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EDITOR'S Comment

As I look out my window at the carnage that is currently the great British weather, cherishing my last three roof tiles, I hope that by the time this issue goes to press, spring might have finally sprung. In fact, there are a lot of things I hope to have happened by the time this issue goes to press, not least be rid of this double whammy of tonsillitis and appendicitis I accrued from nowhere, but most of all, I do hope you entered our awards.

Entries to our ER & DCR Excellence Awards 2020 closed on March 6, which means by the end of the month we will have our short list, and we know what that means – judging time. As part of the panel I am very much looking forward to perusing all your entries – may the best products and projects win. And if you took part in our Reader's Survey, in this issue we take a look at what you had to say and reveal the all-important winner of our Apple Watch, good luck!

Claire Fletcher, Editor

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News



Over 10% of NHS estate to switch to 100% renewable electricity in April

NHS Property Services (NHSPS) has announced two new energy contracts via Inspired Energy that will see British Gas provide 100% renewable electricity and Corona provide natural gas to its properties across England by April 2020.

NHSPS is responsible for around 11% of the NHS estate, totalling more than 34 million sqft, with over 3,500 properties and 5,000 employees.

By moving to 100% renewable electricity, NHSPS will offset over 40,000 tonnes of CO2 per year, as part of its efforts to tackle climate change while promoting sustainable practices with all its buildings.

Retrofit of existing buildings is best route to net zero, says Priva

"The greenest building is the one that is already built" is the key message in a new report from the Government's Building Better, Building Beautiful Commission, which is supported by building controls manufacturer Priva.

Priva believes that the January 2020 report, which is largely focused on domestic buildings, offers much in the way of sensible thinking for both commercial buildings and those owned and operated by the public sector.

Currently, in many cases, it is cheaper – for tax reasons – to knock a building down and rebuild it rather than retrofit it, even though the former may be more environmentally intensive. The report highlights that as the built environment sector is currently responsible for up to 40% of the country's total greenhouse gas emissions, more needs to be done to encourage greener practices.

Gavin Holvey, UK and Ireland sales manager for Priva commented, "We can make so much more of the buildings we already have. With the addition – or upgrade of – building control systems and other energy efficiency measures, we can help to bring older buildings in-line with the performance of modern structures. Building from scratch is carbon intensive – we must therefore think smarter about approaches to the re-use and greening of our building stock."



ELECTRICAL APPRENTICE OF THE YEAR COMPETITION ENTERS NEXT STAGE



The second stage of the Electrical Apprentice of the Year competition is underway, after a month of deliberation from judges. Now, the top 20% of entrants will go to the second heat of the competition.

Kicking off in Corby, the second stage of this year's competition, which will run until April, will test the apprentices' understanding and knowledge of installation practices in a two-hour written exam. The eight highest scoring students will then go through to the Grand Final, which will take place at Scolmore Group HQ.





Project Success

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UK UTILITIES SECTOR QUADRUPLES INVESTMENTS IN EU SINCE BREXIT VOTE



The UK utilities sector has quadrupled its investments in the EU since the Brexit vote, while earnings have increased just a quarter, analysis of the latest ONS data has revealed.

UK outward investment positions by electricity, gas, water and waste firms were £1.3 billion in 2015, the year before the Brexit referendum, but increased to $\pounds 5.1$ billion in 2018 – up 292%, according to R&D tax relief specialist Catax.



European manufacturers critical to mitigating China components shortage

European manufacturers hold the key to alleviating worldwide shortages in LED and other lighting components as Chinese factories halt production in the wake of the coronavirus outbreak, lighting specialist Prime Light has said.

Prime Light has warned that businesses who rely heavily on imported products from China could be just weeks away from a critical component shortage, as the outbreak ripples through global manufacturing supply chains forcing factory closures.

The warning comes amid reports that electronics companies in China face significant production cuts and possible delays in launch of products, further disrupting component supplies and costs across the world.

In fact, as of the beginning of February, twothirds of the Chinese economy remained closed. More than 80% of its manufacturing industry is closed, rising to 90% for exporters. Whilst Chinese vendors have already increased component prices by 2-3% due to supply shortages triggered by factory shutdowns, with fears this could rise further unless the situation improves.

Although many factories are expected to reopen shortly, delays in the design and prototyping processes could cascade well into the coming months, said Prime Light.



Apprenticeship Management Group offer services to non-apprenticeship levy payers

The Apprenticeship Management Group, which currently looks after large levy paying organisations, is encouraging smaller businesses to make the most of apprenticeship benefits.

The government and Education and Skills Funding Agency has extended its apprenticeship budget to immediately accommodate up to 15,000 new apprenticeship starts from registered non-levy paying employers with more to follow. Apprenticeship management group director John Henry commented, "We can manage your access to training and to the necessary funding, so it is worth getting in contact. At the entry-level, training with an average cost of £4000 - £5000 for 12 -18 months of job-related skills training, will cost a business without their own levy fund a maximum of about £30 per month for a period of 12 months or so."

PRICE CAP DECLINES BUT IS EXPECTED TO FALL FURTHER STILL, SAYS CORNWALL INSIGHT



Due to the mild winter the UK has experienced, it will have come as little surprise that the price cap has fallen yet again. As a result of the warm winter and a healthy supply of LNG, wholesale prices have fallen to a 13-month low. This substantial reduction in wholesale prices has offset any rise in network and policy costs causing the default tariff cap to lower.

Are you an EV installer?

The rules on DC fault protection are changing for the 18th Edition*.

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GOSSAGE

"No true friends in politics"

In my December diary I pointed out that there might be problems ahead for the woman who had been appointed in the summer by Prime Minister Johnson to be president of the big fortnight-long multinational climate change conference, due to be held in Glasgow this November. I warned that Claire Perry O'Neill might not survive in post to complete the job.

How prescient my warnings are proving to be. I expressed concern that all her predecessors running these annual "Conference of the Parties" events had invariably been either heads of, or at minimum senior ministers in, the host government. I reported that our co-hosts, the Italian government, were already offended that somebody who was no longer a Member of Parliament, let alone a senior minister, had been nominated. I mused that their anger might be abated were Claire to become a Baroness. After all, everybody loves a Lady.

But the New Year's Honours List did not contain her name. Instead she received a Friday night telephone call from Johnson's Rasputin, the odious Dominic Cummings. He told her she had been fired, apparently because she wasn't a trained diplomat – an omission of which Johnson presumably was aware when he had appointed her. No replacement was named.

Just before, the former Conference President had warned in a BBC interview that there would be just "one shot" of success at this conference. If it failed, "it could mark the end of the global approach to tackling the problem of climate change". We have been warned.

"John Bull's other island"

Another fallout from Brexit. The island of Ireland as a whole is heavily reliant on energy from Great Britain. The Republic and the North have constituted one single energy market ever since the 1998 Good Friday Agreement.

This market constitutes an energy island save for just two underwater power links, both of which go to Great Britain. Most of Ireland's oil and gas imports come from the UK.

There is no prospect of gas or electricity ceasing flowing between the UK and Ireland, because energy trading isn't something that depends on EU membership. But the EU does govern the rules and standards around such flows, and that's what is causing concern in Dublin.

For instance, if the British government really does deliver on its threats to diverge on energy usage standards, it could get a lot harder to trade energy between them. It may also become difficult to address short-term shortages if the energy regulators are not cooperating as they used to through EU bodies.

Complications would also arise if disputes between the two regulators emerge, because given the UK's obduracy, those disputes could no longer be resolved by the European Court of Justice.

Because of this, state-owned utility EirGrid has pressed the European Commission for EU funding for a planned €930 million underwater electricity link across the Celtic Sea to France. This would enhance European energy connections: the project is a joint venture between EirGrid and French utility RTE.

"It's a project of common interest and a project of enormous strategic importance to an island nation which post-Brexit, is not connected to Europe," warns EirGrid CEO Mark Foley. Quite so.

Back to the future

Pause for thought for those convinced that achieving net zero carbon means electric heating will become the norm in all British buildings within the next 15 years. Currently over 80% of UK homes depend on gas for heating and cooking. For so long as gas produces greenhouse gases like carbon dioxide and methane, its days must be numbered.

But what if gas production could become as it was before North Sea Gas, when town gas was made available to homes that was more than 50% hydrogen, after being derived from coal?

Presently hydrogen is mostly produced for commercial use by extracting it from natural gas, which is carbon intensive. But technically it is equally easy to extract hydrogen from freshwater or seawater using electrolysis – a process that involves passing an electric current through water to obtain hydrogen and oxygen. When the hydrogen is burned it produces only water as waste, and no carbon dioxide.

Several trials are already taking place in the UK with existing gas distribution networks to supply homes with a mixture of up to 20% of hydrogen and natural gas. Others are developing networks that can burn 100% hydrogen.

However, current legislation bans more than 0.1% of hydrogen in the gas network. If either or both of these trials prove successful, the government will have to change legislation to allow such schemes to be rolled out to consumers, thus retaining the gas network of transmission and boilers.

Given the right regulations and market incentives, around 60% of the heat supplied to domestic, commercial and industry consumers could come from hydrogen in the gas network.

Sales of gas to buildings (its main market) have already dropped by one-third since 2005, thanks to better energy efficiency. It is reckoned that more insulation and modern glazing could easily reduce gas use by a further quarter by 2035. The future may not be quite as electric as many are naively assuming.





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Heating up history

Koen Verleyen, marketing manager at nVent, explores the rise of heat tracing cable technology.

eat tracing technology has become an essential addition to many industries, used widely to protect pipes and surfaces from freezing, and to maintain fluids at the right temperature for processing or storage. The technology, which has been finessed over several decades, works by applying heat to a pipeline or vessel to replace heat loss through thermal insulation to the ambient environment.

It's a growing area; the electrical heat tracing market is expected to be worth US\$3.26 billion by 2023. Today, the technology is commonly used in commercial and residential properties, to protect water lines, such as fire sprinklers and wastewater, from freezing. Its use also extends to roofs and walkways, to help maintain the process temperature of fluids, for example grease waste slips in factories and restaurants. The oil and gas industry, too, has come to rely on heat tracing technology to keep offshore vessels and platforms running safely and smoothly in freezing conditions.

Steam: The very beginning

Before the use of cables, steam was used as a traditional heat tracing system as early as the 1900s, due to its high heat capacity and suitable heat transfer coefficient. It works by dissipating its latent heat to the process pipe, to compensate for the loss in heat, enabling it to maintain a constant temperature. These benefits mean steam is still frequently used today, often in power industries, where it is already a 'free' by-product of the core process.

