FEATURES:

- Industry 4.0 + IIoT
- Energy management + the industrial environment
- Measurement + instrumentation
- Safety of plant, equipment + people

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Measurement is a critical aspect in all manufacturing, enabling production of consistent quality products, ensuring the safety of workers and equipment, and meeting regulatory requirements.
(Read more on page 3.)

Editor: *Leigh Darroll*
Design & Layout: *Darryl James*
Advertising Manager:
Paul Engelbrecht
Circulation: *Karen Smith*
Editorial Technical Director: *Ian Jandrell*
Publisher: *Karen Grant*
Deputy Publisher: *Wilhelm du Plessis*

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Taking safety seriously

This month we again feature topics that are chosen for the impact they can have on industry. And, as is so often the case, it is important to review and refresh our understanding of the benefits.

The issues of safety and energy management stand out. The first because it remains a perennial challenge where human factors can so easily affect an outcome, and the second because this is surely top of mind for most of us.

After some consideration I feel the latter is likely to cause indigestion as we now learn – what we always knew – that load shedding is here to stay for years to come. Although it can no doubt be easily explained, I do still find myself wondering why those in positions of considerable influence were somehow never aware, or even informed, of this. Or perhaps they chose not to admit it.

This also poses an opportunity for each of us to consider how it may be possible to limit our exposure to utility power – but that can be a topic for the future.

Let's return to safety – of equipment and personnel on site. And lest we forget, safety is about doing our best to prevent an accident occurring, and to mitigate the effects of an accident if it does occur. It is, after all, an accident that leads to a situation where protection is essential.

Any manufacturing plant poses risks to operators, and anyone who has access to the production area.

Part of the solution, of course, is the availability and use of appropriate PPE (personal protective equipment). It is obvious this is an issue that should always be complied with: it is not just about what is observed, but about our need to protect ourselves in hazardous environments.

The trouble is that human nature is quite a peculiar thing.

What one observes is that the more familiar with a particular process or procedure one becomes, the more convinced one becomes that nothing will go wrong. An analogy can be made with driving your car – for many hours a week, and for many years. What could go wrong? Well, things can and do go wrong – and that is the moment you need a seatbelt – not for any of the eventless moments leading up to that one!

To check this point, this week visit all the substations on your site, and confirm that there is a protective blast suit in each. Why pick on this example? Well, racking switchgear in and out, and turning systems off and on again seems like common sense. What could possibly go wrong?

The point is, things do go wrong; and in this case, things can go horribly wrong. I can also attest to the fact that in some cases where things have indeed gone horribly wrong, it is clear that the correct protective kit was not available.

Worse still are those substations where the kit is available, but the dust layer suggests it has not been used for years (or even decades).

So, the message this month is simply: there are so many sophisticated detecting, alarm and warning systems to help us, and we have often worked in a particular area for so long that we become blasé.

Do not let this happen to you; and do not let this happen to your employees. Familiarity breeds contempt. But one mistake and the world can end!

So, take the time to check that all is well on your site – from a PPE point of view, from a protective systems point of view and, most importantly, from a human behaviour point of view.

Ian

Ian Jandrell

PrEng IntPE(SA), BSc(Eng) GDE PhD,
FSAAE FSAIEE SMIEEE

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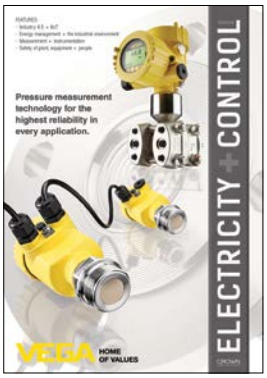
Why measurement matters



In the stringent environment of manufacturing, precision meets strict regulatory requirements. From producing uniform, quality products to ensuring the safety of workers and environmental safety, accurate and reliable measurement underlines every critical step. It is the invisible thread weaving together efficiency, profitability and responsible practices.

Why is measurement so crucial?

- *Resource optimisation:* Precise measurement helps quantify raw materials and ingredients, track production rates and optimise manufacturing. This translates into maximising resource utilisation, minimising waste and ultimately increasing profitability.
- *Process control and efficiency:* Each stage of the manufacturing process relies on precise measurements for optimal performance. Sensors monitor variables like flow rates, pressures, high/low levels and temperature, enabling real-time adjustments.
- *Safety and security:* In any production and manufacturing environment, accurate measurements are essential for safeguarding lives. Monitoring tank levels, flow rates and pressure helps identify and address potential risks before they escalate. Additionally, accurate stockpile measurements prevent overloading and potential collapses.
- *Environmental responsibility:* Manufacturers around the globe face growing pressure to minimise their environmental footprint. Measurement is crucial in measuring water usage, by-products and potential pollutants. Real-time data allows for adjustments and helps ensure compliance with regulations and responsible resource management.
- *Cost reduction and profitability:* Every aspect of manufacturing, from equipment selection to maintenance schedules, involves cost considerations. By optimising processes through accurate measurement, companies can reduce energy consumption, minimise downtime and extend the lifetime of equipment, leading to significant cost savings and improved profitability.

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Jonathan Duncan, Vertiv.

Keeping edge data centres cool

Jonathan Duncan, Technical Director, Africa at Vertiv

Digital transformation is seeing organisations become increasingly reliant on information technology to monitor and run almost every aspect of their business. The creation of more data – which needs to be processed and stored – brings with it the need for more computing power and more data centres.

In many cases, these are not large, purpose-built data centres, but rather, close-proximity smaller, edge facilities that share space in the same building as the rest of the business. This can create particular challenges with regard to securing the environment and cooling the IT or OT loads.

At the edge

Edge computing can be described as the concept of having computing and storage capacity physically close to where users are generating, consuming and manipulating data. We are seeing a rise in edge computing (also known as decentralised IT) driven by such factors as: the ongoing rise of the Internet of Things (IoT) – or similarly the Industrial Internet of Things (IIoT) – which generates significant amounts of data, legal requirements, the need to consolidate data, high network costs, latency issues, and network security requirements.

When the time taken in sending data to a centralised or cloud data centre is too long and latency becomes an inhibitor, this drives the need for localised processing capabilities, or edge data centres.

However, the edge data centres often have to share an area that is already serving another purpose, and which may not have cooling systems intended to handle the IT equipment at the edge of the network.

Checking the cooling requirements

IT equipment can produce a lot of heat on a continuous basis. Organisations therefore need to take steps to ensure the proper cooling of the equipment in order to protect it and ensure its constant availability. Placing sensitive IT equipment into spaces designed originally for some other purpose can present challenges, especially with respect to cooling.

As demand grows for edge data centres in offices, factories and warehouses, suitable cooling is essential for each installation.

For example, an office building is optimised to be comfortable for its employees; and a more open space, such as a factory floor or warehouse, has its own heating and cooling requirements. In either case, the existing cooling system may not meet the stringent requirements for the proper functioning of a data centre. This is especially true for high-density IT equipment, including hyperconverged infrastructure, which can generate large amounts of heat from a relatively small space.

Controlled versus uncontrolled environments

Companies are now routinely installing edge data centres in two general categories of space:

- Controlled office environments, which are geared towards standard comfort cooling for people, and
- Uncontrolled environments, such as manufacturing spaces, which may or may not have ambient cooling and humidity control in place.

The typical office environment uses room-based cooling systems provided as part of a building's heating, ventilation and air conditioning (HVAC) systems, or decentralised mini-split cooling systems. Cooling capacity is calculated based on the heat load the comfort cooling system needs to handle, as measured in watts or kilowatts.

A typical office HVAC system could have a cooling capacity to deal with a heat load in the range of 50 to 100 W per square metre, or perhaps one to two kilowatts for an entire room. But a single rack of IT equipment may produce a heat load of three to four kW or more. As a result, a cooling system designed for one kW of cooling could be asked to deal with as much as four times that capacity.

This is likely to have several repercussions.

- Employees may be uncomfortable as the comfort system struggles to maintain a target temperature.
- IT equipment (such as servers) often has thermal protection systems that trigger a shutdown if the temperature rises too high.
- Overtaxing the comfort HVAC system by requiring it to operate continuously above its rated cooling capacity will drive up operating costs over the long term, and probably also cause its early failure, as it is typically not engineered for continuous operation.

