the scientists do hypothesise that it is due to climate change, noting that the world's shifting oceanic circulation patterns may have played a role.

ENERGY STORAGE COSTS FALLING AT THE FASTEST RATE EVER

Thanks to recent advancements in battery technology and the more than $1.4 billion invested in the space in the first half of 2019 alone, energy storage costs are falling at the fastest rate ever.

That's according to the recent *Breakthrough Batteries Report* by the Rocky Mountain Institute, which found that the increased demand for battery electric vehicles, as well as grid-tied storage was fuelling the cycle of investment and cost reduction in the sector.

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GOSSAGE

Champagne Perry

Those who follow these matters will know that each December somewhere in the world there is a Conference of the Parties (COP) to the Rio Convention on Climate Change. Here Government foregather to discuss, and frequently announce, what they are doing to minimise the threat of global heating, as it is now called.

This month delegates are meeting in Madrid, a last-minute change from Lima, because the Peruvian government is enduring very disruptive riots.

In December 2020, the 26th COP is to be run jointly by the Italian and the UK Government. As ever, both events are set to be chaired either by the head of the host government, or failing that, the relevant secretary of state. The Italians have nominated their president to lead in Rome.

Earlier this year it was announced that the UK climate change minister, Clare Perry, would chair the UK event, to be held in Glasgow (which it has anticipated may still be in the UK in 12 months' time.)

Eyebrows were raised in Rome. The UK-end was not to be run by the monarch. Nor the prime minister. Nor even the secretary of state. Was this a deliberate insult?

Worse was to follow. When the UK prime minister changed, Ms Perry lost her job in the Government. A few weeks later, she announced that – along with many other leading Conservative women – she was quitting the Commons. But she would retain her role as chair of the COP.

Much wailing and gnashing of teeth in Rome, at what was obviously a calculated insult from the perfidious Brits. Whispers of refusing to continue with the joint arrangements got louder.

There is of course one obvious solution. Whoever wins the General Election, a new Honours List will surely follow. I am quite sure that should Clare Perry suddenly become the noble Baroness Perry, there will be an audible sigh of relief and of satisfaction from within the Italian Government. After all, everybody loves a Lady.

Back to skool for Labour

Big fights still continue within the Labour Party regarding what future (if any) nuclear fission should have. As the election was announced, the party issued a 187 page document. Thirty recommendations by 2030 contains one very odd section. It ostensibly backs nuclear, even whilst conceding that, "There are significant embedded greenhouse gas emissions associated with nuclear." These are in respect of, "the construction of the plant, uranium mining, milling, fuel processing, fuel enrichment, refuelling" – being offline for months at a time – "back-up power, radioactive waste storage, and decommissioning." Quite so.

Additionally, it contains some weird editing errors, including several sloppy spelling mistakes: in the same sentence it spells the nuclear plant Hinkley Point C also wrongly as Hinckley. It manages to spell the proposed Moorside nuclear plant near Sellafield as both Moreside and Mooreside. And includes one hysterically wrong location of a nuclear reactor site, moving Bradwell from Essex to Kent.

I wonder whether this might have been an early unexpected consequence of sea level rise from climate change. With friends as incompetent as these, does nuclear need enemies?

All at sea?

The International Energy Agency (IEA) has announced that offshore wind power has the capacity to meet all of the world's electricity demand, and is set to be a "game-changer" for energy systems.

Before issuing this breathtaking calculation, I wonder whether the IEA has considered the ramifications that carrying through this remarkable finding might have for the governments of the 49 landlocked countries around the world?

PV piffle

Time spent reading the Hansard reports of House of Lords' Question Time is seldom wasted.

The former Gateshead MP, Joyce (now Baroness) Quin has been tirelessly asking the Housing Department whether the introduction of solar panels would be made mandatory for all new homes in England. Just before the election was called, she finally received a formal answer from the minister, Lord Younger of Leckie.

It was accompanied by an announcement that the (now former) government had launched a consultation on, "options for a meaningful and achievable increase to the energy efficiency standards for new homes to be introduced through the Building Regulations in 2020."

M'Lord Younger continued that, "We expect this would be achieved by homes being built with high fabric standards alongside the use of low-carbon heating, such as a heat-pump, or renewables technology such as solar photovoltaic (PV) panels."

Cause for celebrations in Gateshead and beyond? Not quite. Because the minister went on to say that whilst, "the Building Regulations set minimum energy performance standards for new homes and non-domestic buildings, they do not prescribe the technologies, materials or fuels to be used, allowing builders the flexibility to innovate and select the most practical and cost-effective solutions in particular circumstances.

"For example, many roofs are not suitable for solar PV panels because of visual amenity, age, strength, or orientation of the property. It would therefore be implausible for Government to enforce a blanket requirement to deploy solar PV panels on every new home," Lord Younger concluded.

Hang on. At the start of his response, His Noble Lordship had stressed that these new standards were exclusively for "new" homes. So why on earth would his caveats about PV not being appropriate owing to either the "age" or indeed the "strength" of a new roof be even vaguely pertinent? Anybody would think that the Housing Department wanted to give cowboy builders every excuse to omit to build photovoltaics into each and every new home. Inevitably these sweepingly dangerous caveats went unchallenged by those in their Lordships' House still awake at the time.

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Following the success of the 2019 Excellence Awards, which took place at the oh-so-swanky Four Seasons Hotel in London, we are gearing up to do it all again. So, keep the 21st May 2020 free, get it in the diary and dust off your posh frock.

The 2020 Awards will be taking place at the breath-taking Christ Church, Spitalfields, and we already have some brilliant sponsors lined up, in the form of: Centiel, Omicron, Vertiv, the ECA, Smart Grid Forums and GS Yuasa. And of course, we have our friends Riello UPS on board, who have been our partners for the event not once, not twice, but thrice. Thank you for the hattrick Riello. We are thrilled to have such a strong team of industry leaders joining us for 2020, to help us recognise and celebrate the very best of what our industry has to offer. And it's not just the electrical industry we will be celebrating – oh no. Like last year, Data Centre Review will be along for the ride, but this time, in a much more prominent capacity, bringing with it a whole host of new awards categories, further opening the floor to the data centre space.

The awards are free to enter via our website, so I strongly suggest you head on over there to be in with a chance (where you will also find more information on categories, as well as a selection of media from last year's event to give you a flavour of the evening.) We had some absolutely fantastic entries last year and many more than deserving winners, which as part of our independent judging panel, I thoroughly enjoyed, well, judging. Marrying together two incredibly strong, synergised industries, never has there been a better opportunity to network among players big and small.

So please, join us for the ER & DCR Excellence Awards 2020 and raise a glass (or several) to the innovations and ideas helping to define and shape our industries.

How to get involved

The positive reception to these Awards so far from entrants, sponsors and readers alike proves that there are plenty of products and projects out there which deserve recognition. Equally, it is our pleasure to highlight the people who work tirelessly behind the scenes across the industry, to innovate and set ever higher standards that others can look up to. This is why we look forward to receiving entries for the 2020 Awards welcoming the industry on 21 May.

We also have a few sponsorship opportunities remaining – so if you are an electrical or data centre organisation with excellence at the heart of your values, then being involved is a great opportunity to reward your team and clients, and network for future business.

For sponsorship enquiries or further information please contact Sunny Nehru sunnyn@sjpbusinessmedia.com 07741 911296 or Amanda McCreddie amanda@ electricalreview.co.uk 07741 911314

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Visit the website to check out this year's awards and submit your entries by 6th March 2020.