However, there are challenges to using steam. It can waste high amounts of energy, as more heat is provided to the system than is needed to maintain design conditions. It is also difficult to control the pipeline temperature and energy usage, which can lead to health and safety issues. Crucially, steam tracing systems can be costly to install and require regular maintenance to prevent leaks, corrosion or blocked steam traps.

Innovation in electricity

The development of electric heat tracing began in the 1930s, as a result of innovative chemical and electrical experimentation. With a unique composition of copper wires, packed in a sheath alongside powdered materials, such as magnesium oxide, mineral insulated cables were a viable alternative to steam, ensuring low flammability, even when used in extreme temperatures and conditions.

They were prone to fail at termination points in the presence of fire or moisture, and were unsuitable for use with heavy machinery as they could crack. Additionally, the magnesium oxide insulation was hygroscopic, causing the cables to draw in moisture and potentially cause electrical leakage. Early controllers were rudimentary and opportunistically adapted from other equipment. This carried some safety risks, as well as low accuracy levels.

Raising the bar with resistance

The 1950s saw a more specialised mineral insulated resistance heating cable enter the market. Conductors were constructed from high-resistance alloy, which made them more specialised, and therefore, more effective than their previous counterparts. This was a huge step for industries, such as oil and gas, which needed a solution for applications with high exposure temperatures, or with a high-power output. This development also helped to meet the need for specific temperature conditions in bitumen production and liquid salt in concentrated solar power (CSP) plants, as well as preventing condensation in incinerators.

Despite progress in this area, overheating and energy inefficiency continued to be a problem – particularly for many high-risk assets. Since they still contained magnesium oxide insulation, they needed to be designed carefully off-site to prevent electrical leakage. This made any on-site repairs or installations with last-minute changes challenging. Due to the intricate nature of the cables, they could also not be overlapped, leading to issues during complex piping installations.

Experimenting with heaters

Continuing with innovation in the area, specialised heaters for longline pipelines arrived in the 1960s. These worked by placing a current carrying conductor, energised at a high voltage inside a ferromagnetic tube, to allow a small current to be induced via magnetic inductance, causing resistive heating in the tube. This is known as 'skin-effect' heating and is limited to long runs of unbranched pipe work, between 1-15 miles (1.5-25 km).

As such, these heaters needed careful planning for the design of the transformers and equipment to ensure the required level of heating. Demand was therefore still growing for an effective solution that would suit smaller circuits as well.

Hitting a milestone

Through experimentation over the years, Raychem Corporation (now a part of nVent) developed the first conductive polymer self-regulating heat tracing cable in 1972. With polymer-based cables constructed from crosslinked polymers, a conductive path was created between conductors. In cold pipes, the core or fibre contracts microscopically, to open electrical paths and increase the current. In warms pipes, expansion disrupts electrical paths to lower the flow of current.

The introduction of self-regulating heating cables was a significant development, as power output could be more effectively regulated for the first time. Being able to control the temperature of pipework on a micro scale was crucial to overcome the overheating problem, in addition to lowering general energy costs. The wattage is also not affected by its length, enabling the self-regulating cables to be cut to length on-site —



helping to save time and energy.

Since this development, electric heat tracing technology has expanded to provide solutions for much broader applications, including roof de-icing, embedded snow melting, floor heating, window condensation prevention and marine applications. Globally, it has proved beneficial for use in harsh geographical conditions, such as the arctic and Middle East, as well as for specialised applications like sulphur transfer, crude oil transport, asphalt lines and oil well heating.

The development of electric heat tracing began in the 1930s, as a result of innovative chemical and electrical experimentation

Keeping it constant

Building on the success of self-regulating technology, constant wattage zone heaters have since been developed as a cost-effective alternative to mineral insulated cables. Their design is based on a constant wattage alloy, which is helically wound around an insulating core, shortening the deployed length of resistance wire. It is then wrapped around two insulated parallel bus wires, with alternating nodes at regular intervals, to create zones between 3-6 ft (1–2 m).

This functionality allows cables to be cut to length to suit varied wattage applications in the field, enabling heaters to be overlapped once. Constant wattage heaters are also are well suited to higher temperatures and as such, hazardous conditions.

Where next?

As the world is becoming increasingly digitised, the demand for more intelligent, responsive systems will drive further innovation in the industry. Taking advantage of smart technology and the Internet of Things (IoT), the latest heat tracing systems will be much more intuitive and able to be integrated into a smart device management network, allowing for unprecedented levels of insight and control — even in large, complex systems. **E**





Size matters

Rob Mather, solutions director at Power Control, discusses the often controversial topic of sizing DC cables and DC isolation.

here's no question that DC isolation is a means of preventing a direct current (DC) from transferring between two parts of a system while still allowing signal and power to transfer the parts. However, with so many isolation methods, there are questions about which one is best.

As stipulated in both the International Electrotechnical Commission (IEC) and the UK IET (BS 7671:2008), the Safe Extra-low voltage (SELV) of a direct current cannot exceed 120V DC. The guidance on how this is to be achieved is often interpreted differently. Some companies construe this to mean that the batteries must be separated to be under 120V (typically eight batteries) before deemed safe for an engineer to work on them. Naturally, the problem with batteries is that they are always live, so isolating them from a power source within a three phase UPS system, which will typically use between 30 and 60 batteries, is not achievable.

Whilst separating eight of the batteries is perhaps the safest method of DC isolation to comply with regulations, it is far from being cost effective. The batteries in each set of eight will require cabling back to a breaker, and then to the next battery in the string with the connecting links being added afterwards. In order to accommodate this, the DC isolators need to be much more complex. Connecting the end links on a battery string last, and the layout of the batteries in a cabinet or rack, should make it very difficult to cause a short circuit in error, and therefore be in compliance with these standards. Ensuring that all battery terminals have shrouds to prevent any exposed terminals is also required.

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Sizing a DC cable also causes conflicting opinions with companies forming their own interpretation of requirements.

Following compliance guidance from the NICEIC, at Power Control, we believe the DC cable should be sized to the maximum requirement of

The difference in current between a fully charged battery and a battery near full discharge can be 25%

a UPS in a worst-case scenario. When using this approach, the regulations also specify that the cable's maximum temperature rating needs to be considered.

In reality, the maximum demand from the UPS will only be in effect for a short period of time – most battery autonomies are designed at ten minutes. The difference in current between a fully charged battery and a battery near full discharge can be 25%. In addition to this, the fact that a majority of UPS systems are never operated at full capacity makes it clear to see why some suppliers may take a risk and undersize DC cabling to be more competitive on price or to simply increase their margin.

DC breakers and fuse ratings are much of a likeness, both remove electrical power from an electrical circuit. For example, if a 200kVA UPS requires 400A DC isolation to match the maximum demand, the chances of the breaker or fuses tripping on overload are almost non-existent. This is because the battery voltage will have collapsed and therefore the inverter will have turned off long before the breaker or fuses will have tripped – typically they have 20% overload for 30 minutes. The only real protection is offered if the DC cable between the batteries and the UPS is damaged to create a direct short circuit (the UPS DC fuses will also fail) and this is essential protection. DC isolation will prevent the UPS from having an internal short circuit; however, by their very nature, batteries cannot be isolated in this scenario and a battery short circuit may not be avoidable.

When configuring a battery design that requires multiple strings,

varying methods of achieving a required autonomy should also be considered. Such as, if there is a need for all of the batteries to be connected when a minimum autonomy of five minutes is desired, then all battery strings will usually need to be connected at the same time. However, if a ten-minute autonomy is needed, the battery set may be configured in such a manner to allow one string to be isolated for maintenance purposes. This would mean a level of redundancy would be built in without too many extra costs.

UPS suppliers should aim to allow for this in battery configurations whenever possible to make ongoing O&M much more manageable in the event of any work needed on the batteries during the lifetime of the UPS. A UPS operating at a reduced battery autonomy is preferable to one operating with no effective autonomy.

The method used to isolate batteries on a multiple string system is dependent on the supplier. A lot of suppliers will have a main DC breaker or isolator and then individual string fusing, this is a perfectly acceptable method. The problem occurs further down the line when a single string needs isolating. The standard fuses are there for protection, not isolation

A UPS operating at a reduced battery autonomy is preferable to one operating with no effective autonomy

when a voltage passes through them. Consequentially the whole battery set firstly needs isolating and then the fuses removing on the individual string before the rest of the batteries are reconnected.

I personally prefer individual string isolators to ease the maintenance process and allow any individual string to be isolated without affecting others. Where there is a concern of having to switch multiple isolators to remove electrical power from the batteries in an emergency situation, a DC breaker can be used with a shunt tip function and these can all be connected to a master emergency power off (EPO) switch.



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Building better

A transformational decade lies ahead for building and construction. **Gail Cook,** global head of marcoms at Glen Dimplex Heating & Ventilation, predicts the trends that will shake up the industry.

ccording to projections, England alone will need 340,000 new homes to be built each year until 2031 to house the ever-growing population. Making that goal more complicated is the Government's target to eliminate greenhouse gas emissions by 2050.

The demand for buildings that are better for the environment is growing, with 78% of people in the UK saying they believe environmentally sustainable building performance is important when choosing a new home.

Indeed, the building sector has an obligation to reduce its carbon footprint due to its high impact on our natural environment. Almost half of all emissions in the UK (45%) are linked to construction, operation and maintenance of the built environment. The challenge today is to provide high quality, attractive homes that are also low carbon, energy and water efficient and climate resilient.

Modular future

As the industry responds to changing requirements and demand, there are growing trends in green building technologies that will become more popular as we move through the next decade. This is especially relevant given all new housing must be Nearly Zero Energy (nZEB) by December 2020, paving the way for ultimately achieving Net Zero Carbon (NZC) buildings.

Modular housing will also become more popular in the drive to deliver carbon neutral construction. Often referred to as a 'prefabricated building', a modular build is pre-built in sections. Each of those sections is then transported to the location where the building will stand and the building is assembled on-site.

Modular buildings are subject to the same regulations and planning laws as traditional builds, but this won't stop them developing at a fast pace as they represent a quick way to rectify the housing shortage. A collective of organisations that includes Homes England, Urban Splash and the largest modular house building company in Japan, Sekisui House, has come together to support a £90 million initiative that will see the building of modular homes increased in the UK.