Another issue with most office buildings is humidity. With doors and potentially windows opening and closing all the time, humidity levels can change randomly, depending on conditions outside. This is not ideal for IT equipment. Similarly, dust is a concern as it does not support the optimal functioning of IT equipment. That is why purpose-built data centres have air filtration systems that remove dust and other particulates from the air.

Many companies need to install edge data centres on

factory floors, in manufacturing facilities and in warehouses that have widely differing environmental characteristics. These are often large spaces of 200 m^2 or more.

Any warehouse faces challenges in maintaining a constant temperature, as they are not usually well-insulated or sealed. This can lead to excessive heat or cold inside the facility, and wide fluctuations – varying with seasonal temperatures. Again, humidity can be an issue, especially in facilities with no ambient air control system in place. Uncontrolled environments are also likely to be dustier than offices, and less likely to have a particulate filtration system in place. Dust combined with high humidity can be particularly harmful to IT equipment.

What are the cooling options?

Theoretically, the same cooling systems that apply in an office environment can be used in uncontrolled locations, but most customers favour an approach that involves a sealed rack or row, which means dedicated rack- or row-based cooling.

The reason is simple: these self-contained systems essentially seal off the IT equipment from the outside air, thus protecting it from dust and humidity, and enabling the company to control the temperature of the racks closely.

The key is to look for a system with a high ingress protection (IP) rating as defined in the International Electrotechnical Commission (IEC) 60529 specification, which covers mechanical and electrical enclosures intended to protect against ingress of dust and water.

An IP 54 rating, for example, denotes an enclosure that offers strong protection against dirt, dust, oil, and splashing water – all harmful to IT equipment. With such an enclosure, the IT equipment is isolated from the environment in which it is installed.

Combined with a rack- or row-based cooling system, this can help ensure the temperature for IT equipment is tightly controlled and the equipment is protected from its potentially risky surroundings. Such a setup can also be highly efficient, as IT equipment can withstand far higher temperatures than are comfortable for people.

Operating the IT cooling system at higher allowable temperature envelopes can save significant sums on cooling costs, rather than aiming for temperatures closer to the comfort levels set for people.

Cooling solutions for any environment

As companies continue their digital transformation journeys, they will be producing more data, which in turn will demand more edge data centres for processing. The data centres will need to be close to the data origination source, in an office facility, warehouse, or on the manufacturing floor. Companies therefore also need racking and cooling strategies that can cover edge data centres located anywhere. Vertiv offers a range of solutions for edge data centres with integrated cooling solutions to suit different workspaces. □

For more information visit: www.vertiv.com/en-emea

Addressing the skills shortage in semiconductor industry

USA-based Siemens Digital Industries Software has joined the Semiconductor Education Alliance to help build and nurture thriving communities of practice across the integrated circuit (IC) design and Electronic Design Automation (EDA) industries, from teachers and schools to universities, publishers, educational technology companies and research organisations.

Founded by Arm in 2023 with a mission to help close education and skills gaps in the global semiconductor space, the Semiconductor Education Alliance brings together key stakeholders from across industry, academia, and government, to provide resources that help teachers, researchers, engineers and learners access new, accelerated educational pathways.

"Joining the Semiconductor Education Alliance is a significant step forward in our collective efforts to promote communities of practice in STEM education and research with the involvement of academia and industry partners throughout the EDA industry," said Mike Ellow, Executive Vice President, Electronic Design Automation, Siemens Digital Industries Software. "As part of the alliance, we are undertaking specific projects aimed at developing the workforce in the semiconductor industry to benefit all parties involved. Siemens also aims to share resources, capabilities, and expertise in a flexible, federated and open model through a variety of forums."

The Semiconductor Education Alliance was created to address the shortage of skills and talent in the industry.

Khaled Benkrid, Senior Director, Education and Research at Arm said, "The global semiconductor industry is facing a shortage of skills and talent that requires industry-wide action. The Semiconductor Education Alliance was created to address these challenges and we welcome the capabilities Siemens brings to the alliance as we come together as an industry to nurture the talent pipeline."

Dora Smith, Senior Director of the Global Academic Programme, Siemens Digital Industries Software, noted: "According to Deloitte, the semiconductor industry needs more than one million additional skilled workers by 2030 to keep up with global demand. Partnering with Arm through the Semiconductor Education Alliance helps us collectively bridge pathways to address the quality and quantity of talent needed to drive innovation and meet market growth. We look forward to collaborating with this ecosystem of expertise to nurture the future workforce."

For more information visit:
www.arm.com/resources/education

AI can advance the capabilities of robots, increasing precision and safety among other factors.

Artificial intelligence in robotic technology

An industry leader in automation and robotics, Yaskawa Southern Africa pioneers innovative technologies and automated solutions. Artificial intelligence (AI) has emerged as a groundbreaking technology in diverse sectors, including transportation, healthcare, finance, and agriculture. In the field of robotics, AI is redefining the landscape and human-machine interaction. Andrew Crackett, Managing Director of Yaskawa, offers some insight into the role of AI in robotics technology, its advantages, challenges, and what it might offer in future.

In Crackett's view, the speed at which AI is being integrated into our rapidly advancing digital world makes it important for all industries to welcome its adoption – and this is especially the case for robotics. He sees artificial intelligence as "the cognitive powerhouse behind the physical capabilities of robots, influencing aspects from design and functionality to adaptability in diverse environments." AI provides robots with new levels of precision and efficiency, optimising actions through machine learning algorithms to enhance productivity and accuracy. In addition, it improves safety standards as its integration into robots enables them to navigate complex environments, detect potential hazards, and execute tasks with a focus on minimising risks. This promotes the safety of human workers in the same environment.

AI also enables robots to make split-second decisions based on data analysis – an especially valuable capability in dynamic environments like manufacturing or in autonomous vehicles that work along the production line.

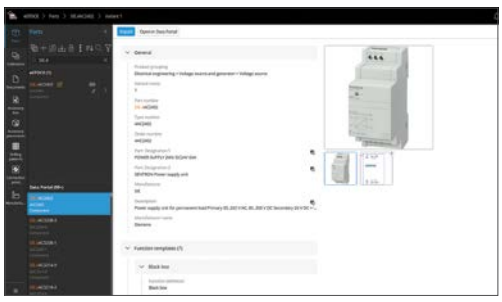
However, he says it is equally important to acknowledge AI's potential shortcomings. As AI becomes standard in robotics, ethical concerns may arise, which demand careful consideration and regulation regarding the ethical use and accountability of AI-driven robots. "Overcoming challenges and addressing any limitations in current AI models is essential for continuing advances in AI-driven robotics." Harmonious collaboration between AI-driven robots and human workers is necessary, as the integration of robots, or collaborative robots (cobots), need not mean the elimination of manual labour jobs. He emphasises that robots are designed to work alongside people, taking on more labour-intensive tasks and freeing up capacity for upskilling and career development.

The future looks promising for AI and machine learning, Crackett says. Robots are capable of adapting, learning, and performing increasingly complex tasks. "Synergy between humans and robots is key, and AI can facilitate seamless collaboration, complementing human skills and augmenting workforce capabilities." He adds that a focus on ethical development is essential for the future of AI in robotics, ensuring transparent and ethical AI practices to build trust and ensure responsible deployment across industries. □

Faster access to device data

For system engineers working with Eplan, the new version of eStock in Eplan Platform 2024 provides easier access to centralised device management in the Eplan Cloud, simplifying collaboration and reducing coordination times and media discontinuities. In the Eplan Platform 2024, users can automatically and quickly access the full range of more than 1.5 million device datasets in the Eplan Data Portal. Another benefit is that all the data – from a company's in-house device management system or from the Data Portal – can be edited together and saved via user rights management.

Eplan eStock – the cloud-based device management system on the Eplan Platform – lets users manage and maintain device data in a browser, including voltages, currents, data sheets and component designations. They have already had access to the data stored there since Version 2023. As a result, the data is more consistent and of higher quality as there is no need for multiple data entries. Overall project quality also benefits, taking into account all the required standards.