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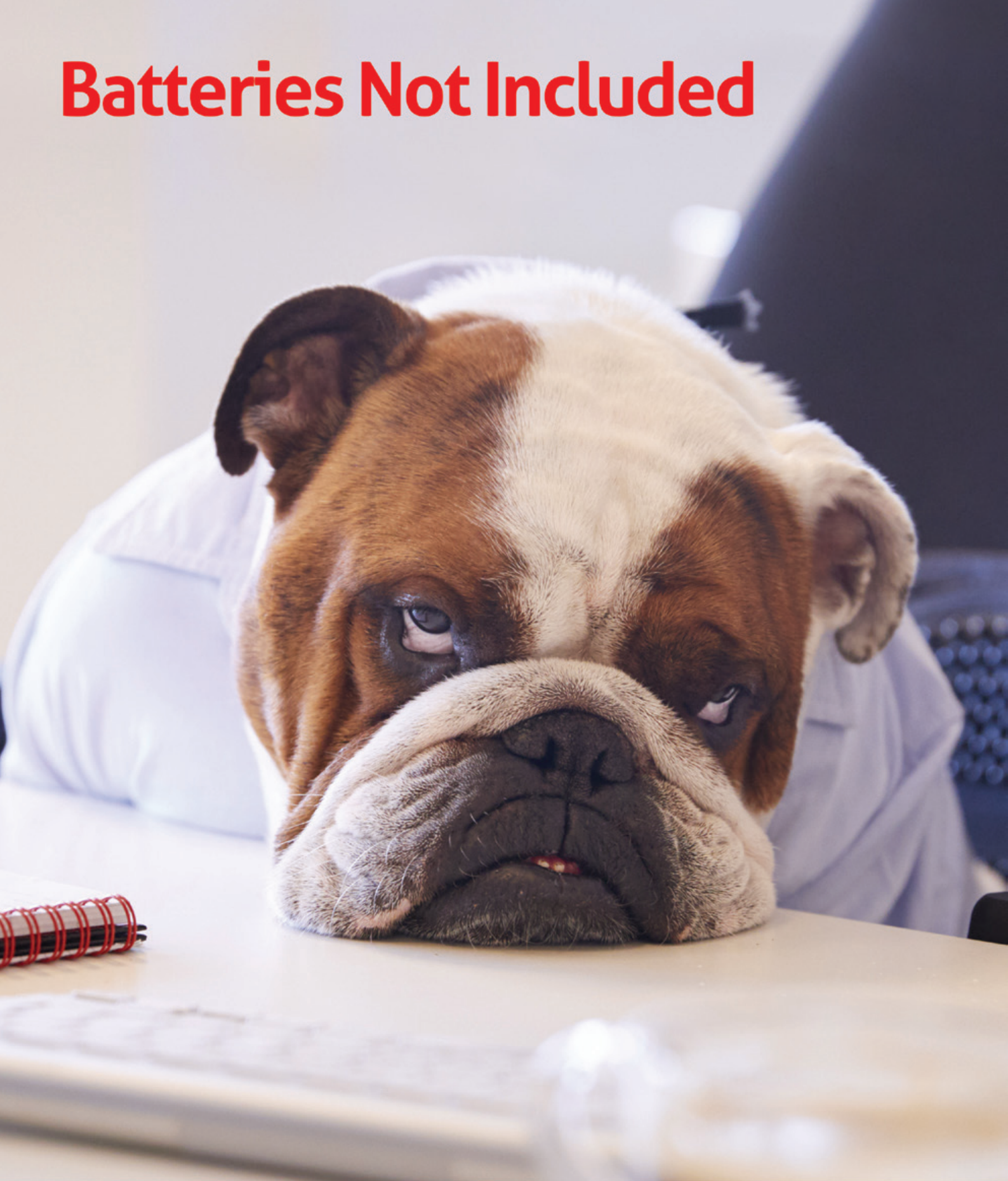

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Old grid, new tricks

With today's unprecedented demand for energy, needless to say our current grid isn't coping all that well. With our appetite for power only set to grow, **Luke Osborne,** energy and emerging technologies solutions advisor, ECA, explores what it would take to build a smart grid for our times.

When the electrical grid as we know it was first built almost 100 years ago, average household demand rarely stretched beyond a few lightbulbs and a radio. Power generation was built around small communities and set up as a one-way interaction from utilities to consumers.

Although now a vastly larger network, today's grid is lagging behind 21st century demands. In most developed countries, grids now operate at full capacity most of the time. To survive the next 100 years, the world's grids will have to get smarter. Luckily, the technology to make that possible is now coming to the fore, from turbine to socket.

In with the new

During peak demand, typically when kettles across the country are switched on after the working day, utilities will activate additional (often less efficient) power plants to keep up. This also means energy is costlier and less environmentally friendly to deliver at these times.

The success of the smart grid hinges on the proper deployment of new technologies on both sides of the meter. If used correctly, the smart grid will introduce a two-way interaction between utilities and consumers, where the Internet of Things (IoT), artificial intelligence, battery storage, renewable energy and falling prices converge to help us manage our electricity needs.

Talking machines

Having taken the industrial world by storm, the IoT has made data ubiquitous. More installations than ever are fitted with sensors that communicate with engineers and each other, about how much power they are using, when they are using it, and how much it is likely to cost.

In an ideal future, smart homes will communicate with the grid via robust and secure protocols known as the Smart Meter-Wide Area Network (SM-HAN). Utilities can then provide consumers with much better information to manage their bills.

Within the smart home, a Consumer Home Area Network (C-HAN) will connect smart appliances, thermostats, and other electric devices to an energy management system through the IoT. Smart devices and appliances will adjust their run schedules to reduce electricity demand on the grid at critical times and lower consumers' energy bills. These devices can be controlled or scheduled over the internet, or through a smartphone.

Self-healing powers

To keep the lights on, utilities have typically relied on manual switching and complex distribution schemes across the grid. Any break in this system caused by bad weather or sudden changes in demand can lead to outages.

Using artificial intelligence to act on data shared over the IoT, the smart grid will effectively be self-healing in the case of an outage. Faults will be automatically detected, and distribution will be rerouted and restored.

This 'distribution intelligence' can also be used to predict and manage electricity usage (with the cooperation of consumers sharing their data), ultimately leading to lower production costs.

In an ideal future, smart homes will communicate with the grid via robust and secure protocols known as the Smart Meter-Wide Area Network (SM-HAN)

Super substations

A vital part of the smart grid is the smart sub-station, without which we would be left with a pretty 'dumb' energy system. Since 2003, the IEC 61850 Power Industry Communications standard has continued to develop. IEC 61850 is an Ethernet-based international standard, enabling communication in power generation facilities and substations.

It has been critical in providing enhanced, high-speed protection, through interlocking and intertripping, control, and monitoring functions via Intelligent Electronic Devices (IEDs). Substation Configuration Language (SCL) is employed under IEC 61850, allowing information to be exchanged throughout the power network, regardless of whether each device is made by a different manufacturer.

A smart combination

There is also Government's ambitious 2050 net zero carbon target to consider. While this is a bold step in the right direction, it will not be achievable without a smart grid properly supported by renewable energy and battery storage.

Increasingly, UK renewable energy delivers the cheapest, lowest carbon electrical energy available to the grid. By itself that would be impressive, but renewables and energy storage together offer a winning combination, allowing customers full flexibility to use and export 'carbon free' electrical energy, even on cloudy and breezeless days.

Batteries still only comprise a small part of the UK's energy storage capacity, but they are expected become far more important in the near future, as costs continue to fall.

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Upskill to upgrade

Opportunities for contractors abound, and they include the design, installation, maintenance and servicing of the smart, renewable and distributed power systems mentioned above.

Tomorrow's energy market will require significant up-skilling of the workforce, particularly in relation to:

- Type of technology: Distributed energy technology is developing quickly. New products, with improved functionality and connectivity, are continually arriving on the market.
- Keeping abreast with what is available – and what will meet customers' needs and options.
- Safety codes of practice: When designing, installing and operating technology in buildings and infrastructure, ensuring operational safety should be a top priority.
- Regulatory/access codes: Given the (currently slow but steadily increasing) two-way nature of customers' interaction with the grid, contractors will need to be more aware of how the network and systems function, and the codes that govern the network.
- Security: Smart, communicating systems may well have security vulnerabilities, which will make this a high priority.

Renewables and energy storage together offer a winning combination, allowing customers full flexibility to use and export 'carbon free' electrical energy, even on cloudy and breezeless days

While the growth and availability of such technology should be celebrated, we need to be careful that the industry adopts the right standards, learns the right skills, and deploys the right installations, if the smart gird of the future is to be a success for the next 100 years and beyond.

Raising the stakes

If introduced, the UK Government's proposed plans for the tightening of the Minimum Energy Efficiency Standards could have major implications for building managers and engineers everywhere, says **Gavin Holvey,** general manager, sales – UK & Ireland at Priva.

The word is out: major change could soon be on the way for the commercial rental sector in the UK. Until January 2020, the Government will be undertaking a formal consultation that seeks views on how best to improve the energy performance of 'non-domestic' privately rented buildings through tighter minimum energy standards. This is with a view to achieving the targets established by the Clean Growth Strategy (CGS), published in October 2017, that pledges Government support for businesses to reduce their energy use by at least 20% by 2030.

The concerns raised by the Government will be familiar to anyone who has monitored developments in the non-domestic rental sector. Market failures including a split-incentive problem between landlords and tenants, and a general failure to address the negative impact of carbon emissions, have resulted in a continuing under-investment in energy efficiency. While the Minimum Energy Efficiency Standards introduced in April 2018 have brought fresh impetus to the matter, they are oriented towards what are described as the 'lowest performing buildings in the stock' only.

Hence the current consultation, that aims to yield tighter minimum energy standards on a wider scale, as well as a long-term outlook to 2030 that provides 'time and certainty' to landlords, businesses and the energy efficiency market regarding the reductions needed to achieve a zero-carbon future.

Perusing the case study sections of the supporting documents, it soon becomes clear where expectations are likely to be placed in the enhanced regulations. For example, they highlight measures including lighting upgrades, reversible air-to-air heat pumps for heating and cooling, and thermal controls as being integral to smaller retail stores improving to the point where they can achieve Energy Performance Certificate (EPC) B or C standards. Meanwhile, the installation of gas heat pumps as lighting upgrades and thermal efficiency improvements are felt to be crucial to earning EPC B or C in older office environments.

To their credit, these outlines are priced realistically, with most of the proposed upgrades costing no more than £5,000 – and often considerably less. The documents are also strong on identifying the benefits of energy efficiency upgrades for various groups, including potential increase in rental and property values for landlords; a rise in satisfaction, health, comfort and productivity for tenants; and carbon emission savings, air quality improvements, and increase in security of energy supplier for society as a whole.

The benefits for building managers, integrators and consultants are not delineated in detail, but in truth they do not require much unpicking. It stands to reason that those specialists who have the greatest knowledge of energy-efficient technologies, and how best to implement them in order for companies to meet their regulatory obligations, are going to be in the greatest demand. In addition to having knowledge of individual building systems – air management, heating, lighting and so on – a holistic comprehension is vital so that all systems can mesh together seamlessly.