Not only does a modular build require less time and labour, the controlled environment means it generates less material waste too. The Waste and Resources Action Programme (WRAP) shows that a 90% waste reduction can be achieved by increasing the use of off-site construction.

Going for green

Rethinking building materials and sourcing locally will contribute significantly to gaining nZEB status. Materials with practical and ecological benefits such as cross laminated timber will, over time, usurp virgin concrete which uses more energy and depletes natural resources.

Fitting heat pumps and mechanical ventilation heat recovery (MVHR) systems will support high energy performance in new buildings and achieve low household bills, a double win for meeting carbon cutting targets and the homeowner's back pocket.

The challenge today is to provide high quality, attractive homes that are also low carbon, energy and water efficient and climate resilient

Renewable energy itself will continue to experience its surge in popularity, propelled by technology innovations. Advances in battery storage will help to combat the fluctuating natural energy sources of wind, solar and water. Cutting-edge sensors and devices will take smart technology to a new level, with heating, cooling, lights and water controlled in more intelligent ways.

How the industry can respond

In an effort to address climate change, builders and engineers can embrace these green technologies in 2020 and beyond. The industry can also respond in other ways:

Understand the language of sustainability

The UK Green Building Council is working with the Government to help shape the meaning of the 'net zero' terminology, but understanding its precise definition and what it means for your business and your customers is essential.

Educate customers

A home can have excellent energy efficiencies, but maximising them is reliant on those who live there. Many construction companies now provide energy efficiency training to new residents and motivate them by sharing performance data on their nZEB homes.

Make a declaration

Using products with Environmental Product Declarations (EPD) is becoming increasingly important for the construction industry. These green certifications demonstrate sustainability credentials, helping to improve a property's long-term value and attract and retain tenants and residents.

There is no silver bullet for global warming, or the challenges generated by a growing, urbanised population. However, the building industry is a significant driver of social change and a substantial contributor to the environmental footprint. Now is the time to rise to the challenge.



Intelligence report

Karl Walker, market development manager at Beckhoff, discusses what the term "smart building" might mean from various viewpoints and explains why data is the key to a truly effective intelligent building.

hat is a smart building? There isn't one discernible answer as it really depends on who you ask. A "smart" feature could be as simple as ensuring heating and cooling are never delivered into the same space at the same time. However, this is rarely guaranteed as the two systems have likely been installed by two different contractors with no one taking responsibility for the interaction between them.

The Construction Innovation Hub's 'Smart Buildings Project' – a consortium of the BRE (Building Research Establishment), the MTC (Manufacturing Technology Centre) and CDBB (Centre for Digital Built Britain) – describes a smart building as follows:

"A smart building should be intelligent, sustainable, secure, adaptive and occupant-centred in its design, construction, operation and integration with other smart infrastructure within the built environment. It has a passive environmental design with digitally changeable characteristics that react, learn and predict any alterations within its internal and external environment."



Misused, misunderstood

The word "smart" has become somewhat misused and misunderstood due to the proliferation of domestic Internet of Things (IoT) devices, e.g., smart meters, smart lighting and smart thermostats. Very few of these devices will ever form part of a truly smart solution.

As an example, a smart meter in the home does nothing to save energy itself – it merely presents the user with information that 'might' allow them to make some informed choices as to how they 'might' use less energy. A smart lightbulb that you can control from your phone can still be left on all day. Without a controlling infrastructure behind these devices and software to analyse all the data, a smart building cannot be achieved.

To the casual observer, however, a smart building could be anything

from a modern high-rise office building with multifunctional, interactive control panels to a professional footballer's house boasting state-of-theart audio-visual and security systems controlled from a smartphone app. In reality, a building should only really be considered smart if it is performing the functions the end-user wants it to perform efficiently and with minimal input required from the user.

Let's break this down and consider what a smart building might mean for different people:

Housing tenants

A social housing tenant experiencing fuel poverty is not going to be interested in a lightbulb that can be controlled from a phone, but a service that is convenient, comfortable and offers lower energy costs will be of utmost importance. In contrast, a tenant of a private rented sector (PRS) development in the city is likely to be far less concerned about energy bills but will be keen to enjoy the full interactive experience.

Domestic landlords

A domestic landlord, such as a housing authority, will most likely use smart technology to ensure that their property isn't being abused by the tenant (e.g. damage from condensation where an extractor fan isn't being switched on in areas of high humidity, such as kitchens and bathrooms) and also to ensure that assets are working correctly and have been correctly maintained (e.g., boilers or emergency lighting systems). This has taken on greater importance since the publication of the Hackett Report in the wake of the Grenfell Tower disaster.

Commercial landlords

Energy efficient smart working environments are now seen as a way to attract and retain the best workforce, and this presents a great opportunity to landlords of commercial premises. Commercial buildings that attract such tenants are able to set premium rental rates and for this reason commercial landlords will want their smart buildings to create better, more comfortable and healthy working environments.

Creating "exciting" workplaces is a big consideration for potential employees. Indoor air quality (IAQ) has become the major factor for healthy workplaces, and high levels of VOCs and CO2 have been proven to seriously reduce worker efficiency and performance levels and highly impact on absence through sickness.

Facilities managers

Facilities managers and building owner/operators require proactive/predictive maintenance through the continuous monitoring of assets, energy performance monitoring (e.g., by the comparison of similar buildings), utilisation and optimisation of space.



For effective predictive maintenance, data needs to be captured from all sensors and controllers throughout the building or estate. This can then be consolidated onto a single platform, where the environment can be accurately controlled according to the needs of the occupiers, and recommendations can be generated that can be operationalised and turned into work orders for facilities managers.

Cloud-based platforms allow comparisons to be drawn from data from similar buildings so that performance can be benchmarked. This could lead to 'exemplar' control methodologies and strategies being rolled-out to other buildings or be used to pinpoint hot-spots or pinch-points in control processes.

Main contractors

Main contractor/construction companies need to be able to monitor and understand the performance of buildings e.g. thermal performance of the building's envelope, actual energy performance vs modelled (which, as we know is always wildly different – see the BRE's excellent *Bridging the performance gap: Understanding predicted and actual energy use of buildings* report), and changing the layout of buildings to adapt to the ever-evolving patterns of working life, for example through the monitoring of people's movements through the building, which record occupancy patterns that reveal how spaces are used.

The requirements of the users of buildings are unlikely to be considered by the main contractor during the construction phase and, of course, there is no way of knowing how that building will be eventually used. Problems are almost always uncovered in the post-occupancy phase and most smart control is implemented retrospectively, attempting to use existing disparate control hardware. Wireless technologies and the Internet of Things have made it easier to install additional sensors and converge systems into one centralised system or cloud-based platform.

The power of data

Whatever your idea of a smart building is, the key to ensuring it achieves what you want it to is data – lots of it! Through the combination of data within existing building control systems and that of additional sensors, knowledge can be generated by software systems which could include analysis of historic data using machine learning and other artificial intelligence algorithms.

The more sensors you have in the building, the better. Measurement and control to a highly granular level is always the best strategy. In a domestic environment, this might mean having temperature and ventilation control in each room. There is no point in having a smart thermostat that controls the temperature throughout an entire house if, say, two of the four bedrooms are rarely used.

A good control strategy or systems should be able to deliver the required data to all interested parties. There is no point in implementing a system that delivers the ultimate user interaction experience if the data cannot also be used by, say, an FM company to ensure the smooth operation of the building and ensure that potential problems are highlighted before they occur. It is also very important that this communication works both ways so that external software has the ability to calculate optimised parameters and adjust the operation of the systems accordingly.

Whatever its size, type or purpose, if a building is smart it will be easy to manage, it will run efficiently, be adaptable to future changes and ensure a comfortable environment for its occupants.

Where the smart money is

Mark Redfern, managing director at Wieland Electric, looks at the role modular wiring plays in creating truly intelligent buildings and how it offers flexibility for the future in commercial buildings.

> Future new technologies, products and systems in the building industry will create new opportunities to help the environment, end-users, and make significant cost savings

n an increasingly connected world, the term intelligent building has become part of the common vernacular but, to leverage the future-focused capabilities of an intelligent building, strategic planning is vital. Numerous options are available in terms of building and system design, and in order to meet the need for a flexible, cost effective and reliable power infrastructure, there has been a significant increase in the use of modular wiring systems.

The concept behind modular wiring is simple – from a pre-approved design, a manufacturer produces and tests a system in a quality-controlled environment, providing a complete installation from the respective distribution board, to the furthest point of a circuit. This process is highly efficient and can reduce installation times by up to 75%.

Virtually any intelligent building, regardless of size and complexity, can utilise this technology, with components delivered to site and simply connected together in a complete 'plug and play' installation that can be used for a wide range of building services – from lighting and security to heating, ventilation and air conditioning (HVAC). It vastly reduces, and in many cases eliminates, the need for on-site electrical connections and cuts the number of qualified electricians required to carry out installation work. Furthermore, installation schedules can be completed with greater predictability and by reducing work on-site, there is far less risk posed by improperly configured assemblies.

During the second-fix stage, for example, the rapid speed of connection is impressive, and this gives project managers the flexibility to free up personnel more quickly to tackle other work. Additional time savings can also be achieved by making use of innovative product developments, such as a flat cable connection system that combines a busbar and cable into one product. These use a safe tap-off adaptor with a piercing contact that eliminates the cutting and stripping of cable. Leading manufacturers will also be able to provide support at all stages of the project, ensuring that installations are standards compliant, for guaranteed performance and reliability.

Creating an intelligent building involves more than just connecting the various facilities systems and building services. There is growing recognition that buildings that can continually adapt to how they are being used are more efficient and can save energy, while increasing occupant comfort and productivity.

Modular wiring installations are simple to reconfigure and allow for future design changes. Structured wiring systems do away with on-site cutting and fabrication, eliminating wastage and improving health and safety. There is also less packaging and what there is can often be re-usable, so the cost of waste removal from a site will be avoided. Exact quantity ordering also means that materials are not over-supplied and waste is therefore reduced, while components can even be packed and labelled on a room, zone, floor or even building basis.

A building that has a modular wired infrastructure can facilitate changes of use so that lighting, HVAC and other building services can be quickly reconfigured to maintain the desired comfort conditions and avoid extensive re-wiring work. Having a traditionally wired system in place can make such changes very complex and time consuming, and can prohibit the ability of intelligent buildings to evolve over time to best suit occupant needs. Conversely, a modular wiring system reduces disruption and overall cost when it comes to optimising space.