If a device is opened in the Eplan Data Portal, it can be imported into eStock easily and quickly.

One of the key innovations now allows users to import devices from the Eplan Data Portal into eStock. When making the first keystrokes for the entry, users see all devices in their own database in addition to all the relevant devices for the search in the Eplan Data Portal. Users can then open the device they want to include in the same window and import it (if this has not already been done) with one or two clicks. When items are transferred from the Data Portal into Eplan eStock, the software initially creates a draft version – so previously approved device data is not automatically 'overwritten' and the saving must instead be actively confirmed – that is, accepted – by the user. Users can thus add data and/or make changes to the draft version before approving it and using the device in a project.

Another practical benefit is that users have access to more than 1.5 million device datasets in eStock with the new direct integration to the Eplan Data Portal. Component manufacturers involved in the Data Portal upload new and/or updated data on an ongoing basis and the pool of device data is continually growing.

Additionally, with the centralised device data management system based in the cloud, data sovereignty always lies with the company or user, who determines the quality and level of access to allow for collaboration. □

Renewable energy for SA data centres

Teraco, Africa's largest interconnection hub and vendor-neutral data centre provider, recently announced it has secured its first grid capacity allocation from Eskom and will start construction of a 120 MW utility-scale solar PV energy facility in the Free State, in South Africa.

The grid capacity allocation from Eskom will allow Teraco to connect its planned 120 MW solar facility to the national electrical grid. The power generated will be wheeled across Eskom and municipal power networks to Teraco's facilities across South Africa.

"This allocation is a significant step that supports our meeting our renewable energy ambitions and those of our clients. It marks only the first phase of our longer-term renewable energy commitment. We have been on the journey over the past few years to obtain these approvals, and our aim now is to execute quickly on the opportunity," says Jan Hnizdo, CEO at Teraco.

In the context of the various challenges South Africa faces, Hnidzo says, "This presents us with an opportunity to meet our near-term renewable energy goals while adding additional power capacity to the generation-constrained grid. It will be a unique approach in Africa as Teraco will own not only its data centre facilities, but also a significant renewable energy source with which to power them, creating a sustainable energy path to support growth. The initiative aligns with Teraco's long-term vision of powering digital transformation across Africa. South Africa's solar resource offers a competitive advantage for data centres relative to other locations," he adds.

"This project represents a significant component of our plan to power our data centres with 50% renewable energy by 2027 and 100% by 2035," says Bryce Allan, Head of Sustainability at Teraco. "In addition, over the past two years, Teraco has deployed about six megawatts of rooftop solar integrated into its facilities,

Teraco has already installed a solar PV energy system at its JB2 facility in Isando.

and this is to be increased to 10 MW as new facilities become operational." As part of construction design, Teraco facilities are built to maximise their solar yield potential.

Teraco has partnered with JUWI Renewable Energies South Africa and Subsolar to develop the 120 MW solar PV plant, with JUWI appointed to design and manage the procurement, construction, and commissioning. In a first for Teraco, a green loan has been raised to finance the building of the plant. Choosing the right partners has been central to the company delivering on its renewable energy strategy.

Wheeling renewable energy across electrical grids enables power to be moved from a renewable energy producer in one area via existing transmission and distribution systems to end-users located in other areas. It also enables the location of renewable energy projects in areas that offer high energy yield to maximise renewable energy generation potential. □

A powerful all-rounder – IIoT controller for the control cabinet

The IIoT controller from ifm is a powerful, communicative, and flexible PLC solution in machine and plant digitalisation. Even at ambient temperatures of up to 55°C, the 1.3 GHz quad-core processor works at high performance level. The controller incorporates various communications protocols, for connections to the IT world or to integrate automation technology I/O data. In addition, a 'plug and work' connection of IO-Link devices is possible – including IODD (input/output data definition) interpretation. The IIoT controller is also flexible as it is freely programmable via CODESYS V3.5.

A further advantage is that the device can be managed remotely. The CODESYS Automation Server enables remote debugging and remote web visualisation.

The IIoT controller allows for transmission of the recorded and prepared data to the most common cloud platforms such as AWS, Microsoft Azure and AnyViz. It handles the common standard digitisation languages such as OPC UA and MQTT. Whenever data needs to be recorded and processed in real time, I/Os can be read and controlled using Industrial Ethernet protocols such as Profinet, EtherCAT, EtherNet/IP or Modbus TCP.

For more information visit: www.ifm.com/

The IP20 2-in-1 cloud connector and powerful controller can be mounted on the DIN rail in different orientations.

Energy-hungry data processing microchips raise environmental concerns

As reflected in its increasing stock market value, Nvidia's H100 AI GPUs (graphics processing units) are taking the tech world by storm, but their reign comes at the price of a hefty energy bill. According to Stocklytics.com, these power-hungry processors are projected to consume some 13 797 GWh in 2024, surpassing the annual energy consumption of entire nations like Georgia and Costa Rica.

These findings bring up concerns about the environmental impact and sustainability of AI advances.

Stocklytics Financial Analyst Edith Reads commented on the analysis: "AI, which often requires running computations on gigabytes of data, needs enormous computing power compared with ordinary workloads. And Nvidia's cutting-edge H100 AI GPUs are leading the way in escalating energy consumption. Each H100 GPU, running at 61% annual utilisation, consumes roughly 3 740 kilowatt hours (kWh) of electricity annually. This is equivalent to the average American household." Reads added though: "While this figure might seem alarming, GPU efficiency may improve in the near future, offering a potential path towards more sustainable computing."

Venturing into the $30 billion tailored chip market

As a leading player in AI chip design, Nvidia is broadening its scope by venturing into custom chip development for cloud computing and AI applications. The firm is now looking to tap into the growing custom chip sector, projected to reach $10 billion this year and double by 2025. The broader custom chip market hit around $30 billion in 2023, accounting for 5% of chip sales annually.

Based in Santa Clara, California, Nvidia targets the changing needs of tech giants such as OpenAI, Microsoft, Alphabet, and Meta Platforms. The company is establishing a division focused on developing custom chips, including powerful artificial intelligence (AI) processors, for cloud computing firms and other enterprises.

[Photo credit: american-public-power-association-TF-DL_2L1JM-unsplash]

The soaring energy consumption of AI GPUs raises concerns about the environmental impact and sustainability of AI advances.

Currently holding 80% of the high-end AI chip market share, the position has driven Nvidia's stock market value up by 40% so far this year to $1.7 trillion after a more than threefold increase in 2023.

The energy challenge of powering AI chips

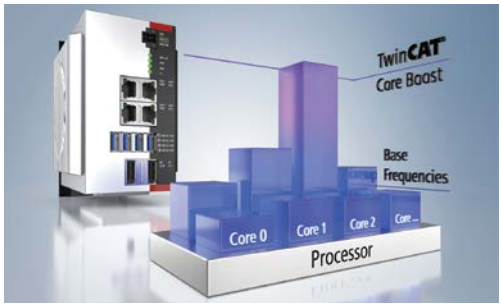
As Nvidia's aspirations grow, concerns are emerging regarding the impact of the escalating energy requirements linked to its cutting-edge chip technologies.

According to Paul Churnock, Microsoft's Principal Electrical Engineer of Datacentre Technical Governance and Strategy, the installation of millions of Nvidia H100 GPUs will consume more energy than all households in Phoenix, Arizona by the end of 2024.

Successfully navigating these challenges and fostering innovation will shape the future landscape of AI computing and beyond. Amazon's recently unveiled Arm-based Graviton4 and Trainium2 chips hold promise for efficiency gains. □

Turbo processors advance computing performance

TwinCAT 3 consistently supports modern multicore processor technology. The multi-thread capability enables the application to be distributed across several cores. Supplemented by TwinCAT Core Boost, the computing performance of individual real-time or user-mode cores can now be increased by up to 50% to gain the maximum performance out of the system and adapt it optimally to specific requirements.



With TwinCAT Core Boost, individual processor cores can be operated as required and in turbo mode.