Fortunately, technology vendors have undertaken much R&D in recent years that is geared towards making these objectives easier to realise – not least in the form of more user-friendly and cost-effective control systems.

Taking control of the situation

Indeed, the importance of control systems has not been lost on the Government, which has pinpointed this aspect of building design as being one of the most important steps to achieving carbon reduction in the consultation documents. Upping expectations from the original 2015 targets, the Government's roadmap calls for an additional 1,100,000 control system installations that satisfy the demanding EPC B standard. As opposed to the less exacting EPC C, large-scale adoption of EPC B would, says the Government, "drive a greater demand for energy efficient measures."

Whilst acknowledging that it is difficult to "predict the full impact of the estimated installation numbers on the energy efficient market", the Government thinks this more ambitious target would help encourage a "competitive marketplace in which suppliers can use the certainty of demand to grow, scale and innovate. This is ultimately good for landlords and businesses: if the market functions well, there is the potential for the costs of individual measures to decrease and for performance to improve, as well as the potential for new innovations to become available."

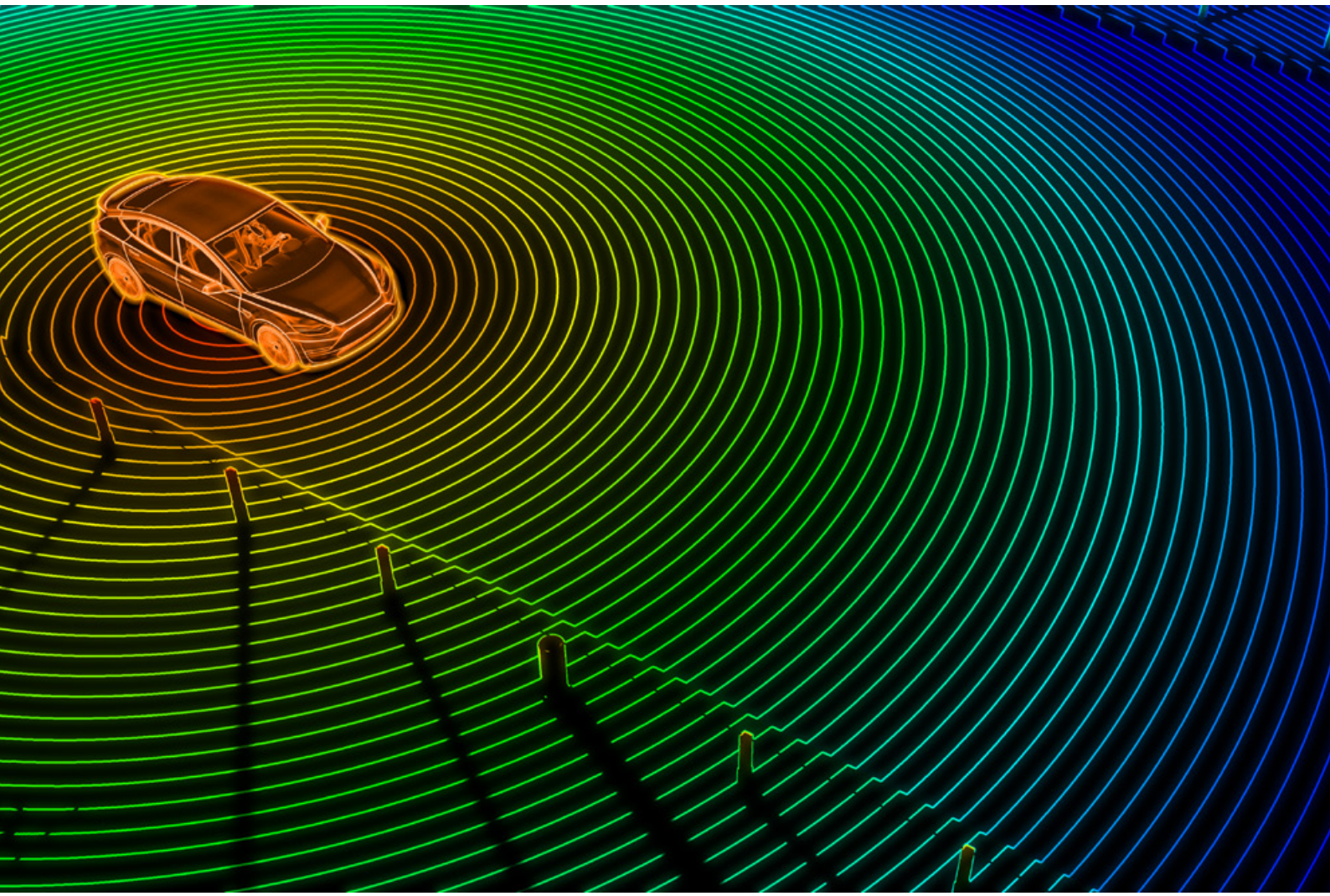
The importance of control systems has not been lost on the Government, which has pinpointed this aspect of building design as being one of the most important steps to achieving carbon reduction

Although it will be some time before the results of the consultation are known, it seems certain that control technologies will be an important part of delivering enduring improvements to energy efficiency. Therefore, those building managers, engineers and consultants who are familiar with the latest control systems will have a distinct advantage – both with their existing employers and potential future ones, as demand for technical staff who have a complete understanding of related technologies continues to grow.

Above and beyond that, technical building personnel would be advised to review their chosen suppliers and ensure that they have the assistance of a well-respected integrator and/or consultant. With developments such as AI also set to impact upon building management in a major way, it may soon become significantly harder to keep track of developments, meaning that specialist help could be more important than ever before.

The rise of self-driving buildings

Jordan O'Brien, contributing editor for Electrical Review, discovers how AI and machine learning is creating a new breed of smart buildings.



The world is going nuts over self-driving cars and their ability to make your life easier, but the reality is, we're still a long way off from buying cars that do away with human drivers altogether. That's why we should be concentrating on self-driving buildings instead, a technology that is very much already with us.

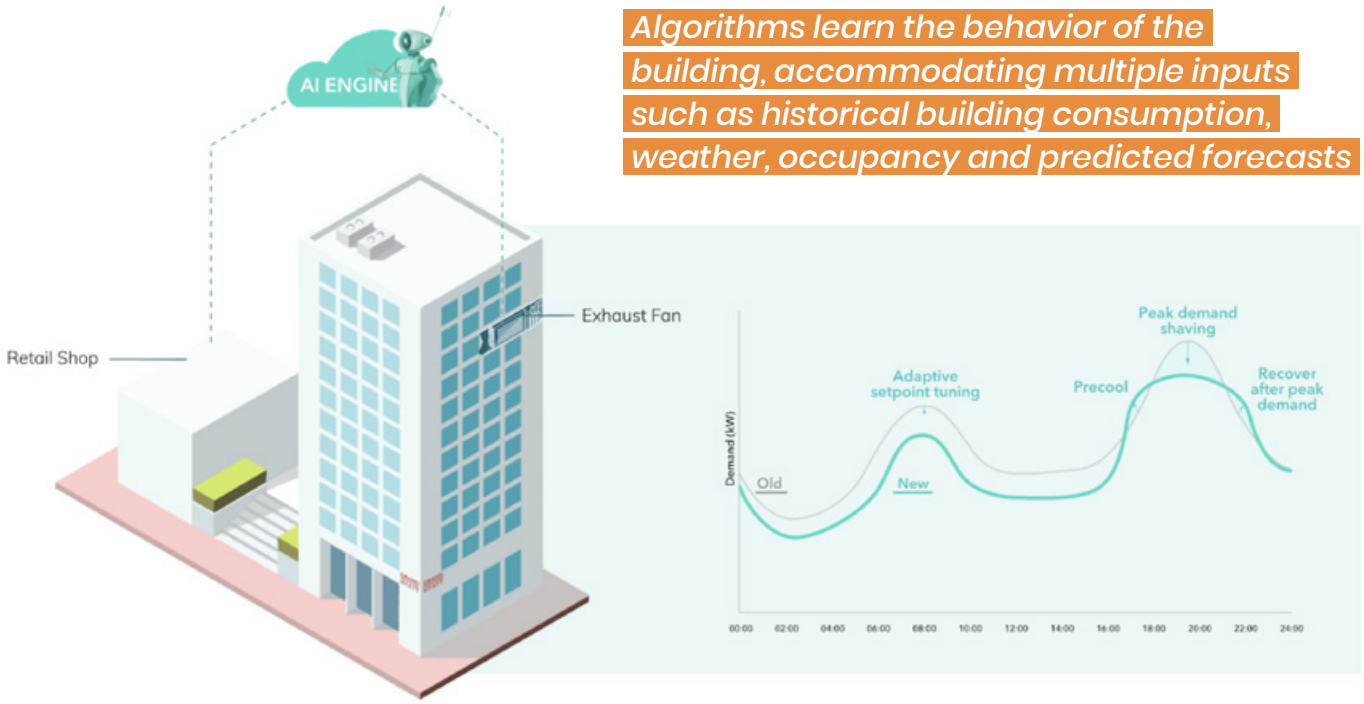
It might sound crazy to call it a 'self-driving building', because the building is of course stationary, and not 'driving' anywhere. However, what I mean by that phrase is a building that uses AI and automation to adapt on the fly without needing any user input. It's building automation on steroids.