Safety is also a key benefit of modular wiring and systems must meet the requirements of BS 8488, which identifies the need for system design,



Modular wiring installations are simple to reconfigure and allow for future design changes



installation and verification for conformity with BS 7671, and guarantees that manufacturers supply solutions that meet a defined standard.

When it came into force in 2013 the Construction Products Regulation (CPR) laid down harmonised rules for the marketing of construction products in the European Union (EU). Most cables within Europe that are designed for permanent installation within commercial buildings have been subject to the CPR and covered by BS EN 50575 since 2017. For modular wiring systems this means that, while the assembly itself cannot be tested to CPR standards, flexible cables used in the construction of the system should be compliant with the standard.

Future new technologies, products and systems in the building industry will create new opportunities to help the environment, end-users, and make significant cost savings. Modular wiring technology delivers tangible, commercial and operational benefits, provides occupants with a more effective working environment, and offers the potential to develop a building into a truly intelligent facility.

Furthermore, these benefits increase as new manifestations of the modular wiring concept come to the market. In order to take full advantage, system design must be flexible and agile, and ready to respond to new applications and changing needs.

Cool strategies

Variable speed drives generate heat – that's a fact of life – and usually that heat is unwanted. But what's the best way to deal with it? **Alan Baird,** country manager UK and Ireland at Danfoss Drives looks at the options.



eat, when it's not required, is always a problem, and the best solution, in an ideal world, would always be to eliminate it at the source. But that's not always possible. Consider, for example, variable speed drives (VSDs). There are no VSDs in existance that do not produce heat while operating and it's very unlikely that one will be developed anytime soon. That doesn't mean, however, as all VSDs are equal in this respect.

The amount of heat produced by a VSD is inversely proportional to its efficiency – hence, the more efficient the VSD, the less heat it will generate. And, since high efficiency also reduces running costs, the message is clear: always start by choosing the most efficient VSD available that will suit the application in hand. Except in the smallest sizes, modern VSDs can be expected to be up to 98% efficient, so only 2% of the energy they use is converted to waste heat. That's an impressive performance nevertheless, and with large drives it can still amount to a lot of heat.

Consider, for example, a 450kW drive as might be found in many industrial applications. This will generate 9kW of heat, which is quite enough to be problematic! And if several VSDs of this size are in use close to each other, the problem increases proportionally.

What's to be done? If the VSD (or VSDs) have a high IP rating such as IP54, that can be used without an additional enclosure, the most usual answer is to provide air conditioning for the room in which they're installed. If they are of a lower IP rating such as IP20 for instance, which



have to be installed in a control panel, the panel will need to be force ventilated, which means fitting fans and filters. And the room in which the control panel is installed will still need air conditioning.

Actually, if only a few small drives are involved, these solutions will most likely be perfectly adequate. With big drives or multiple drives, however, the cost of running the air conditioning system continuously to remove the heat quickly becomes prohibitive for a number of reasons, including the running cost and additional noise generated. And, for panel mounted drives, there's the extra cost of the energy to run the forced ventilation fans to be considered, not to mention the cost of the air filters, which will need to be changed periodically.

Surely there has to be a better solution? In fact, there are two solutions, as we shall see. The first is back-channel cooling, which is available as an option for all Danfoss VLT high power drives. In these VSDs, the power devices are mounted on efficient aluminium heatsinks, which are arranged so they shield the control electronics from the heat produced by the power devices. The heatsinks are also designed so that they form a continuous channel at the back of the drive, over which cooling air can flow.

VSDs with back channel cooling are arranged typically with the aid of a simple and low cost ducting system, so that they draw in cool air from outside the building in which they are fitted, pass the air through the back channel formed by the heatsinks, and then discharge the warmed air into the environment. As a result, heat corresponding to only around 0.3% of the drive rating is released into the room where the drive is installed. With our earlier example of a 450kW drive, the heat released is significantly reduced from 9kW to 1.35kW, which is far more manageable.

With this reduced heat release, air conditioning may not be needed at all and, in those cases where it is still necessary, the running costs will be very much lower than they would be if conventional drives had been used. When back-channel cooled VSDs are mounted in control panels, forced ventilation is rarely – if ever – needed. In addition, the ducting kits supplied for use with these drives ensure that the IP rating of the panel itself is never compromised.

Back-channel cooled VSDs are an ideal solution in many applications, but particularly where space is limited or where it would be difficult to install ducting, another option is available: liquid-cooled VSDs. These work on the principle of a simple heat exchanger.

Liquid is circulated around the heatsinks that power electronic devices, such as Insulated-Gate Bipolar Transistors (IGBTs) and other heat generating components are mounted, from which it removes the heat. The liquid is then routed via pipes to a radiator where it loses the heat to the environment. The benefits are that the pipework is small and easy to accommodate and that, if necessary, the radiator can be mounted at a considerable distance from the drive. With this arrangement, as with the back-channel air-cooled drives, very little heat is released into the room in which the drives are installed.

The best liquid-cooled drives are those which have been designed specifically for this form of cooling, rather than simply being air-cooled

When back-channel cooled VSDs are mounted in control panels, forced ventilation is rarely – if ever – needed

types that have been adapted for liquid cooling. In fact, dedicated liquid-cooled drives offer additional benefits. They are physically smaller than air-cooled drives with the same power rating.

Their small size and reduced weight make liquid-cooled VSDs a popular choice for marine applications, such as the control of bow thrusters and propulsion motors. More recently, they are increasingly finding applications on land.

All VSDs generate heat, but as we've seen, dealing with this heat doesn't have to be a problem. With smaller drives – provided that high efficiency types are chosen – special measures are unlikely to be necessary. For high power types, back-channel cooling provides an effective solution where access can be gained to the outside air reasonably easily, while liquid-cooling provides a very versatile solution for more challenging applications.

So, whatever the VSD and whatever the application, there's no need to feel the heat – a cool strategy is always available! \mathbf{E}

Raising the bar

Mark Rushton, UK marketing manager at Harting Ltd, explains how RFDI technology is helping the company's European Distribution Centre set new standards in logistics.

n the summer of 2019, Harting opened its new European Distribution Centre (EDC) near its head office in Espelkamp. With around 300 pallet storage locations, 13 loading gates and up to ten thousand shipments being sent out per day, the ability to identify and locate components and track goods across the facility were a key concern. In order to fully digitise processes and optimise the flow of goods, Harting installed its own range of RFID (radio-frequency identification) hardware and middleware within the facility.

A key benefit of RFID is that, unlike barcodes, you do not need direct line of sight to read the transponder

RFID allows you to digitally monitor the physical location of items and assets. It is extremely flexible and can be used in a variety of environments. For example, it can be employed in hospitals to track, locate and digitally update the sterilisation history of medical equipment; and within train maintenance and servicing depots, to identify individual components such as axles or wheels.

A key benefit of using RFID is that, unlike barcodes, you do not need direct line of sight to read the transponder. It's also possible to get information and data from multiple tags at once, with the highspeed technology allowing you to read up to 300 tags per second. They're also able to cope with harsh, industrial environments and can endure wide temperature variations, high humidity and continue to be readable in dirty environments where the tag may become coated in oil and grease.

Another huge advantage of an RFID system is the improved security it offers. The risk of counterfeiting and forgery is reduced massively because transponders can be encrypted and password protected.

Within the EDC, Harting utilises RFID technology to reduce delivery errors and make distribution as efficient as possible. As goods arrive, a sophisticated software system automatically assigns pallets a designated space. These pallets are then equipped with RFID transponders, which allow them to be tracked to ensure the most efficient flow path through the warehouse. Correspondingly, goods-moving equipment and forklifts are equipped with UHF RFID readers, which can then communicate with and read the transponders attached to the pallets.

During loading and delivery, the goods are assigned a unique identifier, which is written onto the rewritable transponders. When the forklift operator receives an order via their terminal, the RFID technology automatically checks and determines whether the pallet matches the order. In addition, the storage location is also identified by RFID transponders embedded in the floor, meaning the forklift driver is immediately alerted if pallets are transported to the wrong storage locations. This helps to improve efficiencies and speed up the distribution process.

A similar system is used to ensure the loading of goods onto lorries is as well organised and cost-effective as possible. The loading ramp has transponders embedded in the floor, which automatically check that the goods on the pallet tally exactly with the transport order. This ensures that goods are loaded onto the correct truck, helping to eliminate incorrect deliveries. Booking processes are carried out automatically, which saves additional time and increases efficiency.

One of the biggest technical challenges in implementing these RFID applications within the Harting logistics centre, was ensuring reliable identification of both components and the storage bins. Due to the surrounding logistical environment, which contains objects which can reflect, block or absorb signals, it was important to select the correct hardware and software. Rather than the classic RFID gate solution, Harting opted to install local, spatially well-defined reading zones, which eliminate the accidental misidentification of pallets or storage areas and means the middleware does not need to filter out misreads.

Another huge advantage of an RFID system is the improved security it offers. The risk of counterfeiting and forgery is reduced massively

The technological advancements even extend to outside the building; as drivers enter the premises, their vehicle is immediately identified by the RFID system and the barrier raised to allow entry.

As well as RFID, the EDC is equipped with other ultra-modern intralogistics solutions which are used in different areas. The flow of goods through the distribution centre is completely paperless and energy and machine data is recorded and evaluated by edge computing devices, which is then used for preventative maintenance.

In the future, it is hoped that artificial intelligence will further develop and improve logistics technology in the EDC. For example, autonomous route optimisation of automatic guided vehicles (AGV) and intelligent palletising solutions for shipped items of different sizes and weights are all being considered as we move further towards an automated digital future.



Harting's new European Distribution Centre opened in the summer of 2019



RFID is extremely flexible and can be used in a variety of environments

EVENT PREVIEW

Smart Manufacturing

Manufacturing extravaganza set to return to NEC in April 2020

The biennial co-located events – Drives & Controls, Smart Industry Expo, Fluid Power & Systems, Plant & Asset Management, and Air-Tech Exhibitions – are once again set to return to Birmingham's NEC 21 - 23 April 2020, alongside MACH 2020.

rives & Controls Exhibition 2020 will once again bring together key suppliers of state-of-the-art equipment representing the multi-tasking culture of today's design engineer, covering critical areas such as energy efficiency, machine safety, drives, motion control, robotics and automation plus much more, all under one roof. With the advent of the smart factory, Drives & Controls Exhibition 2020 is an essential source of technological and engineering information and is fully supported by GAMBICA and EPTDA.