With TwinCAT Core Boost, the clock frequency of the processor cores can be configured individually and as required, so they no longer all have to be clocked at the same rate. The clock rate per core can be defined for real-time transmission and user-mode applications. It is also possible to operate individual cores permanently and in real-time in a so-called 'turbo mode'. This results in several application benefits, including up to 50% more computing power for one or more processor cores, and the possibility of using more cost-effective CPUs.

The permitted power consumption and temperature of each processor core (and of the overall system) is monitored by TwinCAT Core Boost, to ensure reliable operation even when turbo mode is used. TwinCAT Core Boost can be used with all Industrial PCs with Intel® Core™ I processors from the 11th generation onwards.

For more information visit: www.beckhoff.com

A considered view of Draft IRP 2023

Niveshen Govender, CEO at SAWEA.

Leigh Darroll, Electricity + Control

The South African Wind Energy Association, SAWEA, and the South African Solar Photovoltaic Industry Association (SAPVIA) recently hosted their members in a joint discussion forum on the Draft Integrated Resource Plan (IRP) 2023. The objective was to gather members' insights and views on the IRP 2023, which was published in the Government Gazette on 4 January 2024 for comment.

The discussion informed the written submissions prepared by the organisations and delivered to the DMRE (Department of Mineral Resources and Energy) ahead of the deadline – extended to 23 March 2024 (from 23 February 2024 initially proposed).

Speaking to *Electricity + Control* following the discussions, CEO of SAWEA Niveshen Govender said the forum was well attended by members. Invited speakers from industry and from the University of Cape Town provided a closer examination of particular aspects of the IRP 2023 and supporting references for clarity.

Govender said first, SAWEA appreciates the new approach adopted in this IRP, presenting two timelines: Horizon 1 (2023 to 2030) – looking at the immediate challenges in the energy sector – and Horizon 2 (2031 to 2050) – looking at the longer-term energy needs of the country and the technologies that could be sourced to meet the new generation capacity required. Various pathways are presented as options to be considered to guide energy policy going forward.

Govender notes that one of the primary concerns for SAWEA and its members is the proposed procurement of wind energy in respect of Horizon 1, at a much lower level than was set out in the IRP 2019 – reduced to about 3.0 GW as opposed to 14.4 GW in the 2019 plan. "The key question here will be: is this additional to the previously proposed 14.4 GW, or is it a straight reduction of the potential contribution of wind energy to the country's new generation capacity? And if the latter, why would this be?"

He also notes that renewable energy is presented as the most costly pathway to energy security – yet this view is not supported by the document's references, nor by broader and well-grounded industry research. So, the next question is: Where does this assumption come from?

"We will also be looking for clarity more broadly on the bases informing the various pathways presented. Some of the technologies included are as yet unproven – clean coal, for example, and SMRs. CSP is again included, even though the initial CSP installation in South Africa in the early years of the REIPPPP presented some technology problems. Gas, and particularly natural gas, is also an important energy technology and included in potential future pathways, but the practicalities of sourcing gas, locally or otherwise, are not yet in place and would need to be secured."

Constraints on the national transmission grid currently present a major obstacle to the implementation of new-build energy generation and this needs to be resolved. Although it is noted in the Draft IRP 2023, it is not directly a concern of the DMRE nor one that the DMRE can resolve. Nonetheless, it is a critical factor that needs to be addressed in parallel with the IRP.

Govender says SAWEA members are more than willing to participate in potential public-private partnerships (PPPs) to develop additional transmission capacity – as mooted by the Minister of Electricity in the Presidency – but the practicalities of how and where and at what cost to whom – are all yet to be ironed out and understood. "We appreciate that work is under way in this regard, although progress is slower than we would like to see," he says.

Returning to the IRP 2023, a further concern is that it is not clear if the possible pathways presented are guided fundamentally by policy adjustments or least cost considerations or other factors. SAWEA and SAPVIA will be seeking clarity on this.

An overarching concern, Govender highlights, is that the Integrated Resource Plan, which is intended to be a nationally unifying and integrated plan, does not align with other national policy documents – such as the National Development Plan, or Eskom's Transmission Development

SAWEA will request an overhaul of the Draft IRP 2023, taking account of the concerns raised and considering its significance for the country's growth and socioeconomic development.

Plan, or the Electricity Recovery Plan set out by the Minister of Electricity.

"We will request an overhaul of the IRP 2023, taking account of the questions and concerns as I have outlined," Govender says. "And we will request the opportunity to review a revised IRP 2023 before the process is closed from public consideration and processed through parliament.

"We see this a critical concern for the country's future and for GDP growth and socioeconomic development and, as such, it deserves due time and consideration to gather the shared commitment of all stakeholders. The IRP 2023 needs to give us a realistic, clear and constructive guideline for policy that industry and prospective investors can count on and work with," he says.

Asked to comment, as an aside, on the country's Just Energy Transition Implementation Plan (JET IP) Govender said: "Fundamentally, SAWEA is fully supportive of the Just Energy Transition, but here too, we believe a fresh perspective is called for, where we consider the bigger picture for the economy and the country. Certainly, there are lessons to be learned already from the closure of the Komati Power Station and the impact this has had on the businesses that were built up to serve the power station and the communities around it. It is clear that we need to be wary of the premature closure of coal-fired power stations. What we need is effective planning and the implementation of alternative business opportunities ahead of such closure. It is a difficult timing balance. Our view is that we need to look at the JET more holistically to support growth."

In closing Govender said, "SAWEA is excited to see the start of construction on the new Impofu wind farms in the Eastern Cape, the first wind energy projects to break ground in five years! And we look forward to more progress in new wind energy generation in the coming months and beyond." □

For more information visit: www.sawea.org.za

The lighting control solution for industrial facilities

BEKA Schréder's lighting control solution, Schréder ITERRA, is designed to suit most industrial and large area applications. When combined with the cost-effective ECOBAY luminaires, designed to optimise industrial lighting, this solution offers substantial energy and cost savings for facilities.

Schréder ITERRA offers site managers a robust, cost-effective platform to run site infrastructure with maximum flexibility – to adapt the lighting to different scenarios or activities, delivering energy savings and providing optimum light levels for employees and visitors.

A wireless solution

No unnecessary cabling, no PLC (programmable logic controller) requirements, no complicated commissioning process, Schréder ITERRA is a 100% wireless control system for indoor and outdoor industrial facilities and large areas. Based on a Bluetooth™ mesh network, it offers a plug-and-play solution to control all luminaires and floodlights using standard DALI, DALI-2 or 0-10 V/1-10 V protocols.

Schréder ITERRA is a wireless control solution to manage lighting in industrial facilities.

As a mobile app-based system, Schréder ITERRA is easy to operate with a tablet or smartphone. It is supplied with an intuitive visual interface that users can quickly personalise to match the layout and settings of their lighting installation. Through differentiated user rights, managers can decide on access to system features and lighting scenarios according to the profile of the individual.

With Schréder ITERRA it is easy to provide the right light (light distribution, intensity and colour temperature) at any time to support optimum performance from workers, ensuring safety, accuracy and visual comfort.

Smart control technologies

Although the Schréder ITERRA control solution is user-friendly, it is based on state-of-the-art, efficient technologies to offer maximum flexibility and savings for a quick return on investment. As an ecosystem based on leading industry standards, it provides for compatibility with future developments and extensions. Firmware updates are automatically supported by the application.

Key features include:

- Dimming the light to the right level
- Adapting light colour temperature
- Grouping luminaires in clusters
- Creating programmed lighting scenarios
- Programming lighting animations
- Defining calendar-based triggers
- Integrating photocells to harvest daylight
- Integrating sensors for light-on-demand scenarios
- Control from the mobile app, a switch or a remote
- Managing access rights.

ECOBAY Lowbay and Highbay luminaires

The ECOBAY, designed and manufactured in South Africa, is an ideal, economical luminaire for lighting industrial facilities to optimise light levels – and return on investment. Options are available to suit various applications. □

Standby, prime or continuous – choose the right genset

Load shedding in South Africa has cast a whole new light – so to speak – on the selection of generator sets, making the concept of a 'standby' generator less applicable than has historically been the case. As a leading local manufacturer of gensets, WEG Africa explains the importance of understanding a unit's duty – the purpose it is to serve – before deciding on a power rating.