Companies such as Schneider Electric, Silicon Valley start-up, Verdigris Technologies, and German automation firm, Dabbel, are already rolling out solutions that leverage AI, and are using the Internet of Things to better inform a central building automation system and to teach it when to act without any user input.

Electrical Review spoke to Emilie Hung, solutions architect at Verdigris, to get a better understanding on what a 'self-driving building' could be.

What are the advantages of adaptive automation over traditional building automation?

"Traditional building automation systems are not intelligent. They are based on simple feedback loops and can be binary. The controls are programmed based on a few static inputs, design conditions, and often are not re-programmed after a building is commissioned. In this scenario,



Algorithms learn the behavior of the building, accommodating multiple inputs such as historical building consumption, weather, occupancy and predicted forecasts

building performance can drift undetected. Moreover, if control actions are associated to a single variable then some controls may work against each other (i.e. heating and cooling at the same time). It also requires knowledgeable personnel to re-calculate the control parameters and re-program a system.

"Adaptive automation is intelligent and predicated on periodic analysis and optimisation. Algorithms learn the behaviour of the building, accommodating multiple inputs such as historical building consumption, weather, occupancy and predicted forecasts. In this scenario, the models can identify which parameters are strongly and loosely coupled, combining more inputs than possible with human computation, and optimises building electricity systems without human intervention."

To reach our goal of carbon reduction, implementing modern building automation systems using AI and machine learning is an absolute must

What are the cost differences between adaptive and traditional automation, including any cost savings?

"Currently adaptive automation integrates into existing building control systems and is an additive feature. Setup requires the ability to connect and digitally send signals to the building and equipment controls.

"Savings from adaptive automation can be through demand management or energy efficiency. We estimate annual savings from adaptive automation to range between $10,000 - $25,000/yr (USD) for a 100,000 sq ft building, that translates to approximately $0.11/sq ft - $0.25/sq ft (USD) in savings."

How is adaptive automation easier for a facilities manager to use vs standard building automation?

"Building automation as a whole is under-the-hood technology. Standard building automation is a static model with preset control sequences, whereas adaptive automation uses artificial intelligence, is dynamic and as the name suggests, adaptive to changing conditions. The difference is in the experience of comfort and cost and energy savings from building operations."

The IoT is crucial in creating self-driving buildings, as the central automation system makes decisions based on the sensor data that is being fed into it. That means if the temperature sensor detects that the room has dropped below an optimal level, the system will then consult other factors, such as an occupancy sensor, to decide whether to turn the heating on. If it's coming up to 5pm and the last person is about to leave, then it may decide to leave the heating off.

To reach our goal of carbon reduction, implementing modern building automation systems using AI and machine learning is an absolute must. While it's important to reduce our carbon footprint, these systems also come with the upside of potentially saving a building owner a significant amount of money.

One example of how the system can help building owners can be found at the Grand Hyatt San Francisco. Since the hotel switched to a smarter building automation system, one that uses AI and machine learning, it has found its energy use to be greatly reduced. In fact, the new system has consistently saved the hotel over 20% of the costs of the controlled load, resulting in an average monthly ROI of 41% and earn back of the initial investment in less than six months.

Locked out

Lee Funnell, technical manager at Siemon, highlights the importance of physical security in the data centre and discusses specific measures that can be taken at rack level to protect mission critical infrastructure.

Unplanned data centre downtime can cost the business thousands of pounds in lost revenue. Whilst the financial implications are huge, other effects such as reduced productivity, data loss and damaged reputation can hurt a business equally as badly.

Power outages, network failures and security breaches are some of the most common causes of downtime today, but industry reports show that human error plays a significant role in data centre outages too. In a colocation facility, human error can be as simple as accidentally accessing the wrong cabinet for patching and maintenance work.

Incidents like these highlight the importance of implementing physical security in a data centre facility. To enhance security, access to cabinets should be controlled to safeguard critical IT infrastructure, especially in colocation and multi-tenant data centres where several parties share common spaces.

At the cabinet level, cabinet door security systems can significantly increase the physical security of a data centre, whereby electronic door handles eliminate the use of universal cabinet keys to open any cabinet and restrict access to mission critical equipment based on specific cabinets, roles and time periods. Leading manufacturers of data centre cabinet solutions would typically supply cabinet door security systems with their cabinet range and depending on the type, they can provide multiple layers of security through one or more levels of authentication.

In a colocation facility, human error can be as simple as accidentally accessing the wrong cabinet for patching and maintenance work

Card access handles for example, will unlock with a compatible low access card and biometric access handles use fingerprint biometrics to grant access. Biometric and card access handles, on the other side, allow for access via either fingerprint, card, or both for dual factor authentication. The same principle of dual factor authentication applies to pin and card (high frequency or dual frequency) access handles. Dual custody rules – common in military data centres – can also be applied which then require two persons, e.g. from pre-defined security groups, to be present to authenticate.

Server-based administration software administers users, their cards and biometrics and manages user and group permissions. It also provides real-time monitoring of all devices, including open/closed status, propped door or forced entry, and it can deliver alerts via email. The system maintains extensive logs as to who accesses what physical hardware where and when. This becomes increasingly important for auditing purposes required for compliance and that are especially common in the finance or healthcare sectors.

These systems are available in a centralised bus and node system to manage access to entire groups of cabinets or PODs providing cabinet-level or end-of-row authentication. A de-centralised Sentry System will allow for the management of individual cabinets located in multiple different positions within the same data centre or in different rooms.

But there are other advantages to cabinet door security systems besides access management and control. Whilst in traditional colocation or multi-tenant environments, cages have been quite popular, they aren't always an efficient use of space. When a tenant is using only a few cabinets, the size of their cage (to allow for space all around the cabinet) is quite large compared to their actual cabinet usage.

With a cabinet security solution, cabinet level authentication can mean that the same level of security can be reached but without wasting as much floor space. The solution is a lot more flexible. Adding or removing users to cabinets as tenants grow is much easier than moving cages around.

Whilst these security systems provide much better access control to mission critical infrastructure, physical security doesn't stop at the cabinet door.

Secure and tamper-proof outlet locks and lockable fibre cassettes can provide a simple means of securing active equipment ports and patching environments inside a rack or cabinet. These simple and straightforward solutions – where outlet locks snap into industry standard RJ45 or LC fibre ports, block cord access and can only be removed with a specially designed key – protect against unauthorised port access and provide an extra element of physical layer security at port level.

Further, if rack mountable PDUs with 'intelligent' features (e.g. remote monitoring, device level or outlet level monitoring, outlet level switching/control), are deployed, an added layer of security can be applied. Because intelligent PDUs monitor the amount of power consumed by the individual connected devices, network managers can observe if equipment operates within the intended ranges for energy use. Any irregularities and hotspots can be quickly identified to prevent equipment failure that may lead to network outage.

With cabinet door security systems, outlet locks and intelligent PDUs there are several measures that can be taken at cabinet level to increase physical security. If data centre managers are looking for a more holistic approach, Automated Infrastructure Management (AIM) can be applied to track any physical layer changes in the data centre, such as unauthorised removal of equipment or connection of unapproved devices. AIM provides an accurate map of the organisation's infrastructure and instantly identifies the location of a breach so that remedial action can swiftly be taken.

Further down the line, door security, PDUs and AIM and can be integrated into comprehensive Data Centre Infrastructure Management (DCIM) software which will give data centre operators the ability to improve infrastructure planning and design.

At the cabinet level, cabinet door security systems can significantly increase the physical security of a data centre

More than a box

There's a lot to be learned from the famous fable, The Three Little Pigs. While the tale teaches us to stay wary of menacing wolves, it also reminds us of the importance of a sturdy home. Electrical equipment requires robust protection and a durable enclosure is vital to its safety. Here, **Andrew Keith,** product development director at power resistor manufacturer Cressall Resistors, explores the top considerations when designing an effective electrical enclosure.

When designing a complex network of electrical components, an enclosure may be something of an afterthought. After all, it is simply a box that houses electrical components and connections, wiring, machinery controls and related equipment — all the important stuff.

However, it is this misconception that leads to failure — especially if important design considerations are forgotten or unfulfilled. Although enclosures can seem like a non-critical element in electrical system design, a failure to secure electrical equipment can result in a build up of moisture or dirt, a drastic change in temperature or poor ventilation.

Electrical equipment can generate significant heat as a by-product of their operation, known as losses, inside the cabinet

Keep your cool

When designing a heat management system for an enclosure, manufacturers must account for external temperature fluctuations such as solar gain — heat from the sun. In addition, electrical equipment can generate significant heat as a by-product of their operation, known as losses, inside the cabinet. Failing to safely remove these losses will increase the temperature inside the enclosure and could adversely affect its contents.

One remedy is passive cooling. This technique uses the simple principal of convection to distribute heat from a higher temperature area to a lower one. To do this, enclosures must be designed with strategically placed vents that replace hot air inside the enclosure with cooler, external air.

However, the feasibility of passive cooling depends on its environment and the ambient temperature surrounding the enclosure must remain lower than the air inside it. Additional air filters may also be required to prevent dust or dirt from infiltrating the enclosure. Instead, design engineers may want to opt for active cooling by installing heat exchangers or air conditioners to cool the air inside the enclosure.

A material matter

Of the numerous materials available for electrical enclosure construction, each offers its own protective benefits. While painted carbon steel is the most cost-effective metallic choice, it has limited resistance to solvents, alkalis and acids and is thus best suited to indoor applications.