Returning exhibitors include Beckhoff, B&R, Rittal, Weidmuller, Mitsubishi Electric, Radwell, Bosch Rexroth, Elmo Motion Control, Binder, Carlo Gavazzi, Eaton Electric, Finder, Harting, Hepco, HMS Industrial, Leuze Electronic, Control Techniques/ Nidec Industrial Automation, Omron, Pilz Automation Technology, Renold, plus many more returnees.

GAMBICA and the European Transmission Distributors Association will again be hosting pavilions where members will be promoting their activities.

Smart Industry Expo 2020

To complement the Drives & Controls Exhibition is the now firmly established Smart Industry Expo, where visitors will have the ideal opportunity to learn about digitalisation and how to prepare and implement a strategy in this smart era, as well as being able to discuss a wide range of issues from components to Predictive Maintenance 4.0, Logistics 4.0, and smart grid technologies amongst others.

Other areas covered include: components for IT-based automation solutions that will bring fundamental change to all in-factory processes, IT security, as well as smart technologies that manage and coordinate power, gas and heat networks so that capacity can be balanced and optimally deployed across the entire energy system – integrated energy, plus much more.

MTC 2020

New for 2020 is the significant announcement that the Manufacturing Technologies Centre (MTC) has confirmed a 100sqm pavilion within Drives & Controls and Smart Industry Expo where it will be joined by its members.

The MTC was established in 2010 as an independent research and technology organisation, with the objective of bridging the gap between academia and industry. Its role has also increased to cover not only R&D but also training, advanced manufacturing management and factory design and it now has over 700 employees working with it. The MTC has helped hundreds of companies across a range of industries and over 100 of them have become members of the MTC. Its presence at Smart Industry Expo and Drives & Controls highlights the importance that the MTC attributes to these key sectors.

Air-Tech 2020

Running alongside Drives & Controls Exhibition and Smart Industry Expo, will also be Air-Tech 2020, which is set to highlight current key themes connected to the very latest in air compressor and related technology from companies from around the globe. The event is supported by the British Compressed Air Society (BCAS) and is the UK's only dedicated event for the compressed air and generators market. Vanda Jones, the British Compressed Air Society's executive director, comments on its presence at the key industry event, "As the UK's only dedicated exhibition for the compressed air, generators and vacuum market, Air-Tech is an ideal chance for visitors to keep up-to-date with all the latest developments in our industry.

"For BCAS, it is an ideal opportunity to engage with manufacturers, distributors and end-users alike, and for us to provide impartial advice about legislation, standards and technical issues. Events like Air-Tech are more vital than ever over the next two years because it brings our industry together to understand issues that affect us all."

Visitors to Air-Tech will be able to see a wide range of equipment and solutions, including the following:

- Accumulators, actuators, air delivery systems and air motors.
- Compressors, cooler tools and cylinders.
- Vacuum systems and generators.
- Displays and meters.
- Filters, fittings, heat exchangers and hoses.
- Instruments, lubricators, manifolds and mobile compressors.
- Pumps, regulators, sensors, software and valves.

Plant & Asset Management 2020

The co-location will also include Plant & Asset Management 2020, the UK's premier event for plant, asset, maintenance and works management engineers and directors.

Industry spends huge sums of money maintaining its plant, machinery and building assets and, because of constantly increasing business and financial pressures, there is an on-going need to achieve the maximum performance from those assets.

Plant & Asset Management 2020 will therefore showcase the very latest in condition monitoring, CMMS, outsourcing/contract maintenance, energy efficiency, boilers/burners/combustion, handling and storage plus much more.

Fluid Power & Systems 2020

In addition, Fluid Power & Systems 2020, will focus on a comprehensive range of hydraulic and pneumatic equipment, together with products that facilitate better electro-mechanic system design and application for improved process automation, control, monitoring and analytics.

Fully supported by the British Fluid Power Association (BFPA), Fluid Power & Systems comprises the largest gathering of world-class companies displaying and demonstrating the latest in mechanical and electro-mechanical equipment.

Whatever your industrial sector, whether engineering, construction, offshore/marine, oil and gas, agriculture/farming, automotive, aerospace etc., Fluid Power & Systems offers a convenient one-stop shop for all your fluid power and system requirements, including:

- Hydraulics: Industrial and mobile, including pumps and power packs, cylinders, valves, motors, heat exchangers, and accumulators. Filters and sealing technologies.
- Pneumatics: Valve and valve islands, linear and rotary actuators, air motors, FRLs and other treatment technologies.
- Systems: Electro-hydraulic and pneumatic systems design; CAN bus technology; process automation; monitoring and control; modelling and simulation.
- Instrumentation: Sensors, switches and controls as applied to fluid power; temperature, flow, pressure, liquid level, position.



Digitalisation and Engineering Forums

At a time when engineers are under increasing pressure, and time out of the office for attending exhibitions needs to be balanced against heavy workloads, one growing justification is attending a well-balanced and focused seminar programme where gaining further industry knowledge is at the core.

Located at the heart of the 2020 co-location are The Digitalisation and Engineering Forums. With a strong emphasis on technology, The Engineering Forum will bring together all aspects of plant and asset management, hydraulics, pneumatics, robotics and automation, energy efficiency, machine safety, drives, motion control, legislation, system strategies and technological developments. Featuring representatives from across industry including government agencies, research bodies, trade associations, and manufacturers.

The Digitalisation Forum, sponsored by Pilz, will fully reflect the ongoing global transformation to the smart manufacturing era and provide a fascinating insight into the potential plants of the future, covering all aspects of digital transformation across the manufacturing spectrum. Leading experts will address the vast array of information around 4IR, discussing the practicalities, technologies and issues surrounding transition and implementation of digitalisation in UK manufacturing.

Over the course of the three-day seminar programme, visitors will have the opportunity to learn how they can seize the opportunities that exist and promote the benefits of adopting emerging digital technologies.

The variety and scope of both forum programmes for 2020 is extremely exciting, adding real value. The combination of leading manufacturing events, with a highly engaging seminar programme, will give visitors a genuine opportunity to keep abreast of the latest industry developments.

For regular show updates, full Digitalisation and Engineering Forum seminar programmes and to register to attend, please visit the official websites: www.drives-expo.com www.smartindustry-expo.com www.fluidpowersystems-expo.com www.airtech-expo.com www.maintenanceuk-expo.com

Exploring the energy saving benefits of modular ups



Riello UPS sales manager **Chris Cutler** explores the evolution of modular uninterruptible power supplies and unveils a major upgrade to their own award-winning Multi Power range.



s we head into the 5G era, demands on data centres and computer processing power are surely set to soar. Even today, the 200 million-plus followers of Cristiano Ronaldo's Instagram account use 30 megawatt hours of electricity viewing each of the football superstar's latest posts.

Data centres in the UK already consume around 2% of all UK electricity. The biggest bit barns having an annual bill upwards of £3 million and using enough energy to power 300,000 homes.

Industry and technology manufacturers have made great efforts to reduce power consumption and improve efficiency. But there's evidence that the gains of Moore's Law are starting to slow.

Research from the Uptime Institute found that almost two-thirds (65%) of the energy used by data centre IT systems accounts for just 7% of the processing work. This is because of ageing equipment and efficiency improvements plateauing.

Energy accounts for around 60% of a data centre's overall running costs. So any efficiency savings across the entire tech stack are welcome, both economically and environmentally.

Explaining efficiency gains

Thankfully, UPS technology doesn't stand still. Compared to a couple of decades or even a handful of years ago, efficiency has come on in leaps and bounds.

While there's still a place in certain circumstances for monolithic, transformer-based UPSs that can only achieve optimal performance and efficiency when carrying high loads of 80-90%, for most applications today there are more efficient solutions.

First, we had the introduction of transformerless UPS systems. Not only are these far more efficient compared to their transformer-based counterparts, but they also generate far less heat so don't need as much expensive and energy-intensive air conditioning.

Following this progress came modular uninterruptible power supplies. As the name implies, modular solutions allow greater flexibility and scalability than a standalone UPS does.

They start with a cabinet that is populated with multiple power modules working together to provide the necessary power and N+1 redundancy. This enables the UPS system to closely mirror the load requirements at initial installation, which reduces the risk of wasteful



oversizing and cuts unnecessary energy losses.

Say you're supporting a 100 kW load with a modular cabinet that holds five 25 kW modules. It shares the load across its 125 kW total capacity. If any of the individual modules fail, there's still enough power in the remainder to fully support the load without interruption until the faulty module is replaced.

The MPW range is capable of achieving exceptional efficiency of 96.5% in online double conversion mode

Such redundancy in this example requires just a 20% increase in capacity compared to the full load. However, to achieve the same N+1 redundancy with a monolithic UPS would need a completely separate uninterruptible power supply in case of failure – 100 kW + 100 kW, or a 100% capacity increase.

Another major advantage of modular UPS systems is their inherent scalability. As power requirements increase, you simply "pay as you grow" by plugging in extra power modules or adding cabinets in parallel as and when required.

This vertical and horizontal scalability offers end-users capacity ranging from as little as 15 kW to more than 1 MW plus redundancy in a single UPS system. This helps future-proof their power protection plans for years to come without wasting energy, floor space, or air conditioning.

Power modules are all hot-swappable too. This means there's no need for any downtime during general maintenance and service visits.

Relaunching Riello UPS's modular Multi Power

Riello UPS's own award-winning modular solution has undergone something of a recent revamp. We're officially unveiling our new and improved Multi Power range at Data Centre World this month (11-12 March).

The exciting extension sees the introduction of two brand new power modules – 15 kW and 25 kW both 2U in height – to complement the existing 42 kW option.

We've also developed a dedicated cabinet for the new modules measuring just 60 cm wide by 1.2 metres high, delivering 60 kW N+1 (for the 15 kW modules) or 100 kW N+1 (for the 25 kW modules) in a single frame.

This ensures smaller data centres and other applications can enjoy the same performance, flexibility and efficiency benefits that modular UPSs currently provide high-end data centres with.

The pair of new power modules sit alongside our best-selling 42 kW version. This is housed in a two metre-high chassis that holds a maximum of seven modules, offering 252 kW N+1 of power in a single cabinet.

With both the standard and the compact cabinets, up to four can be paralleled together and when the time comes to expand, offering a maximum of 1,008 kW N+1 in a single system.