South African businesses have come to rely increasingly on generator sets to keep the wheels of industry turning, but there is still much confusion about selecting the right genset for the specific duty it is to serve.

"Customers tend to make the mistake of choosing gensets based purely on the nameplate rating," says Craig Bouwer, Senior Manager Gensets at WEG Africa. "The most important aspect of the selection is the application of the genset, which needs to be clearly understood before choosing the genset with the correct rating to serve that application."

Distinguishing the applications

Genset applications can be generally categorised as standby, prime or continuous. Part of the confusion in the market is that the frequency of load shedding means few gensets in the country today are used as 'standby' units. A standby application is one in which the genset is seldom used. It may even be that a standby unit runs more during its regular maintenance and testing than it runs operationally. A standby unit is in place to take over the power supply in an emergency situation.

"When a genset is specified for standby purposes, there is a limit to the number of hours it can be run each year," says Bouwer. "The load factor also needs to be taken into consideration."

More common in the current South African context are prime and continuous applications. A prime application is one in which the genset can run for an unlimited number of hours each year. Importantly, the load that is applied to the genset is variable, but it has to run at an average load factor, which is specified by the relevant original equipment manufacturer (OEM) of the engine.

A continuous application is also unlimited in terms of the hours the genset can run, but the load is constant and predetermined.

"Many people get confused between a prime rating and a continuous rating, because they focus only on the runtime factor when thinking about ratings," Bouwer says. "With both prime and continuous ratings having unlimited running time, the difference is the load factor. In a prime application the load is variable, whereas in a continuous application it is fixed. The load factor is therefore critical in choosing a genset for the respective application – whether that is a prime or continuous application."

"These definitions are key to ensuring that gensets perform as required," notes Damian Schutte, Engineering Manager at WEG Africa. Both the customer and the OEM need to be clear about the conditions under which the genset will operate prior to selecting a suitable system.

3 000 kVA 400 V primary equipment before being installed in its enclosure.

"Consider the analogy of a vehicle on cruise control," says Schutte. "A continuous application for a genset is like a car travelling a long distance at a steady and reasonable speed, rpm and load – all well within the engine's output capacity. A prime application, in contrast, can be compared to a vehicle needing to perform at higher speed and power output at variable intervals and for variable periods of time."

He explains that each category of application will place different demands on the genset, and this will affect the choice of rating and the expected lifespan. Just as a car will usually experience less wear and tear from being driven at a suitable and constant speed, so a genset's life cycle can be extended – and total cost of ownership reduced – by operating it similarly.

As an example of continuous power, a mine may need additional power when its grid power is partially limited during load shedding. The genset solution is designed to bridge the gap between normal supply and reduced supply, and the units will run during these times to cater for a more-or-less fixed load.

For an industrial application like a workshop, the load is likely to be much more variable – with machines being turned on and off depending on the time of day and the

workload. This illustrates the need for a prime rating on the genset, rather than continuous. Both these categories differ from standby applications, which are characterised by higher loads and a limited number of hours for which the genset can be run.

Standby power has its place

Bouwer emphasises, however, that there is still a place for standby power. In some environments it is legally required for health and safety reasons.

"Load shedding is not the only reason we need gensets," he says. "Mines, hospitals, hotels, financial institutions and data centres are among the many sectors that need standby capacity for those times when the power fails – for any reason. This may be to address life-threatening risks in an emergency, or other considerations."

Schutte highlights that, as an OEM, WEG Africa uses the standby, prime and continuous categories as a guide to advise customers on choosing the right genset and understanding the lifespan they can expect from it.

"If the application changes from what was initially intended, the customer will not get the service life initially expected," he says. "Operating the unit outside of its design capacity can also void the warranty that is provided with it."

Making the right choice

WEG Africa therefore works with customers to help assess what loads they plan to place on the genset and how often it is expected to be used. They also look at what loads will be switched on and off while the unit is running.

"It is important for customers to ask us, as a reputable genset OEM, for our input, rather than assuming too much about what the best solution should be," Schutte says. "A site visit may be required to assess the detail of an application fully. Perhaps the biggest mistake sometimes made is just to estimate what the total load might be, and then simply look for a genset with that nameplate rating; this is risky and likely to lead to premature failure and unexpected costs," he says. □

For more information visit: www.weg.net

Construction starts on three new wind farms

Enel Green Power South Africa (EGP South Africa) has begun construction on three new wind farms in South Africa's Eastern Cape province.

The wind farms – Impofu East, Impofu West, and Impofu North – will provide renewable energy to Air Liquide Large Industries South Africa (Air Liquide) and Sasol South Africa (Sasol) and are scheduled to become operational in 2026.

Together the projects will include 57 turbines, eight high voltage substations, plus 120 km of 132 kV high voltage overhead power lines. They will generate up to 330 MW of renewable energy which will be wheeled via the national grid, in terms of a wheeling framework agreement with Eskom, to Sasol's Secunda site in Mpumalanga where Air Liquide operates its large-scale oxygen production facility.

The projects will further complement the existing platform of over 1.2 GW of renewable energy that EGP South Africa already has in operation.

Speaking at the groundbreaking ceremony, Manuele Battisti, Country Manager at EGP South Africa, said the projects align with the Enel Group's strategic vision for 2024 to 2026.

"In line with our commitment to the global transition to a low-carbon future, the construction of these wind farms marks significant progress as we see our vision of driving the future of sustainable energy in South Africa come to life. Through strategic partnerships, EGP South Africa is proud to spearhead these transformative wind farm projects.

Enel Green Power South Africa: breaking ground for the three Impofu wind farms in the Eastern Cape.

"As we forge ahead, we remain dedicated to providing innovative, clean energy solutions in South Africa, and creating shared value for our partners, communities and clients, enabling progress with sustainable energy, environmentally, socially and financially," Battisti said.

The new transmission lines from the wind farms will not only improve South Africa's grid capacity, but, as with all Enel Green Power projects, will continue the company's commitment to creating shared value (CSV) in the communities it operates in.

While coordinating with up to 60 different landowners within the vicinity of the projects presents its challenges, the social and economic benefits for local communities will be substantial. These include a series of community upliftment initiatives and job creation opportunities that will take place during the construction phase and, thereafter, during the operational phase. □

Energy optimisation in the timber sector

Large timber and paper companies have led the way in generating their own power using steam turbines. Today, the timber sector generates its own power using its own by-products – and can create a new income stream from the biomass it produces. Dennis Williams, Commercial Director at operations and maintenance service provider on steam systems and boilers, Associated Energy Services, reports on some of the work it has done to help companies optimise their energy plant performance.

Ensuring plant reliability and safety

The timber industry contributes up to five per cent of South Africa's gross domestic product and involves a complex value chain. AES (Associated Energy Services) has worked with sawmills and related downstream businesses for many years.

"One can be sure that somewhere in the value chain, thermal energy is required to condition or soften wood chips – or to dry them," Williams says. Companies operating in the sector therefore need to ensure their energy plants are efficient, reliable and resilient in the face of rising input costs and broader economic pressures.

Working with tissue manufacturers, a kraft paper producer and a large board manufacturer, AES has helped improve boiler efficiency, steam quality and boiler reliability, and in cleaning up and reducing emissions through its operations and maintenance (O&M) services, including energy plant upgrades and project management.

Safety and asset care are always priorities. As many plants in the timber sector are old, Williams emphasises that pressure vessel safety is crucial. AES's ISO 45001 certification (managing occupational health & safety risks) – including the management and legal compliance of boilers – is therefore particularly important. Similarly, the company's ISO 9001 (quality management systems), ISO 14001 (environmental management systems) and ISO 45001 certifications in energy plant operations and maintenance set AES apart from competitors. This is key in the timber sector, as the company is often responsible for the operation and maintenance of clients' energy plants on sites in remote locations.