Stainless steel provides a much higher resistance and variants such as grade 316 are specified in industries that require resistance to chemical attack, such as pharmaceutical manufacturing, which must avoid excessive metallic contamination. As the material has better resistance against sulphates, seawater and high temperatures, we recommend this type of steel as the preferred choice for both indoor and outdoor applications.

Away from metals, fibreglass is a lighter weight choice, making it suitable for wall or pole-mounted installations. As fibreglass is not conductive, any open circuits would stay safely inside the enclosure and wouldn't be transmitted through the material. The conductivity offered by a metallic enclosure enables it to be ground connected to reduce the risk of electrical shock, should an exposed conductor come into contact with the enclosure.

Follow the rules

Many manufacturers design and build enclosures at a central location before shipping the equipment to the end-user. For an enclosure to comply with local guidelines, manufacturers must consider its end destination. Standards typically referenced are the International Electrotechnical Commission (IEC) 60529 Specification for ingress protection (IP) for countries using IEC standards, while the applicable EN standard should be followed for the European market.

Understanding these regulations can be daunting, which is why manufacturers should work alongside their customers to advise on the most effective solution. If the IP rating is too high, for example, it will place tighter restrictions on the openings in the enclosure panel work and restrict ventilation.

The considerations for enclosures extend beyond straw, sticks and bricks

Enclosures should only be opened using a key or tool and when all live parts are disconnected. Installing a viewing window reduces the need to access inside the enclosure. Other safety features include interlocking the enclosure door with a disconnecting device to prevent direct human contact with equipment, should the door need to be opened.

The considerations for enclosures extend beyond straw, sticks and bricks. However, if designers are to learn anything from the pigs, it is that we should never underestimate the value of a home's materials. Enclosures may seem like just a box, but they play a vital part in equipment protection and their design needs to be carefully considered.

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Danger, danger

Electrical injuries can occur from the smallest voltage, but generally the risk of injury increases with higher voltages and can cause electric shocks, burns, loss of muscle control and even death. Reece Safety gives us some tips on how avoid these high voltage hazards.

The correct clothing and equipment can be lifesaving in dangerous circumstances and provides a buffer against any hazards that occur when working with electricity

Working in a high voltage (HV) environment should always be approached with the correct personal protective equipment (PPE) and necessary training required to work in or around the high voltage area. It is important to feel confident enough to work around electrical hazards safely, following on from thorough training. To make sure you're as safe as possible when working in a high voltage environment, the following guidance should be remembered and practiced at each HV occurrence.

Safety assessment

Risk assessments are important as they form a key part of an occupational health and safety plan. The person or group responsible for the environment should undertake a safety assessment before any workers or visitors enter an electrical area to ensure that correct health and safety procedures are being followed and implemented to keep those in the area, such as workers, cleaners and visitors, as safe as possible. Risk assessments recognise the hazards throughout the environment, how they can harm people and what is being done to control the risks. This is an integral and essential part of creating a safe environment.

Signs and warnings

In many places of work, from construction sites to warehouses, safety signs are a necessary part of worker safety and awareness. They are in place to help prevent injury and ensure staff and visitors are fully equipped for any hazards ahead and in different areas of work. To have correctly displayed safety signs in the workplace is integral to meet

Electrical lockout prevents fires, burns, electric shocks and arc flashes, so it is an imperative part of staying safe in high voltage areas

health and safety standards which help in looking after employees and visitors, particularly in high voltage environments. Safety signs should be used at points of danger to indicate hazards that present themselves around the site, and in the instances of HV environments, should be present at each point of live electricity. Safety signs also alert people to the new hazards that have recently occurred from maintenance work or falling scaffolding.

The main types of safety signs in and around the workplace are:

Red: These signs mean 'prohibited', e.g. 'no smoking' signs. They are present when an action is not allowed on the premises.

Yellow: These signs warn people of danger in the area; examples of yellow signs are 'high voltage' and 'hazardous area' signs.

Blue: Mandatory/site safety – Blue safety signs are usually outside of an industrial site to inform staff and visitors of what they need to know before entering an area, and let people know about site safety. Examples of these signs are 'keep out' and 'fire door keep shut'.

Green: Health & safety – Health and safety signs inform people of where to go in an emergency. Green signs are often used to indicate the location of first aid, fire doors and emergency equipment

Lockout/tagout

'Lockout tagout' is the practice of safeguarding employees from an unexpected start-up of machinery or equipment to prevent harm. Electrical lockout is integral in performing a correct lockout tagout programme, as most equipment will require an electric energy source to be locked out as part of their isolation procedure.

Examples of electrical lockouts are electrical plug lockouts, button lockouts and electrical panel lockouts that can be used to prevent unwanted electrical activity when work is finished to prevent access to switches and buttons. Electrical lockout prevents fires, burns, electric shocks and arc flashes, so it is an imperative part of staying safe in high voltage areas.

Correct PPE

The correct clothing and equipment can be lifesaving in dangerous circumstances and provides a buffer against any hazards that occur when you are working with electricity. Depending on the task at hand, PPE for the electric power industry includes:

- Flame-resistant clothing
- Insulating suits
- Face shields
- Safety glasses
- Hard hats
- Safety shoes
- Rubber gloves

Equipment for use in an electrical emergency, such as electrical safety hooks, are also important to have on-hand when working in an HV environment to retrieve victims of electric shock, while protecting the rescuer from electric shock themselves, as the safety hook prevents back feed of electricity from harming the rescuer.

Electrical injury can be prevented by using insulated tools and rubber matting to work on while wearing protective workwear that leaves no visible skin exposed to an electric spark. To ensure safety as much as possible, always follow the health and safety policies in place in the high voltage environment.

The future of backup batteries

Olivier Amiel, marketing director for Saft's Industrial Standby Division, explains what the future has in store for backup battery technology, how the data centre market provides unique challenges for batteries and why environmental sustainability is central to the future.

Fast-changing trends in data centres mean that the market for backup power is unlike other segments. Whereas battery applications such as electric vehicles are shifting towards more energy storage capacity to provide long lasting service, data centre operators need high power to ride through short outages and overcome voltage fluctuations. We're typically seeing demand for batteries to provide five-10 minutes of backup duration, but some customers are asking for two or even one minute.

In addition, data centre operators want to build their facilities close to the businesses they serve and as a result provide faster services. This has led to development of small data centres in city-centre buildings, where rents are high, space is at a premium and floors have load bearing limits.

Today, state-of-the-art Li-ion systems can provide up to 140 kW per cabinet. This provides a small footprint and lightweight solution with no need for structural reinforcement of the floor. In turn, this offers savings in rental and structural costs that far outweigh the cost of the battery.

This is one factor that can be considered alongside Total Cost of Ownership (TCO), which is the sum of all the financial costs associated with a battery system over its life. This includes the purchase price, installation, maintenance and end-of-life costs – and operators typically find that Li-ion and nickel technology batteries offer the most favourable TCO.

Solid state for a step change in performance

Looking further ahead, there's a limit to the energy density in Li-ion. Therefore, we're now working on the next major shift in battery technology: solid state batteries. These are named for their solid electrolyte – and being solid means that they will offer high levels of safety as well as high energy density.

Solid state batteries will create a step change in our development roadmap for data centre backup and we're likely to see cabinets with a power rating of 250 or 300 kW.

Integrating Li-ion into a UPS

In the early days of Li-ion technology, we viewed the need for electronic control as an additional component that was needed to manage the battery, but that did not bring value to the customer.

However, today's customers are using it as a benefit. It enables straightforward integration into data centre control and SCADA systems. Operators can monitor their batteries remotely, identify the end of life as it's approaching and take proactive action to replace assets at the right time.

To support this, we've worked closely with Uninterruptible Power Supply (UPS) companies to support the integration of Li-ion technology with their controllers and power conversion systems. We have successfully integrated our technology with UPS manufacturers around the world such as Socomec and others including AEG, Eaton, Mitsubishi, and Piller.

A further benefit of electronic control is that the battery management system can optimise the performance and lifetime of a battery system. It achieves this by adjusting charge and discharge of individual cells to maintain constant temperature across battery strings, modules and cells. Constant temperature means that cells age at the same pace, providing consistent performance.

Nickel technology developments

Elsewhere in the data centre backup power chain, other battery types are used. For example, our SPH nickel technology batteries provide the cranking power to start up diesel gensets and ensure unbroken power in a longer outage.

We have two areas of development for nickel technology batteries. The first of these is a remote monitoring system for these nickel batteries. This digital solution will offer operators the ability to keep tabs on their fleet of batteries and take proactive action. It enables the switch from a traditional time-based maintenance to smart condition-based maintenance.

The clear benefit for customers will be OPEX savings resulting from fewer site visits. Another benefit is better planning of Capex, as real-time data will help the end-user to maximise the usage of the battery and replace it when it is needed and not before!

The second area of improvement is an adaptation of the electrochemistry to make our nickel batteries a near plug and play replacement for valve-regulated lead-acid (VRLA) batteries. This has not been possible to date as nickel technology batteries need a higher charge voltage than VRLA, typically 1.42V per cell vs 1.39 V per cell for VRLA. The consequence for the customer was the need for a DC-DC converter as part of the UPS architecture to fill the gap between 1.39 and 1.42V.