While the popular range also includes space-saving combination cabinets containing both power modules and battery shelves. These are an ideal choice for applications needing to balance high power density with a limited footprint.

Extra energy savings

The MPW range is capable of achieving exceptional efficiency of 96.5% in online double conversion mode. It also boasts a special feature that boosts efficiency to around 95% even at low loads of 20-25% without compromising on online UPS protection or redundancy.

Energy Saving Mode keeps the UPS in online operation with the inverter powering the load. The Multi Power's advanced microprocessors automatically activate the appropriate number of power modules to supply the current load.

All other modules stay idle with their inverter closed and charger switched off to maximise system efficiency. An inactive module stays in this Energy Saving Mode for up to 15 hours. After that, it swaps roles with another active module so that all modules and components age at the same rate.

If there's a problem with the mains supply, a fault in any of the modules, or if the total load goes above 85%, all the idle power modules immediately kick back into action to provide online double conversion protection.

It's important not to confuse Energy Saving Mode with another common operating status – ECO Mode – which in effect sees the UPS run off the mains supply without any of the power conditioning associated with online mode.

Although ECO Mode offers 99% efficiency, if there's an issue with the mains, there's a fractional break in power while the UPS switches back to the inverter. Although this can be as little as 15 milliseconds, that's enough to cause serious damage in mission-critical settings.

For that reason, ECO Mode should only be used at sites where the mains supply is stable and at times when any critical loads are inactive. This could be overnight or out-of-hours when essential equipment isn't running.

Making the move to modular

The major data centre boom in the UK took place around a decade ago, although thankfully the sector shows little signs of slowing down with several sizeable new installations currently under construction.

Every UPS system has a natural lifespan where it will eventually require replacing. Industry best practice suggests this tends to be between years 10-12. However, there's a strong case that replacing earlier in the

Eco Mode should only be used at sites where the mains supply is stable and at times where critical loads are inactive

lifecycle can often make financial sense, with the long-term benefits in efficiency and performance more than paying off the upfront cost of upgrading the UPS.

Moving to modular solutions like the Multi Power offer operators the perfect opportunity to do more with less – high power density in a small footprint, maximising their efficiency while minimising waste and their environmental footprint.

The official UK launch of the extended Multi Power UPS range will take place during Data Centre World at ExCeL London on 11-12 March. Versions of the new power modules and cabinet will be available to demo on the Riello UPS stand D920, with the team on hand to talk about the wider benefits of modular uninterruptible power supplies.



Micromission

E+I Engineering explores the role of microgrids in critical power management.

microgrid is a local energy grid that consists of multiple interconnected loads and distributed energy sources, which can range from renewable sources such as wind and solar to non-renewables such as fossil fuel generators. Microgrids are broadly categorised into two options; grid connected, which works in tandem with the traditional power grid or; off grid, where the microgrid autonomously controls the power supply to the electrical loads. Although both options improve power availability, they are suitable in different situations. Microgrids provide increased control over power generation, making it possible to choose the best times to consume, store and sell energy from each distributed energy source. In turn improving power sustainability in terms of availability, environmental impact and cost.

Power availability

Traditional power grids are becoming strained as they try to keep up with increasing demand for energy. This presents a serious problem for mission critical organisations such as data centres, hospitals and airports that rely on access to 24/7 uninterrupted power to operate efficiently, with unplanned outages compromising revenue and potentially lives.

Grid connected microgrids offer mission critical organisations additional support when inefficiencies or outages occur in the main power grid. Microgrid technology can detect impendent disruptions in the power grid and leverage energy from more stable sources until issues in the main grid have been resolved. This ensures faster system response and recovery to keep power running 24/7. This solution is often a necessity in developing countries, where national power infrastructure is poor and requires frequent support to meet power demands.

Off-grid microgrids are common in remote areas where the traditional grid is out of reach. Applications may range from remote military bases or industrial sites to entire islands or villages where the microgrid provides power to vital community services.

Environmental sustainability

As data consumption increases globally, more power is required to process it and as a result, the carbon footprint of data consumption is increasing at an exponential rate.

In fact, when the music video for Despacito reached five billion views on YouTube in 2018, the energy consumed was equivalent to powering 40,000 US homes for a year!

Microgrids provide increased control over power generation, making it possible to choose the best times to consume, store and sell energy from each distributed energy source

As the concern for environmental sustainability grows, pressures from government organisations and consumers are driving mission critical organisations to look towards renewable energy sources for power generation.

Although this shift towards renewables is a positive step for climate change, it does not come without barriers. One of the main barriers to mainstream adoption of renewables for mission critical power generation is stability. Wind and solar don't run on a steady rate 24/7, so what happens when the power dips? This is where microgrids fit into the equation.

Grid connected microgrids can be used to support renewable energy penetration by removing reliability concerns. By utilising renewables as the primary power source, backed up by the traditional grid, mission critical organisations can reduce their carbon footprint with the assurance that renewable power dips will be counteracted by switching power generation back to the traditional grid until stability is restored.

Financial sustainability

Whether it's a hospital or data centre, the bottom line of any organisation is financial sustainability and with energy prices on the rise, this is becoming an issue for mission critical organisations. In addition to providing a more reliant and greener means of power generation, microgrids also come with a cost benefit. Despite the initial investment required to put microgrid infrastructure in place, the ability to leverage renewables can cut energy bills significantly.



Many governments now offer green initiatives to increase penetration of renewables, so organisations could see themselves receiving tax breaks and subsidies if they factor renewables into their microgrid. These incentives can make a huge difference in the cost of implementing a microgrid.

An added benefit of grid connected microgrids is that the excess power generated from your renewable sources can be stored in the microgrid and then sold off to the main power grid. This new revenue stream can balance out the impact of high energy rates from utilities to improve financial sustainability.

Is mission critical power ready to go off the grid completely?

In short, the answer is no. In the current climate resilience should not come at the expense of clean energy goals. Despite microgrids having a positive impact on sustainability across the globe, we still have a long way to go before off-grid solutions can provide both environmental sustainability and mission critical reliability in the same instance.

Additionally, greater expertise in the area is required before offgrid power will become a mainstream solution. The architecture of a microgrid can be quite complex and as most vendors are accustomed to selling standalone products and services, the prospect of taking on an integrated microgrid project can be quite daunting. Likewise, the benefits of microgrids are often not realised by potential customers and if many vendors are not yet keen to sell the concept, customers are not likely to trust in the solution.

The IEA estimates that by 2030, over 71% of new electricity connections will be off-grid solutions, but will mission critical power generation ever go completely off-grid?

Whilst its difficult to determine if off-grid power generation will ever be sustainable as a standalone solution for mission critical applications, the industry is definitely moving towards a more decentralised approach as the goal of clean and reliable power continues to drive the adoption of microgrids.

Net-zero by design: An industry view

Yselkla Farmer, director policy and marketing at BEAMA, highlights some of the challenges facing the UK if it is to achieve its ambitious net-zero target by 2050.

s the first country to legislate for the 'net-zero by 2050' target, UK industry are also working to be the first movers in this progressive change to decarbonise. BEAMA was one of the first industry sectors to commit to net-zero, with 25 of our members (manufacturers of electrotechnical products) signing a commitment to this target. This commitment not only sets out their obligations to decarbonise their own business, but also their promise to support government and other sectors in the transformative change necessary to meet this target.

So, what does net-zero mean for our sector? The Committee on Climate Change net-zero report is the backbone for setting out how net-zero can be achieved in the most cost effective and sustainable way. This clearly sets out the need for renewed focus in the buildings, heat, transport and energy networks sector. A snapshot of figures from their work with Imperial College London gives an indication of the scale of the challenge; the scale will depend on the approach adopted in the UK – hybrid, electric or hydrogen:

- \bullet The cost to the distribution networks could range between £2 -5.8 billion a year by 2050
- Estimates imply a switch to low carbon heating in the order of £15 billion a year
- 17 million homes would require a heat pump by 2050
- Overall 29 million existing homes in the UK will need energy efficiency measures by 2050.

BEAMA agrees that setting a target in legislation is not enough to deliver this level of change, and clear decisive action is needed from government, who must also show clear leadership to drive investment into the necessary sectors.

We are starting to see signs that this is being accepted, for example with the recent announcement to bring forward the phasing out of petrol and diesel cars by 2035, and more work is underway which we hope will lead to a dramatic change in the market potential for low carbon heat, through changes to building regulations and network investment. This includes the current Part L review and consultation on the Future Homes Standard which will be a key marker in the sand in determining the potential to decarbonise the housing stock in the next 10 years.

Indeed through our work analysing the market mechanisms our sector relies on for investment and market reform (building regulations, network investment plans, incentives for heat and energy efficiency), the next two years will be vital in determining future progress as we are in the midst of a regulatory review for buildings and networks. So, time is of the essence.

The deadline of COP26 in Glasgow this November places added pressure on the Government to demonstrate clear action in the fight against climate change and we expect the year ahead to be a busy one as we work closely with government departments to determine the best course of action.

Heat is probably one of the most hotly debated topics (no pun intended) and the debate as to how we move away from high carbon fossil fuel sources of energy for heating UK homes, including gas, is one currently under review. Work that the Department for Business Energy and Industrial Strategy is currently leading on to develop a heat roadmap for the UK will be crucial. This needs to provide the regulatory clarity on the future role for heat pumps and electric heating, setting out its applicability alongside the growth in low energy homes, its role in off gas grid homes, and as part of an electrification strategy – including in combination with MVHR and PV.

We expect to be at least 10 years away from a viable commercial implementation of hydrogen as part of the potential heat and transport solution, so while this may well form part of the heating mix in the longer term, we cannot afford to delay action while this market matures.

As an industry we have talked for many years of the need to decarbonise heat, the opportunities in retrofitting UK homes and making energy efficiency improvements. We are also well aware of the shortcomings of existing regulation in facilitating this. The evidence is there, and technologies are available today to ensure net-zero is achievable so there should be nothing stopping us from ensuring 2020 is a year of action in the UK to lead the way in clear and decisive decarbonisation strategies.

While this is a huge challenge at a policy, regulatory, industry and consumer level, it is also a huge opportunity for all if we get this right and move decisively. Not only will this create new jobs and market opportunities, it will also make UK homes more comfortable, healthy and more affordable.