It also offers clients on-site training and management for boiler and energy plant staff. On some sites this entails bridging language differences and providing literacy training where needed. "In this way, we have been privileged to make a real difference for the staff participating – unlocking further career path growth – and an improved quality of life," Williams highlights.

Extended services

Over the past decade, AES has witnessed significant realignment within the timber value chain. "We are now engaging with companies looking to invest in new plant and equipment, providing them with systems that support more efficient use of energy and water and economies of scale – currently key operational and economic considerations."

The timber value chain usually originates in remote locations.

AES also works with clients to plan how best to use and manage the volumes of biomass they generate. "We look for solutions that enable the company to use as little of this resource as possible, so they can on-sell the rest. Getting the right balance is key," he says.

Related to this, AES is assisting clients in other sectors to source greener fuels– such as timber biomass – where those clients are wanting to offset the use of fossil fuels by using biomass to fire their boilers.

However, there are challenges. High fuel costs mean transport of biomass from rural sawmills is expensive. Distances travelled could also unintentionally increase users' carbon footprint as they seek to improve sustainability. So, the calculations need to be done.

"Furthermore, as timber biomass has a low calorific value, the actual fuel content per mass is low and bulky: loaded onto a 30-tonne vehicle, it might yield only 11 tonnes of fuel. If loaded with coal, there will be 25 to 26 tonnes of material with a far higher calorific value – potentially double – depending on how much moisture is in the wood biomass," Williams explains.

Another challenge is the cost of biomass – a central deciding factor for new plant investment: "It comes down to economics. The originator wants to sell it for the best possible price. So, while the burning of biomass is preferable

to the burning of coal, the buying customer may not want to pay the price the timber mill wants."

Future growth

AES sees the timber sector as currently in transition, considering the value of its biomass by-products. "Many timber residue producers with spare biomass are trying to figure out what this new marketplace means for them. If they are not using the material themselves, they want to maximise what they can do with it. If AES wants to purchase it to convert into a fuel source for thermal energy, we need a 10-year agreement to secure the funding for a new biomass steam plant," he says.

"The coal, gas and liquid fuels markets are well-established. We know the parameters and how the economics work. But in the biomass space, the market is still quite volatile because companies are deciding what works best.

"However, at AES, whether we are optimising operations and maintenance, or developing new opportunities around the use of biomass as a greener fuel source, we are confident that the timber sector provides a real opportunity to assist plant owners in processing and using this resource optimally and successfully," Williams says. □

For more information visit: www.aes-africa.com

Nishandra Baijnath, Schneider Electric.

Microgrids offer a solution to managing energy on site

South Africa's continuing energy crisis has shown us, among other things, that the energy landscape is dynamic, robust, and versatile. South Africa – and the world – are at a historic juncture as businesses and homeowners are implementing alternative energy technologies to meet their daily energy needs.

Nishandra Baijnath, Systems Architect, Power Systems, Anglophone Africa at Schneider Electric, says one option, undoubtedly gaining traction, is the microgrid, which offers a range of capabilities that meet specific energy goals and benefit business strategies.

Microgrids have the potential to meet the needs of various industries and sectors. They enable businesses to generate electricity on site, use it when needed and, potentially, sell excess power back to the local utility.

Importantly, in South Africa, microgrids allow businesses to address the major concerns of the variability and unpredictable nature of energy costs. On-site renewable energy resources, such as wind farms, solar panel arrays, and battery storage systems, take these variable costs out of the equation. A microgrid could provide a cost-effective alternative or addition to a business' energy mix if current power purchase agreements (PPAs) cannot guarantee a competitive rate per kilowatt hour (kWh). Organisations that establish their own on-site energy resources can become more self-reliant and less vulnerable to the external forces affecting energy costs.

Controlling demand and costs

As a practical example, local power suppliers categorise commercial buildings based on peak demands, Baijnath highlights. If a business is identified as a Tier-2 customer, with a potential 10-kW peak demand, the utility must be prepared to supply that amount.

This entails expanding the grid, adding substations, and laying more cables, all of which come at a cost. Businesses are often placed in a tariff bracket with a higher, allocated peak demand, irrespective of their actual loads, and this leads to higher monthly energy bills. The base cost for the allocated peak demand is, in most cases, more than the effective power consumed on their energy bill, Baijnath says.

Here, microgrids, with their control systems can play an important role. When implementing a microgrid, service providers will work closely with customers to identify essential and non-critical loads. Microgrids allow businesses to implement a strategic load management plan which, in turn, reduces the peak demand.

For example, if the peak demand is six kilowatts due to simultaneous activation of multiple loads, the microgrid controller system can deliver a staged activation process. This means businesses can strategically schedule the activation and deactivation of loads, and thus lower overall energy costs. Peak demand is a key component of an organisation's allocated tariff and, by managing it effectively, businesses can position themselves in a lower-cost bracket.

Microgrids at work

Bimbo Bakeries, a national food producer in the USA, plans to switch on microgrids – built and operated by Schneider Electric – at six bakeries in California. The project is part of its strategy to cut its carbon emissions by half by 2030 and achieve net-zero carbon emissions by 2050.

The goal is to use microgrids to supply 25% of the energy needs and reduce carbon emissions by 25% at each site. In addition, this will allow Bimbo to convert natural gas ovens to electricity, a major step in decarbonisation.

A key consideration was to lessen the strain on local utilities in the state, which (as in South Africa) are finding it harder to meet electricity demands. By integrating the microgrids, which include solar arrays and energy storage, Bimbo will generate the additional power it needs and create a more sustainable energy mix. □

520 MW wind and solar – another step towards reducing emissions

Anglo American has announced that its jointly owned renewable energy venture with EDF Renewables, Envusa Energy, has completed the project financing for its first three wind and solar projects in South Africa. The terms and structure of the non-recourse project financing are typical of high-quality renewable energy infrastructure assets. The three renewable energy projects, known as the Koruson 2 cluster of projects and located on the border of the Northern and Eastern Cape provinces, will have a total generation capacity of 520 MW from wind and solar energy.

Themba Mkhwanazi, Anglo American's Regional Director for Africa and Australia, said: "The successful project financing of these initial projects marks our first major step towards addressing Anglo American's largest remaining source of Scope 2 emissions – our electricity supply in southern Africa. As we progress towards our 2040 carbon-neutral operations commitment, we also see the opportunity to enhance energy reliability and grid resilience in South Africa. We expect that energy availability to help catalyse extensive socioeconomic activity, playing an important role in unlocking South Africa's economic development and growth prospects."

The projects – the Umsobomvu Wind project (140 MW), the Hartebeesthoek Wind project (140 MW), and the Mooi Plaats Solar project (240 MW) – form part of Envusa Energy's mature pipeline of wind and solar projects in South Africa. The renewable energy ecosystem that Envusa Energy plans to develop is expected to supply a mix of renewable energy, generated on Anglo American's sites in the southern African region and on other sites from which renewable energy will be transmitted via the national grid.

The Koruson 2 wind and solar projects benefit from high-yield resources and a robust Eskom grid connection. This configuration promises considerable electricity cost savings compared to existing tariffs. Anglo American's three businesses in South Africa (Anglo American Platinum, Kumba Iron Ore, and De Beers), have committed to 20-year offtake agreements with Envusa Energy. These agreements will see Anglo American Platinum receiving 461 MW of supply, Kolomela mine 11 MW, and Venetia mine 48 MW. All projects are due to reach commercial operation during 2026. This inaugural phase of contracts is expected to abate some 1.5 million tonnes per year of carbon dioxide.

Nolitha Fakude, Chair of Anglo American's Management Board in South Africa and Chair of Envusa Energy, said: "We are making progress in setting up Envusa Energy for long-term success as a major renewables powerhouse in South Africa. Achieving financial closure for these three renewable energy projects marks a crucial milestone in support of Anglo American's global decarbonisation journey and bolsters South Africa's pursuit of a resilient and clean energy future.

"We believe the energy transition offers a unique chance to generate substantial new economic opportunities as part of South Africa's journey towards an inclusive, sustainable, and low-carbon economy."

The Koruson 2 cluster will include the Umsobomvu Wind project, Hartebeesthoek Wind project, and the Mooi Plaats Solar project.