Looking further ahead, there's a limit to the energy density in Li-ion. Therefore, we're now working on the next major shift in battery technology: solid state batteries

By adapting the electrochemistry of nickel batteries, it is now possible to charge them at the same voltage as VRLA, namely 1.39V per cell. This eliminates the need for the DC-DC converter, reducing the architecture cost and making the replacement plug and play.

As a result, operators can adopt nickel technology and benefit from low TCO thanks to its long life and low maintenance requirements.

Low TCO highlights sustainability

However, TCO is not just good for the bottom line, it is also a sign of environmental sustainability. By choosing engineered products that are designed for a long life, a company can minimise its use of natural resources, transport and materials.

Li-ion and nickel batteries both provide long lifetime and high reliability. In comparison, VRLA batteries typically need extensive maintenance and offer a significantly shorter life – calling for multiple site visits, replacement batteries, transport and logistics.

Sustainability practice also continues at the end of a battery's life. We established a global network of bring back points for spent batteries 20 years ago. These ship batteries to our facility in Sweden or to fully certified recycling facilities, which ensure efficient recycling of components and materials.

Last but not least, Li-ion and nickel batteries can withstand high temperatures. This lets operators turn down the cooling, reducing both energy consumption and utility bills.

Into the unknown

Peter Harrop, chairman at IDTechEx explores the unknowns and uncertainties surrounding lithium-ion batteries.

It is certain that lithium batteries will be dominant over the coming decade and their chemistry will change in pursuit of reduction in cost and flammability and to obtain greater energy density. They will even usurp lead acid batteries in applications where they were unknown not so long ago such as forklifts, mobility vehicles for the disabled, e-bikes in China and India and small boats. Nonetheless, because they are the main source of fear to users – from range anxiety to bankruptcy and being burnt alive – they will be sowing the seeds of their own destruction as sales power upward to 2030.

Hubris will hasten the day. In particular, it is a rule of thumb in manufacturing that you stabilise your design before hugely increasing output, but most battery manufacturers will continue to believe that does not apply to them. They will continue to change anode, cathode, separator, electrolyte and format while building gigafactories. They will therefore continue to have the blazing planes, boats, power stations and more to prove it, coupled with shut downs and recalls. Long-term life tests? Revalidating accelerated life tests? Careful scale up? Forget it. And there is more.

It is a fool's errand to try to forecast recessions hitting battery output, but lithium-ion battery shortages may be caused by shortages of lithium, cobalt and nickel despite the current glut. This is because electric vehicle demand is rising so fast, with pure electric vehicles particularly important as they take over 90% of the electric vehicle battery demand that dwarfs all other demand.

Reduced flammability and greater energy density will certainly be seen from an increasing minority of lithium batteries, particularly after 2025

Cars will be the largest lithium-ion users in market, value followed by trucks/ buses, which are essentially one business leading a trend to bigger batteries in the mix. More of that later. However, even if car production recovers following its drop over the last two years, most agree it will hit a peak globally and drop at some stage no later than 2030. This is because cars hit a perfect storm of internet shopping, the move to cities, Mobility as a Service (MaaS) and young people increasingly failing even to qualify for a driving license.

In fact, the number of trucks and buses is not increasing in the world, so the largest addressable market for lithium-ion batteries – on-road vehicles – is not growing. After 2030, if not earlier, the lithium-ion glory days will probably end even without a different chemistry taking over. Growth but not a "no-brainer' investment any more.

Indeed there is a possibility, no more, that affordable supercapacitors boosted to 60-100 Wh by enhancing pseudocapacitance or better hybridisation with lithium-ion chemistry, will take a nasty bite out of the leg of lithium-ion by offering much faster charging, deeper discharging, fit-and-forget and safe disposal. However, successful supercapacitors will need new facilities or be made by adaptation of existing battery factories so they are not an escape route from any shortage of battery facilities.

Some say the millennials tapping phones for all their waking hours will still jump into cars because those cars will be robotic. However, robotics is coming more slowly than commonly portrayed and not just because they add $5,000 to the price. Robot cars or shuttles working as well as a human driver in all locations, all weather and any time will probably not be prevalent until 2035.

Mobility as a service (MaaS) will certainly be taking more share, resulting in one twentieth of the idle time and therefore number of vehicles needed. Far fewer batteries!

As if that was not enough, the "brute strength and ignorance" approach of getting more range by massive batteries will increasingly be replaced by ubiquitous top-up charging, including non-stop charging of trucks by intermittent catenaries and cars and more by coils in the road.

Look at a pickup truck with a 180kWh battery or a bus with a 600kWh battery and you are looking at a designer that does not know how to do the clever stuff. His bloated cost comes with excessive exposure to battery shortages. He is an accident waiting to happen.

Lower drag factor, better lightweighting even extending to solar and supercapacitor bodywork gets more range with less battery. Indeed the best solar family cars with axial flux in-wheel motors use half the battery (740 km with only 60kWh). Buses using the best top-up charging enjoy one fifth of the battery meaning 60 kWh, like a small family car having 60kWh today. See the way to standard batteries getting cost down?

Careful consideration of the technology roadmap of over 100 categories of electric vehicle – land, water and air – shows the battery as a percentage of cost of a given vehicle dropping in ten years with the new things, such as solar body, supercapacitors, new power electronics (vehicle to grid etc), autonomy and so on taking a greater percentage of cost, as will motors and their controls. Only one traction motor per vehicle is already becoming less and less common. Indeed, many cars are moving to three or four, Class 8 trucks sometimes eight and one vertical take-off plane has 36 motors!

Consequently, one analyst foresees a pure electric bus battery being a mere 6% of cost by 2030, though that is not a majority view.

So much for the trends with a given type of electric vehicle, but widening applications lead to more large batteries in the mix. Some around the 1MWh level are already appearing in mining, agriculture, construction, military and logistics vehicles on land, in some inland river ships and silent-mode cruise ships. One planned manned electric aircraft approaches 10MW batteries, though we are sceptical about the idea.

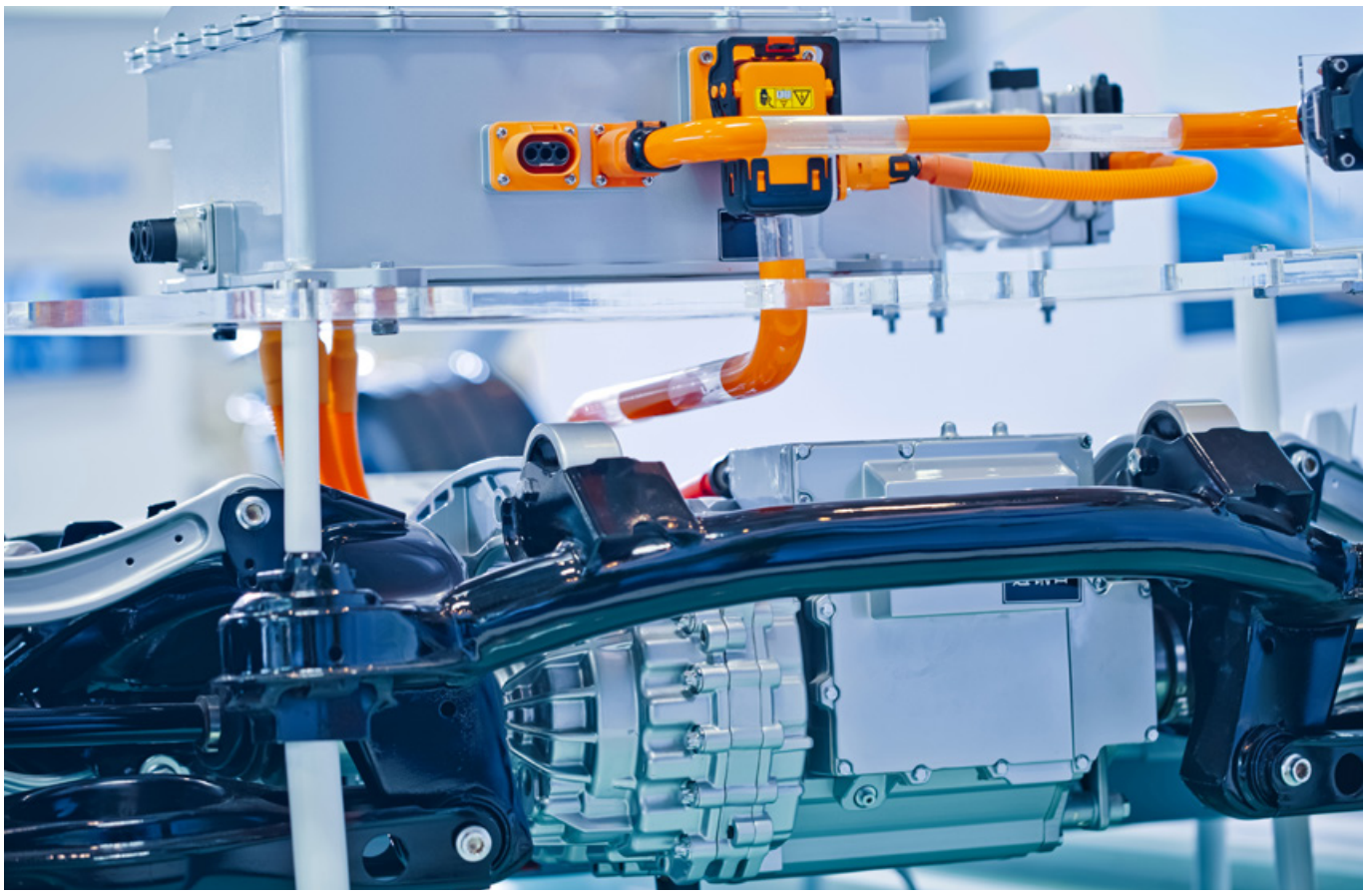
It is a rule of thumb in manufacturing that you stabilise your design before hugely increasing output, but most battery manufacturers will continue to believe that does not apply to them