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Sustainable changes

Katie Burrows, energy services solutions manager at Haven Power, discusses how to build a business case for sustainability.



hat a great proposition. I agree, let's get the ball rolling as soon as possible" - those are the words that every professional wants to hear after making their business case for sustainability to the board. But, when you're the only person in the room that lives and breathes sustainability at work, it's far from easy to

educate your superiors about the benefits of greener practices - especially when making sustainable changes is often linked with pressure to spend more money. So, here are some top reasons that will help flesh out a robust business case to the decision makers of your organisation.

Reputation and customer loyalty

If you're part of a consumer-facing organisation, your customers are at the focus of everything you do. Whether the business is reviewing its manufacturing processes, customer service offering or management structure, the outcome of change is expected to benefit the consumers that invest their time and money in your service or product.

But who says that customers care about how sustainable your practices are?

Well, according to research by Unilever, a third of consumers now choose to buy from brands who they believe are doing social or environmental good. Whether that be reducing the amount of plastic packaging they use, recycling products or using a sustainable energy source, it all counts towards reducing your carbon footprint. The research also found that "sustainable brands grew 46% faster than the rest of the business and delivered 70% of its turnover growth."

It's important to start with your business first, and implement the changes that will help to reduce your carbon footprint in the long run. However, it's also becoming increasingly important for companies to look further along the supply chain. Pledging to improve sustainability has become a common trend among businesses all over the world in



recent years, as consumers demand more visibility and are increasingly willing to do their own research into what processes have a negative impact on the environment.

Attracting and retaining talent

It's not only your consumers that care about your carbon footprint - it's your workforce too. A report by PwC found that over two thirds (65%) of people around the world want to work for a company with a powerful social conscience.

Organisations that consciously look to improve levels of sustainability have quickly become something that job seekers actively search for, with many now looking for a transparent employer that has strong ethical values. So, if the board wants to be able to attract top talent and have their pick of a wide bunch, their commitment to making sustainable changes could have a significant impact.

Ultimately, existing workforces will be required to keep up with changes, while a young workforce with new skills will become invaluable due to rapid rates of innovation. As employers increasingly try to attract young talent, sustainability becomes more and more important. That's because young people are very aware of their personal brand, including their efforts to live a more sustainable lifestyle, and where they work directly impacts this.

Government regulations

As climate change has become a more pressing issue within our society over recent years, the pressure on businesses to commit to a greener strategy and actively reduce their carbon footprint has been mounting. The UK Government has committed to achieving net zero by 2050, while the target in Scotland is even more ambitious at 2045.

It falls upon business and organisations within the UK to make rapid adjustments to their policies, processes and products in this time, and so starting to make changes as soon as possible is vital. Almost half of UK businesses have already put plans in place to reach net zero by 2050, with one in 10 already there.

So far, there has been a vast improvement in the amount of carbon emissions that are produced in the UK, particularly through electricity generation. A third (33.3%) of electricity generated in the UK in 2018 came from renewable sources, and whilst this was a vast improvement on previous years, this number needs to continue to rise to meet net zero.

As a part of reaching net zero by 2050, the UK government has brought forward its ban on petrol, diesel and hybrid cars from 2040 to 2035. As a business, investing in electric vehicles is a huge investment, but it's one that shouldn't be immediately dismissed. There are a lot of things to be considered, but making the transition to electric vehicles will have both a significant impact on your carbon footprint and even save the business money in the long run. That's because EVs can help a



business save around 20% on fuel costs and 30% on maintenance, with the added benefits of free road tax and a lack of congestion charges, too.

Saving money through energy consumption

Whether it's mostly used to power machinery, refrigerators or computers, energy often accounts for a significant percentage of an organisation's operating costs. And, while the decarbonisation of the UK's energy supply to achieve net zero is predicted to cost over one trillion pounds, the board are likely to want to know exactly how this might impact the business' profitability. According to our own research here at Haven Power, over a third (37%) of businesses think that it would be too costly to implement renewable energy, but we actually know that businesses can use renewable energy to save money.

The easiest way to gain an understanding of how energy consumption can impact the business and its carbon footprint is to engage in a conversation with an energy supplier directly. An expert is the most likely person to know how your business specifically can reduce their energy consumption and therefore their carbon footprint.

An expert might, for example, suggest joining Demand Side Response (DSR) programmes, which give you the opportunity to earn extra revenue by altering your energy consumption patterns. Or, perhaps switching to a self-generated or stored electricity at peak times might be of benefit, as this is when power is at its most expensive.

If you have the land and resources available, generating your own

electricity using solar panels or a wind farm could be a great way to make some additional revenue. Organisations can get paid for generating their own electricity by setting up a renewable Purchase Power Agreement (PPA) with their energy supplier. This means your business receives the financial benefit of selling energy back to the grid, just without the administration.

A third of consumers now choose to buy from brands who they believe are doing social or environmental good

Committing to using greener practices as an organisation is not only a positive way to reduce your carbon footprint and reduce your negative impact on the planet, but there are also numerous benefits to the organisation from a business perspective. Offering a vast range of benefits, implementing more sustainable measures is an essential way to future-proof your organisation, enabling you to keep up with the competition and have a positive impact on your consumers.

Ensuring that your business case for sustainability is backed by strong, relevant and relatable arguments is the key to helping the decision makers above you share your vision for change. \mathbf{E}

ELECTRICAL REVIEW AND DATA CENTRE REVIEW READER'S SURVEY

At the back end of last year, we issued a Reader's Survey to find out exactly what you lovely lot wanted to see more (or less) of within our publications. We asked what features interest you the most, what topics you would like to see more of, and how we can make our publications better.

Well, the people have now spoken, and we wanted to share with you some of the points that stood out most to us, and what we're doing to action your opinions.

We asked you how you access our content, and it turns out most of you

prefer to read our publications in digital form, and after all, it is 2020 so who can blame you? Electrical Review has been around for nearly 150 years, starting life as the Telegraphic Journal back in 1872. Although we will always publish our printed magazines for our old school consumers, we will soon be launching a new website which will make accessing our digital publications easier. We are also looking into a more user-friendly platform to host them on, so watch this space.

We also asked you what Electrical Review topics interest you the most. Coming up trumps were our top three: energy efficiency, building services and lighting – closely followed by renewable energy. As a result, we have now ensured that these three topics are on our heaviest rotation throughout the year, appearing more frequently on our features list than before. The sway towards topics such as energy efficiency and renewable energy is also a great sign, showing a clear shift towards greener thinking across the industry. We will also be endeavouring to cover these topics in more depth via our website.

As for our sister title Data Centre Review, the topic of UPS stood out among the crowd. This didn't surprise us too much, it interests us too. After all, a data centre lacking a reliable UPS system is essentially doomed to fail. However, in recent years UPS technology has come on in leaps and bounds from the clunky wardrobe sized machinery of days gone by, and we very much look forward to learning more about the latest developments at this year's DCW event. UPS always has and always will be a topic we cover and invest in heavily.

Thank you to everyone who took part in our survey. As promised, all completed entries were included in a prize draw to win an Apple Watch and we're pleased to announce the winner below.

CONGRATULATIONS TO THE WINNER OF THE APPLE WATCH:

MARTIN HALL, PROJECT ENGINEER, NG BAILEY



HOW DO YOU GENERALLY ACCESS ELECTRICAL REVIEW AND DATA CENTRE REVIEW CONTENT?

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WHAT ELECTRICAL REVIEW TOPICS INTEREST YOU THE MOST?



WHAT DATA CENTRE REVIEW TOPICS INTEREST YOU THE MOST?





Regulation for the nation

Right now, almost anyone can claim to be an electrician and carry out electrical work. The absence of the necessary qualifications and experience required to do so of course make this practice incredibly dangerous for both the 'electrician' in question and the unwitting consumer. Here, **SELECT** discusses the importance of protecting the title for the profession of electrician.

artially or unqualified 'electricians' put us all at potential risk and undermine legitimate electricians, who undertake a proper apprenticeship and maintain their skills by taking part in regular update training.

This is why SELECT, the trade association for the electrical contracting industry in Scotland, has spent the last few years pressing the Scottish Government to introduce protection of title for the profession of electrician. It has been joined in this campaign by a number of other bodies, including Unite the Union.

Such regulation would mean that only those who hold industry-recognised qualifications would be able to call themselves an electrician – and help reduce the number of deaths and injuries caused by fires and electric shocks every year.

Research carried out on behalf of SELECT in 2018 showed that faulty electrical installations account for 7.1% of all fires in Scotland, with damage caused to property by such fires costing around £9.6 million.

SELECT managing director Alan Wilson comments, "Much of the cost of faulty electrical installation lies in malfunctioning or poorly-finished work that needs to be replaced, with a number of surveys pointing to the proportion of domestic work that is substandard. "Based on these and the data on underqualified electricians, we cautiously estimate £104 million of cost to the consumer from faulty electrics installed by unqualified tradesmen – about 5% of work in all.

"Not including the occasional major cost of catastrophic incidents, we think that the overall cost of faulty electrical work in Scotland is approximately £120 million every year."

SELECT's own research suggests that there could be as many as 4,000 unqualified or part qualified electricians working in Scotland.

Unqualified electricians don't improve their own skills or contribute significantly to the economy, mostly operating in the black or grey economy.

SELECT also points to the notable contrast between regulation in the gas industry and its absence in the electrotechnical industry.

Across the UK, there are 102 regulated professions including some of a surprising nature, namely door supervisors, road and street works operatives, arts therapists and public space surveillance operatives – yet no such regulation applies to electricians.

Alan speculates, "It's amazing that an industry that's so safety-conscious and potentially dangerous if not done correctly is still unregulated. There are hundreds, if not thousands, of individuals out there carrying out electrical work who have no qualifications or experience, putting people at harm. "Regulation is the only solution. Whenever we speak to politicians and the public, no one has said yet that it's not the right thing to do. The Scottish Government has to have the courage of its convictions and introduce regulation as quickly as possible."

To highlight this peril, SELECT has embarked on a round of national press and radio interviews, and raised the profile of its campaign further by visiting Holyrood itself, hosting exhibitions and meeting politicians face-to-face to get its message across.

Some 32 new politicians joined the swell of cross-party support after the association spent three days lobbying in late 2019 – meaning that 41 of the Scottish Parliament's 129 MSPs now back the campaign.

Among the new supporters was Michelle Ballantyne, Conservative MSP for South Scotland, who said, "I am delighted to support this campaign because protecting title not only ensures standards and recognition in a profession, it provides reassurance and safety for the consumer."