Tristan de Drouas, CEO at EDF Renewables in South Africa, said: "Collaborating with Anglo American to apply our global expertise in renewable energy infrastructure development, design, and delivery, has been immensely rewarding. With Envusa Energy being developed as a jointly owned venture with Anglo American, we have consolidated our long-term commitment to South Africa's transition to clean energy.

"The financial close of this initial cluster of projects is the first step towards Envusa Energy's ambition to roll out three to five gigawatts of wind, solar and storage projects by 2030.

"These collective initiatives align with EDF Group's CAP 2030 strategy, which is focused on doubling our net renewable installed energy capacity globally (including hydropower) from 28 GW in 2015 to 60 GW by 2030."

In line with both companies' commitment to supporting a just energy transition, Envusa Energy is exploring a range of black economic empowerment (BEE) and community partnership models that will enable businesses and host communities to share in the benefits created by the development of the renewable energy ecosystem, along its value chain. The first of these empowerment initiatives includes the incorporation of a 20% equity investment by Pele Green Energy (Pty) Ltd (an established South African independent power producer) into each of the three project companies delivering the development of the Koruson 2 assets, alongside the establishment of a community trust to manage the financial interests of local communities in the Koruson 2 assets.

Envusa Energy is also in the process of implementing the incorporation of a BEE partner at the business level. The development of the renewable energy ecosystem presents an opportunity to help build a more collaborative and inclusive economy that places people and the principle of shared prosperity at the heart of development. □

The next big shift in energy – high voltage battery systems

Lance Dickerson, MD of Revov, says for South Africa, overcoming the energy crisis will fuel the next big shift in the country's energy infrastructure. High voltage (HV) LiFePO4 battery energy storage systems (BESS), which can improve power reliability for businesses, have been around for some time, but REVOV expects an upsurge in usage in 2024 and going forward.

"HV BESS systems are designed for industrial, commercial and utility-scale applications. We are seeing a growing number of enquiries from key players in agriculture, manufacturing, property development, residential and commercial property management, and the education sector," Dickerson says.

Businesses in primary sectors in the economy realise they need to take control of their own energy security and more business leaders are realising that renewable energy storage is a much more viable, and reliable, option than traditional internal combustion generators.

There are three main reasons for this. From a commercial perspective, hauling big loads of fuel to power generators carries a significant cost, especially for outlying areas, and security of supply – because it is via road travel – is not assured. Further, diesel costs continue to increase, and maintaining and servicing large generators add financial strain on organisations that may already be operating on tight margins.

In addition, the world is turning to renewable energy. Dickerson notes that the commitment to net zero carbon emissions is in focus globally. "South African businesses have to acknowledge this and accept that access to markets such as the EU will become increasingly difficult and restrictive unless businesses, industries, and countries comply with stricter carbon targets. We can no longer assume that products made or grown on the back of power supplied by internal combustion engines or coal-fired power stations will be accepted into the EU or other international markets.

"And, from an environmental perspective, the overwhelming weight of evidence about the critical state of the climate and our planet, surely dissuades anyone from investing in further harm to the planet." He emphasises: "If this moral obligation is not yet recognised as urgent, consider that much of our workforce and consumer population is made up of millennials and Gen Z. Although they are different, both age groups value purpose and actively pressure their employers and brands they support to embrace various environmental, social and governance (ESG) causes. They are also known to reject businesses and brands that don't. Activist shareholders are increasingly demanding accountability and this pressure will continue to grow."

All these factors contribute to creating an environment where HV BESS systems become almost synonymous with electricity security in South African industry.

The technology of HV BESS has evolved to a point where it is applicable and scalable across various sectors, making these systems suitable for larger-scale applications in industrial, commercial and utility settings. Leading suppliers can deliver modular systems that allow businesses to scale up their investment as needed.

Above: REVOV is a leading supplier of LiFePO4 batteries for large-scale industrial and other applications across sub-Saharan Africa. Left: HV BESS technology is applicable and scalable across various sectors.

Dickerson highlights that HV BESS systems are being considered or are already in use in farming and the agricultural value chain, manufacturing, retail centres, and more, to provide power backup capacity when grid supply is unavailable.

Businesses have different motivations, but they all hinge on energy security, with cost savings. He says many are interested in renewable power investments where BESS systems store the energy generated from solar panels and, in some instances, wind turbines. Others need uninterrupted power backup to ensure critical systems such as refrigeration and security are unaffected by protracted power cuts. Businesses are also realising that high voltage storage systems enable them to reduce their energy costs by mitigating against periodic demand changes.

Eskom recently officially opened its first utility-scale battery energy storage system in the Western Cape. This demonstrates another crucial application of HV BESS to improve grid stability and integrate renewable energy sources. Dickerson points out: "These systems, built with the right batteries, can help manage fluctuations in supply and demand and reduce transmission losses. They can also serve additional functions such as regulating frequency, providing voltage support and balancing the grid. There is more than enough capacity and engineering expertise in the local industry to support a shift to the new energy utility of the future."

Modern, modular systems include local and remote monitoring of specific battery telemetry, ranging from individual, per-cell visibility, to data relating to each battery string. "These systems point to the next big shift in our power landscape – for national and municipal utilities as well as IPPs and businesses or other entities choosing the route of embedded self-generation," he says. □

Higher power density in next generation gensets

The new generation 12-cylinder mtu Series 1600 Gx1 diesel engine sets a new standard for power generation in critical applications and standalone microgrids.

The new generation of the 12-cylinder mtu Series 1600 Gx1 diesel engine sets the standard in terms of performance, flexibility, life-cycle costs and lower carbon performance. "With this new generation of diesel engines in the power range up to nearly 1 000 kilowatts, we are continuing to invest in our mtu engine portfolio and offer our customers worldwide cutting-edge technology for reliable and sustainable stationary power generation in critical applications," said Dr Jörg Stratmann, CEO of Rolls-Royce's business unit Power Systems. Rolls-Royce recently presented its new strategic framework in which the focus on market-leading propulsion and energy solutions with higher performance and largely developed and produced in-house is a key component.

Suitable for power generation in critical applications such as data centres, airports and hospitals, the new Series 1600 also serves well as a component for power plants in regions without a connection to the public grid, such as remote construction sites or mines. In combination with renewable energies and battery storage, its unique low-load capability makes it a reliable and robust power generator in self-sufficient microgrids.

"This is a benchmark product in its class. It enables us to offer our customers maximum performance and efficiency for their energy supply," said Tobias Ostermaier, President of the Stationary Power Solutions division at Rolls-Royce Power Systems.

Rolls-Royce has increased engine performance by up to 49% compared to the previous model. As a result, the 12V1600 Gx1 offers the highest power density in its power class and outstanding load acceptance, as well as robustness and reliability. To achieve this, displacement has been increased, a new turbocharger system has been used and the injection system has been renewed. The engines deliver full power even at high ambient temperatures, high humidity and under difficult environmental conditions.

All Series 1600 mtu engines are released for use with synthetic diesel fuels in accordance with the EN15940 standard, including renewable diesel fuel or HVO (hydrotreated vegetable oil). The use of drop-in fuel renewable diesel can reduce CO_2 emissions by up to 90% (depending on the production process and source material) compared to fossil diesel. □

Monitoring power quality to minimise energy waste

Saving energy and minimising waste are critical aspects of energy use. In all industries, looking for energy savings means monitoring power consumption rates and developing an energy-saving power quality management plan. Here, Fluke outlines the steps to take.

Benchmarking electrical energy consumption

The first step in developing a power quality management programme is benchmarking the current electrical energy consumption across the facility. From that initial survey, business owners or energy managers can look for quick and easy solutions to start minimising energy waste: for instance, areas that are typically closed on the weekends and can be shut down. Areas that contribute to energy usage outside significant assets should be monitored, supplementary electrical heating, lighting being left on, or computers similarly being left on when not in use.

Once those quick wins have been identified and action taken, more detailed studies should be conducted throughout the building or facility. The Fluke 1777 three-phase power quality analyser can be used to run load studies on assets across the facility. These measurements will indicate where significant energy savings could be made by switching off some systems during the night or non-operating times.