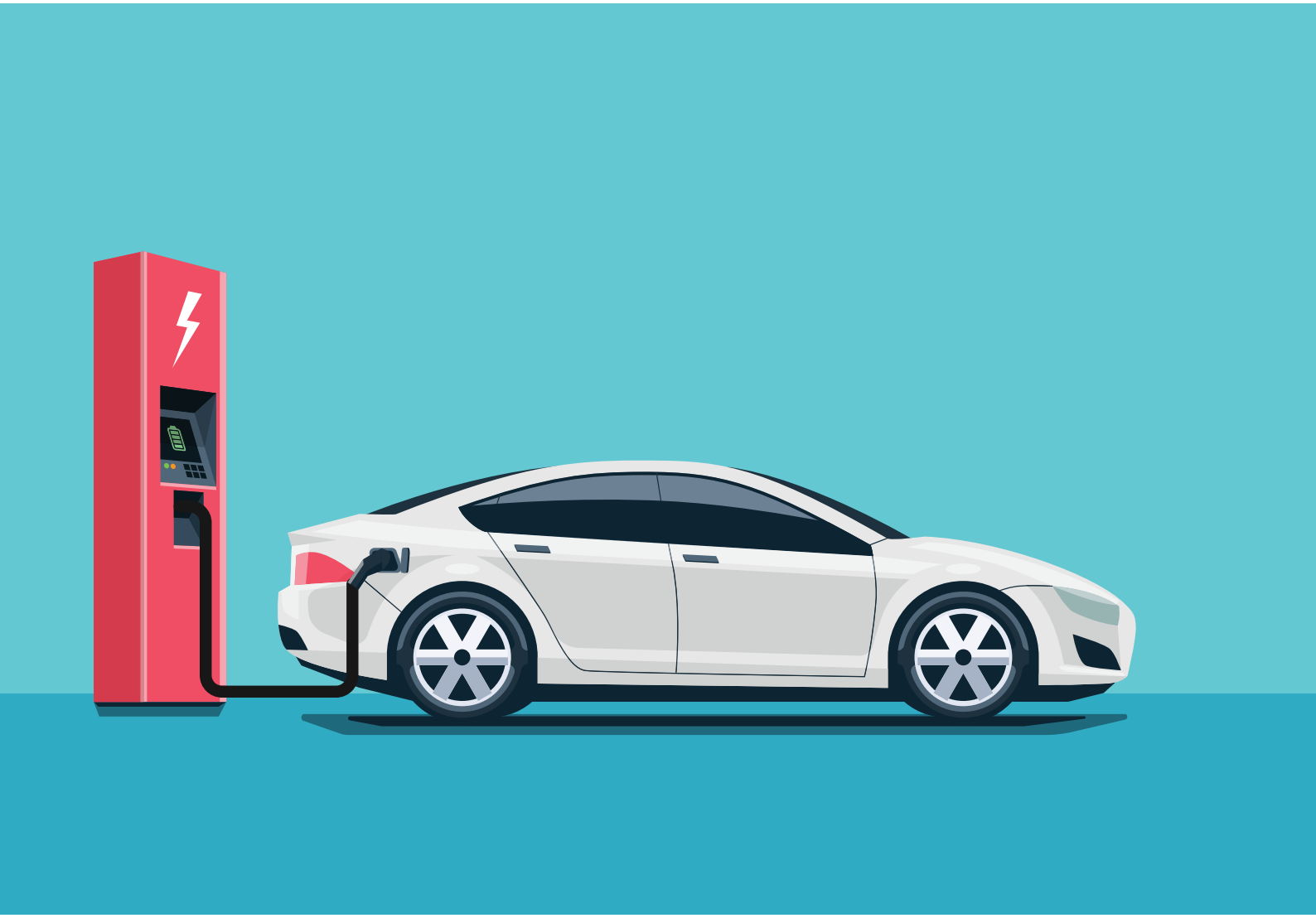
In the face of this, take it as a certainty that attempts to get faster charging and to eliminate the module stage in making large lithium-ion batteries will often succeed.

Reduced flammability and greater energy density will certainly be seen from an increasing minority of lithium batteries, particularly after 2025. Even some lithium-metal alternatives may prove to be safe. Some lithium batteries will avoid that worrisome nickel and cobalt.

Around 18% of the $3+ trillion level EV market in 2030 will be lithium batteries in a scenario unconstrained by supplies or recessions. Any improved performance and cost from solid-state and polymer batteries can only boost demand. The incumbent manufacturers are rapidly increasing output of lithium-ion batteries in the meantime.

Impressive newcomers to battery cell making are investing heavily to launch next-generation cells of their own technology, often for their own EVs. However, whisper it quietly, but savvy designers have the new discipline of eliminating batteries wherever they can. Maybe, around 2030, investors in yet more lithium-ion gigafactories will be lemmings jumping off the cliff. But only maybe.





Willy Wonka & the charging battery

The golden ticket to widespread EV adoption will rely on a large network of public charging points. Contributing editor, **Jordan O'Brien,** finds out what needs to be done to grow the UK's EV charging infrastructure.

Living with an EV is easy if you can install an electric charger at home, but for those relying on the public network, it can be notably harder depending on where you live. The UK government recently published a league table noting which councils are leading the way in terms of EV charging infrastructure, and for many districts across the UK, it's just not good enough.

There are 15,000 public chargers in the UK, but many of those are concentrated around large urban areas. If you live in London, you don't really need to worry about access to an EV charger as there are more than 4,360 in the capital alone, but for those in Barrow-in-Furness, a town of nearly 60,000 people, there's not a single charging point. In fact, there are 58 councils across the UK whose districts have fewer than 10 charging points.

The UK lags behind many European countries when it comes to the number of charging points, with the Netherlands having double the number of points compared to the UK. Both Germany and France also have more charging stations than the UK, although France has fewer per 100km of road.

It's estimated that the UK will need more than 2.6 million public charging points in order to meet the government's target of net zero emissions by 2050. Thankfully, there are a number of solutions currently in the pipeline that should speed up the rollout of EV chargers.

Local councils need to do more

Firstly, the government is urging councils to install electric charging points. It's making money available to local governments in the form of grants, making the burden on the council's finances lower. Most of that money is part of a £5 million fund for on-street residential charge points, which will fund 75% of the capital costs of installing a charger.

Unfortunately, many councils have admitted that it's not only the lack of funding that is a barrier to growing their EV charging network, but also the power network itself. While a city like London can attract large investment in its power infrastructure, with UK Power Networks spending £1.6 billion on upgrading cabling and installing new electricity substations, smaller towns and cities across the UK can't afford to do the same.

It's estimated that the UK will need more than 2.6 million public charging points in order to meet the government's target of net zero emissions by 2050

While it's true that a single home with off-street parking has more than enough headroom in their power requirements to charge an EV, the same can't be said for the rest of the power network. Power networks feeding business districts and town centres have complex needs, and often there may not be the headroom to simply whack in a few EV chargers and call it a day. Instead, they require an application to the distribution network operator, who then has the opportunity to upgrade the network, if needed.

Unfortunately, the UK's six Distribution Network Operators (DNOs) have a lot on their plate, and with applications for EV chargers coming in thick and fast, districts could be in for a long wait before their power infrastructure receives the necessary upgrade. However, the DNOs have committed to making applying for EV chargers easier than ever, with the process streamlined earlier this year, meaning installation times are quicker for those who have ample headroom to install a charger already.

Leveraging existing infrastructure

There seems to be a trend in the EV charging infrastructure market that sees installers relying on existing infrastructure and adding an EV charging point, rather than installing completely new hardware. We've already seen quite a few London lampposts turned into EV chargers, but now we're starting to see broadband cabinets receive the EV treatment too.

Nearly every street in the UK is equipped with a broadband cabinet, those green boxes at the end of the road, and it turns out those cabinets could be the holy grail for the rollout of EV chargers. That's because most public chargers are required to be smart, whether it's for payment processing or energy management, meaning they require a data connection. Hooking EV chargers directly up to a broadband cabinet is a surefire way to get a reliable connection.

The second major benefit of using broadband cabinets is the fact that they have the existing cable and ducting infrastructure running directly underneath the streets that will require EV chargers. That means it's easier than ever to just lay the cables in existing ducts, pave over them, and slap an EV charger on top ready for public use.

There are 19 companies working together on the rollout of this style of EV chargers, including Vattenfall, Cenex and Virgin Media, and it's hoped that more than 1,200 chargers will be installed across the UK using this method in the next 18 months. That's not exactly ambitious considering Deutsche Telekom has done something similar in Germany with more than 12,000 of its own cabinets, but at least it's a start.