Ms Ballantyne, who is also Shadow Cabinet Secretary for Communities and Social Security, added, "In an age where we are increasingly reliant on electricity, we need to know that someone who calls themselves an electrician is indeed suitably qualified and is not going to put our life, or the lives of those we are responsible for, at risk through lack of training."

SELECT specifier and client relations manager Yvonne Wilson, who organised the three-day exhibition in November, said she was delighted with the response.

She said, "The event was a huge success and it was great to deliver our message in person and engage with MSPs from all parties.

"The response from every party was extremely encouraging and it was heartening to see that improving safety for consumers across Scotland is a priority for our politicians, no matter their party allegiances.

"We will now continue to raise awareness of this issue and work to-

wards our ultimate goal – making it an offence for someone to call themselves an electrician when they have no, or inadequate, qualifications."

The results of SELECT's campaign can now be seen on its Wall of Support, an animated online graphic that hosts testimonials from MSPs, MPs and other important industry groups keen to show their backing.

Bodies that have contributed a 'brick' to the wall include the Scottish Joint Industry Board (SJIB), Unite the Union, Electrical Safety First, the Scottish Association of Landlords, the Specialist Engineering Contractors' Group and the Energy Saving Trust.

This swell of support has also been reflected across social media, with SELECT enjoying an upturn in web traffic as people like and share posts under the hashtag #BackTheBrick.

To keep this momentum going, SELECT is now planning to lobby local authorities across Scotland to stress the importance of regulation.

The Scottish Government has pledged to publish a consultation on the regulation of electricians as part of its 2019-20 Programme for Government and a Members Bill is also under discussion.

Alan continues, "Working with the full support of the SJIB, Unite the Union, the Scottish Electrical Charitable Training Trust (SECTT) and others, SELECT is determined to continue to work hard for regulation of electricians.

"Larger political circumstances such as Brexit have unfortunately overtaken most immediate domestic concerns. However, these wider, unprecedented issues can't be allowed to detract from the governing requirements to ensure the day-to-day safety of our citizens, as well as the security of our business environment.

"It's vital that the issue of regulation isn't kicked into the long grass and that it continues to be a prominent issue at Holyrood and beyond. By applying continued pressure, we are confident of a positive outcome for our members, the industry and the wider Scottish public."



How can drones benefit the electric power industry?



David Willems, VP business development and strategy at UMS Skeldar, takes a look at how unmanned aerial vehicles (drones to you and me) could be advantageous in the electric power industry.



he electric power industry, covering the generation, transmission, distribution and sale of electric power to industry and the general public, is a highly complex area. Asset management, environmental compliance and safety must all be addressed and guaranteed.

For example, many organisations have invested heavily in deploying reliable and economical electric power infrastructure across both countries and continents, due to it being an essential element of all developed economies globally. Due to its importance, electric power infrastructure must be routinely inspected to not only ensure its structural integrity for continuing safe operations, but also to monitor for intruders who might want to cause damage.

Traditionally, inspections have been completed by deploying teams of personnel in vehicles such as helicopters. However, these types of examinations often entail high risk situations and very lengthy journeys requiring each team member to spend a long time in the field. In addition, they can be very expensive, with some organisations explaining power line inspections can cost upwards of \$4,000 per flight hour.

The electric power industry is therefore in need of alternatives to the traditional manned helicopter inspection approach. Over the last decade, unmanned aerial vehicles (UAVs) have come to the fore as one such alternative. This is the result of three main benefits that UAVs offer over manned operations: reduced costs, improved safety and enhanced communication.

What UAVs offer the electric power industry

Vertical Take-Off and Landing (VTOL) rotary UAVs enable electric power industry operatives to maintain surveillance as well as check the

status of the condition of hard-to-reach infrastructure, whether underground or across borders. Inspecting and maintaining this critical infrastructure can be a perilous task: many are in extremely harsh environments and can involve complicated procedures to ensure everything is working correctly.

By capitalising on their endurance (many UAVs can fly for more than five hours), using UAVs in these environments means it is possible to access remote areas with relative ease, with the added benefit that a manned crew will not be exposed to any associated hazards. This removes risk to employee safety and consequently reduces medical expenses and lost work due to injury.

As well as the associated dangers, the inaccessible locations of many electric power lines and infrastructure also present a challenge in gathering and sharing data. Having manned crews run inspections and repairs means a delay between data recording and analysis. A further disadvantage is that people can become fatigued, therefore possibly missing potential hazards in the field.

In contrast, using UAVs means data can be shared via the cloud in real-time to crews in another location, totally separate from the inspection itself. UAVs can also monitor significant areas with no loss of concentration.

Not only do UAVs gather information more efficiently than humans, the digital data enables operatives to make better decisions based on timely accurate data. Once a potential hazard has been identified, it can be addressed in a far shorter time than the manned alternative. This helps to identify issues earlier and reduce downtime, which is vital for organisations in charge of safeguarding critical infrastructure.

Today, the electrical power industry is beginning to deploy UAVs as they move towards non-conventional sources to monitor increasingly challenging environments. This is due to the requirement to ensure round-the-clock vigilance, a priority in any strategic asset protection plan.

Overall, the key benefits of UAVs include:

- Provide a quick overview and evaluation of difficult to reach areas;
- Prevent maintenance planning and optimised production keeping costs low;
- Access locations that pose health, safety and environmental risk to personnel;
- Real-time data transmission;
- Fast on-site deployment of UAV platforms;
- Authorised and qualified UAV inspection personnel;
- Reduced downtime increases overall efficiency.

Analyse power quality indoors and out!

Chauvin Arnoux has recently launched the C.A 8436 Qualistar+, a new all-terrain power quality analyser, which is ideal for making accurate and reliable measurements in the field. The instrument can be used on all types of low-voltage installations for preventive and corrective maintenance, and also as an aid to fault-finding.

The C.A 8436 Qualistar+ has five voltage inputs and four current inputs and supports simultaneous recording of all voltage, current and power parameters. Current measurements in the range 100 mA to 10,000 A are facilitated by the use of MiniFLEX flexible sensors that are easy to install and require no direct connection to the circuits being monitored.

The instrument measures total power, active power, reactive power, power factor and many other key power parameters, as well as providing detailed information about harmonics up to the 50th, total harmonic distortion (THD), flicker, transients and energy usage.

Chauvin Arnoux • 01924 460494 www.chauvin-arnoux.co.uk/en



Omicron's IEDScout 5.00 available

IEDScout is the ideal tool for protection and substation automation engineers working with IEC 61850 devices. The software allows access to IEDs (Intelligent Electronic Devices) and a detailed insight into the devices, making all data and communication information available. The simulation of IEDs as well as the monitoring of GOOSE messages in the activity monitor are only two of many helpful functions the software offers for working with IEDs.

The latest version of IEDScout 5.00 now also supports the mobile test set MBX1 and the permanently installable platform RBX1. Additional advantages result from the execution of the software on these cyber-secure test sets:

- Highly secure and powerful platform
- Isolation of Windows PCs from the substation network
- The test device related license allows the use in a team
- Simulation of several IEDs with their real IP addresses possible.

When testing IEDs, ensure cyber-secure separation between your test PC and the system and use IEDScout 5.00 on your MBX1 or RBX1.

Omicron • 01785 848 100 www.omicronenergy.co.uk



A boost for the Sangamo range of Powersaver Controllers

ESP's new Sangamo Powersaver Controllers bring to market two, simple to use, multi-application time switches. The Sangamo Powersaver Select PSS2 is a cycle selectable timer, which, although primarily used for the control of water heating, can also be used for the control of panel heaters, towel rails or combi boilers. This electronic controller offers a maximum of 10 functions each day according to the programming cycle selected.

The Sangamo Powersaver PSB2 is a boost runback timer and although primarily used for the control of water heating, can also be used for controlling panel heaters, security lighting and combi boilers. It is an electronic boost controller with a single button operation, offering three user-selectable boost periods of half-hour, one-hour or two-hours. The Powersaver family saves on fuel expenditure and energy wastage by automatically switching off when the user may forget.

ESP • 01527 515150 www.sangamo.co.uk



Metrel: Leading the charge

Test equipment manufacturer Metrel has developed an EVSE adapter, A1532, that can interface between any charge point and their own or any manufacturers' tester.

The adapter facilitates the testing of single and three-phase chargers and can test them functionally. It simulates the charging state of the vehicle, disconnected, charge ready, active charging (with and without ventilation) and pilot error, permitting the system to be tested as a whole and not just discrete parts. And because there is no need to open the box, testing is quick and there are no warranty implications.

However, there is a problem, for electrical testing with these adapters; they are only as good as the tester you connect them to! Only the Metrel range of multi-testers MI3125BT, MI3152 and MI32155 will test type B RCBs and conform to stipulations of the 18th Edition.

Metrel • 01924 245000 www.metrel.co.uk



Scolmore's new Aquip66 additions offer 20 AMP switching

Scolmore is extending its Aquip66 range of durable, easy-to-install 10A weatherproof outdoor switches to include new 20A versions – which will offer installers the key benefit of enabling 20A switching in a single width module.

Scolmore's existing one- and two-gang waterproof switch enclosures utilise MiniGrid single width switch modules, which are rated at 10A. By adding new one- and two-gang switches that utilise the GridPro range of modules, the range offers 20A switching options.

There are now eight products in the range which comprises one- and two-gang 10A, twoway MiniGrid switches in a choice of furnished or unfurnished, plus the new one- and two-gang 20A, two-way GridPro weather proof switches, again in a choice of furnished or unfurnished.

Designed to offer a high level of protection against ingress of water jets and dust, all products in the Aquip66 range come as completely sealed units.

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Lighten your workload with the C.K Magma Technician's Pro Wheeled Case

C.K Magma's new Technician's Pro Wheeled Case (MA2652) is ideal for all terrain use, offering more storage than ever before, effortlessly transporting a fully laden toolkit with test equipment and power tools.

With back problems a significant cause of loss of working days for all trades, the C.K Magma Technician's Pro Wheeled Case has been designed to take the strain, providing quick and easy transportation of a heavy toolkit to any location.

More storage now includes 50 pockets/compartments, with handy vertical pockets for clear visibility and organisation of tools, with other quality features including: adjustable straps for easier access to main pocket compartment; lockable zip system for extra security; an extra wide main compartment with a red lining for high visibility; a hard protective divider between tools and test equipment; and a zip down front panel for A4 document storage.

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