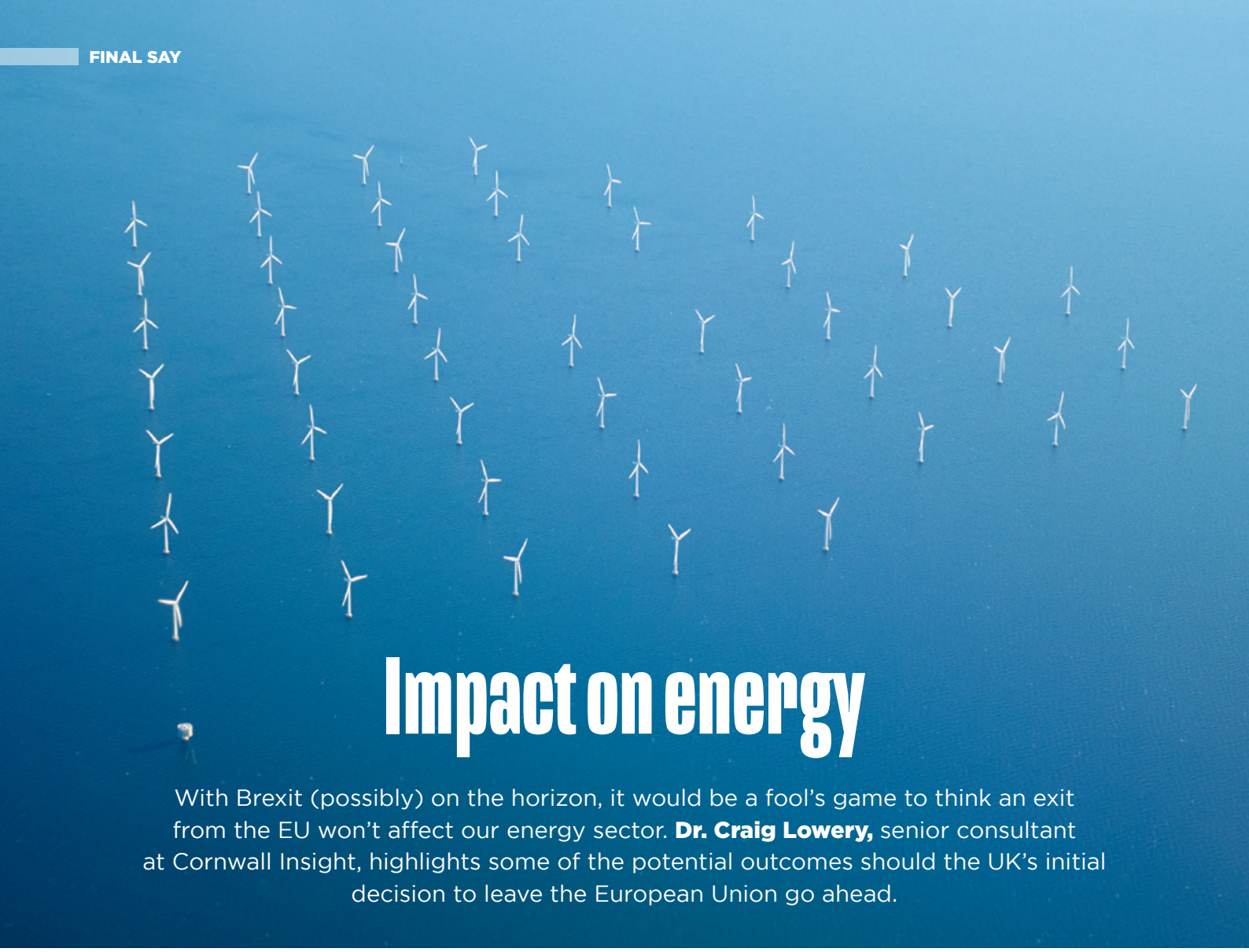
Future investment is needed

The UK government already has ambitious goals for the rollout of EV charging stations across the country, but with the 2019 general election upon us, many of the parties are promising to do even more.

The Labour party is promising a 'mammoth expansion' of the UK's electricity charging network, committing £3.6 billion of government spending in the rollout of both 'en-route' ultra-fast charge stations along motorways, and a mixture of 'about town' rapid and ultra-fast charge stations in more urban environments. It's also planning to create up to 3,000 new jobs for electricians and network engineers, as part of a nationalised industry responsible for the rollout of EV chargers.

Meanwhile, Boris Johnson and the Conservatives are promising to ensure that there's a charge point within 30 miles of each home in England and Wales. The party says it will plough an additional £500 million into electric vehicle infrastructure, on top of the existing £400 million it's already spending as part of the Charging Infrastructure Investment Fund (CIIF).

Whichever party wins at the December 12 election, it will need to sort out the country's charging infrastructure sooner rather than later, or we'll miss that ambitious 2050 net zero carbon target altogether.



Impact on energy

With Brexit (possibly) on the horizon, it would be a fool's game to think an exit from the EU won't affect our energy sector. **Dr. Craig Lowery,** senior consultant at Cornwall Insight, highlights some of the potential outcomes should the UK's initial decision to leave the European Union go ahead.

Let's start with the positives; how might Brexit benefit the energy sector?

As many of the UK's energy and environmental policies are enshrined in UK law – for example, the 2050 net zero ambition – much of the direction for the country in energy terms are set.

Where the UK may benefit is in the ability to potentially employ a lighter-touch approach to energy policies, which could include means by which to support investment, emissions pricing or measures such as the rate of VAT applied to energy. However, as with many Brexit-related issues, this depends upon the manner of the UK's departure from the EU and the nature of any enduring relationship after that.

With regards to the challenges posed by Brexit, what are the main areas we should be concerned about?

Investment in the energy sector may be adversely affected by the economic uncertainty surrounding Brexit, which could lead to higher costs in the long-term. For example, both the UK's onshore and offshore wind sectors have benefitted from support from the European Investment Bank (EIB), with this lost support needing to be replaced by commercial alternatives and/or state-backed solutions.

Due to the UK's reliance on imported energy, the need to implement enduring cross-border trading arrangements is important from a supply perspective. In cost terms, while clarity on any potential energy tariffs is pending, any post-Brexit weakening of sterling on foreign exchange markets would imply higher input costs.

How might these challenges affect your average energy customer?

In terms of costs, it will depend upon how different elements such as costs of imported energy, cross-border trading, tariffs and foreign exchange impacts are combined. From a domestic perspective, there remains a large proportion of the customer base that is on capped tariffs – due to Ofgem introducing a price cap on default energy tariffs – and therefore any potential for higher prices will be mitigated by this policy.

This would also be the case for those customers on any long-term tariff deals. However, customers on uncapped or shorter-term tariffs would be expected to see any changes feed through more quickly, with the same also being the case for non-domestic customers.

How might Brexit affect the future of the energy sector?

If there is prolonged political and macroeconomic uncertainty, as well as movements in the foreign exchange market, it may lead to potential investors in the UK seeking a higher rate of return to compensate for such risks. This underlying investment risk – coupled with the loss of the European Investment Bank's support – may have an adverse impact on new projects across the energy sector. This would raise the cost of borrowing, and hence development costs for new projects, leading to higher energy prices. However, higher energy prices would provide an upside for project developers, increasing forecast revenues and improving investor appetite.

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Now available in the UK, the Nanolink system offers a new solution to the age old problem of tool and equipment management.

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Unicrimp expands fire-rated products range

Unicrimp, part of the Scolmore Group of companies, has extended its Q-Fire range of fire-rated products to include new metal fire safe cable clips in two additional sizes – 40mm and 50mm. As well as enhancing the existing range, the new products will meet the increasing demand from customers asking for these particular sizes to assist with a range of installations that they are working on.

Designed for use when fixing cables down in 40mm and 50mm trunking, the fire-rated cable clips – with a pre-drilled 6mm hole in the base – are made from annealed steel and provide installers with a solution to help satisfy the latest IET wiring Regulations 18th Edition.

Unicrimp's fire safe cable clips are now available in 25mm, 40mm and 50mm sizes, with each size available in packs of 10 units.

Unicrimp • 01827 300600
www.unicrimp.com

New Smart Thermostat added to ESP's Sangamo range

ESP has added a new Wi-Fi thermostat to its Sangamo range of heating controls and time switches, providing installers with the opportunity to easily add a smart control function to their customers' home heating.

Coming under Sangamo's Choice range of heating controls, the Choice Wi-Fi Thermostat allows you to control and monitor the room temperature and thermostat activity from anywhere in the world, through the free to download Sangamo Choice app.

Features include: 100m open field range from thermostat to receiver (868mHz); seven day programmable and six programmable events per day; large LCD display with option for the thermostat to be wall mounted or used with the desktop stand; 5-35°C set point range and frost protection.

Wi-Fi function requires 2.4GHz network and thermostat to be powered with a mains supply or micro USB.

ESP • 01527 515150
www.sangamo.co.uk

Pilot Group launches innovative and advanced energy management system

Since acquiring Vickers Electronics, Pilot Group has invested heavily in product development, launching the upgraded EnergyMgr 2.0 system that can now control an existing lighting system (or new system which can be supplied by Hilclare) resulting in an all-in-one, cost effective management system.

The EMS integrates a central control unit with intelligent software and highly accurate digital sensors to optimise the performance of industrial heating systems. The EnergyMgr 2.0 features a synchronous burner control that circulates the residual heat after the burner has finished firing. The advanced self-learning optimisation programme with built-in algorithms process internal and external temperature readings to calculate how long the heaters should be running.

Unlike a conventional heating system, the sensors are responsive to changes in conditions and will automatically adjust the heaters to achieve the pre-set temperature.

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