Advanced power quality considerations

The next step in reducing energy consumption is to look at where energy waste arises. One area to focus on is losses in conductors. As current flows through conductors, some energy generated will inevitably be wasted as heat. Figuring out how to level this issue returns to the fundamental I2R equation indicating the power delivered. And this leaves two possible solutions: reduce the current flow (I) to lower kilowatts or reduce the resistance (R). Although both present a problem:

- Lowering current (I) means the load will not operate correctly
- Reducing resistance (R) can cost more because it requires the installation of copper or aluminium conductors.

Using power quality analysers, energy managers can locate energy waste and act to gain energy savings.

What is the best solution?

Consider the conductor sizing. The National Electric Code (NFPA 70 or NEC 100) provides guidance on determining the correct size of a conductor for the respective application, describing the ideal conductor size for almost any circumstance. The primary consideration for conductor sizing is ensuring the safe operation of the conductors with the most appropriate insulation. This depends on the length, cross-sectional area, and anticipated current rating required. This approach can provide minimised energy losses, typically 2% or less, and an acceptable voltage drop in the conductor. Additional possibilities could include installing higher efficiency loads and checking if motors are correctly sized – or possibly oversized for the respective application.

Wasted power

The codes and guidelines are great when installing new equipment, but implementation does not always work out ideally once the cabling installation is completed and the loads are installed. Furthermore, over time, the equipment may change with additions or adjustments; moves and age can significantly affect energy waste. Key areas where energy waste may occur are related to power quality: voltage regulation, harmonics, power factor and unbalanced loads.

Voltage regulation

Voltage regulation works to reduce energy consumption in voltage-dependent loads. It reduces or controls the voltage levels within the equipment manufacturer's specifications to deliver energy savings. As more efficient loads are installed at a transformer, the voltage in the system may rise or may be incorrectly controlled.

The Fluke 1777 power quality analyser can be used to catch voltage regulation issues, checking for transient voltages or voltage imbalance. Both issues can lead to failure, unplanned downtime, and expensive repairs.

Harmonics

Harmonics distort voltage and current so that the ideal sine

wave for voltage is not maintained. One of the most recognised effects of harmonics in electrical systems is the excess heat they create in the conductors carrying them. This results in overheating in phase and neutral conductors, known as 'triplen harmonics'.

Unbalanced load

The additional heat causes issues in cable runs, motor windings, and transformers. Overheating can cause significant damage or complete failure, either of which can lead to unplanned downtime and expensive repairs. A Fluke 1770 Series three-phase power quality analyser can be used to measure and diagnose harmonics.

Benefits of power quality studies

Once power quality studies reveal areas where energy is being wasted, a business can take steps to fix the issues.

- Set up a preventive maintenance routine to ensure continuing measurement of energy use against the baseline benchmark. This means any issues can be noted as they arise.
- Install harmonic filters on loads that add to the facility's harmonic distortion.
- Address the sources of unbalance. This may mean setting up a repair or replacement schedule for large motors with mechanical unbalance issues.
- Mitigate unbalanced load issues. In some cases, this may mean adjusting single-phase loads to be more equally distributed across the phases.
- Replace blown fuses where necessary. A blown fuse on a bank of three-phase power factor improvement capacitors could also cause the problem; simply replacing the fuse can resolve a major unbalance.

Monitoring power consumption with the Fluke 1777 three-phase power quality analyser.

Power quality studies highlight much of what can be done to save energy, reduce energy losses in a facility, and lower energy costs.

Power quality monitoring will point to where the issues are coming from and how to fix them.

Beyond the energy savings, power quality studies have been shown to lead to some additional benefits. For example:

- Discovering potential failure points in assets that could cause major disruption allows for early remedial work to be done
- Mixed air temperatures can be corrected
- Uncovering otherwise unrecognised faults such as improperly installed breakers prone to accidental tripping. □

Fluke is represented in South Africa by Comtest.
For more information visit: www.comtest.co.za

Circuit breaker test set

The Doble TDR9100 Circuit Breaker Analyser is a state-of-the-art circuit breaker test set for testing all types of circuit breakers with efficient and accurate performance measurements.

The TDR9100 provides measurements for main and auxiliary contact timing, mechanical motion analysis, analogue values, resistance and capacitance.

This inclusive, rugged and field-portable instrument can be used for simple and complex testing of circuit breakers.

The TDR9100 controls circuit breaker trip and close commands and supports the following operations: Trip (O), Close (C), Reclose (O-0.3s-C), Tripfree (CO), O-CO, O-0.3s-CO, First Trip (O), Slow Close (C).

The TDR9100 test set offers:

- Up to four breaks per phase, three motion channels and six event channels
- Testing flexibility – the TDR9100 can be grouped as a set of two or three units, effectively doubling or tripling the usable channels and main contacts for up to 12 breaks per phase
- User-friendly T-Doble software includes an intuitive control panel for quick, efficient and simple testing of circuit breakers
- Measurement of additional parameters in the mechanism cabinet using Doble or third-party transducers.

Using the TDR9100 test kit, electrical technicians will know that breakers can and will perform when they are needed.

Using the TDR9100 test kit, electrical technicians will know that breakers can and will perform when they are needed. They can easily detect main contact and resistor contact timing errors. A patented digital rotary and linear transducer provide early diagnosis of mechanical problems. A further benefit is that testing is immune to Interference – the accuracy of test results is unaffected by severe conditions of electrostatic and electromagnetic interference normally present in harsh substation environments. The test set can be controlled using a Doble Universal Controller (DUC), tablet or PC. □

Senseca has launched its redesigned data loggers with improved functionality.

High-precision data loggers

Senseca, formerly the GHM Group, has launched its redesigned PRO 111/PRO 115 handheld meter/data logger for Pt100 4-wire probes as well as the PRO 131/PRO 135 data logger for thermocouple probes.

Both the devices now include enhanced features. A higher quality LED screen with backlit dot matrix and clear text display make the data more easily visible and the data logging storage capacity provides for logging of up to one million data units.

"The high-precision instruments are suitable for temperature measurement across all industries. They are robust, reliable and ergonomically designed for one handed or bench top use," says Jan Grobler, Managing Director of Senseca South Africa.

The PRO 111/PRO 115 data loggers are professional handheld meters for 4-wire Pt100 probes. Any four wire Pt100 standard probe can be connected provided it is equipped with an M12 connector. The instruments have a high-precision temperature-compensated analogue front-end meter that does not add any significant error in the measurement chain and also offers life chart viewing. The devices incorporate sophisticated polynomial sensor linearisation to ensure best performance and to provide all relevant possibilities for calibration and adjustments.

Both the PRO 131 and PRO 135 models are dual-channel professional handheld meters for thermocouple probes. They offer configurable surface correction factors and can be set for use in combination with Senseca contact probes for enhanced measuring accuracy. The PRO 135 additionally has a data logging capability. □

Ultra Control Valves has developed a self-cleaning speed controller to ensure reliable closing of level control valves.

Level control in water reservoirs

Peter Bowen of Ultra Control Valves says one of the most common applications for self-actuated control valves is in reservoir level control.

At first glance the valve looks simple – exactly like the valve in a toilet cistern. Except that toilet valves are not likely to fail from cavitation.

Combatting cavitation by controlling flow rates through level control valves is a central concern in water management. Here, however, Bowen looks at a common problem that arises from preventing water hammer when closing reservoir control valves.

Water hammer occurs when a fluid in motion is forced to stop suddenly – for instance, when closing the level control valve on a reservoir. The resulting pressure wave can cause significant problems, including pipe failure.

To prevent this, a long closing time is often specified. Sometimes as long as 10 to 20 minutes. This is achieved using a speed control needle valve on the level control valve. However, the needle valve is usually set very low, which makes it prone to clogging with dirt and sediment. When this happens the level control valve will not close and the reservoir overflows. Needle valves require high maintenance.

Ultra Control Valves has developed a self-cleaning speed controller to solve this problem. It can accommodate a wide range of closing speeds and is reliable even without regular maintenance.

This innovation marks a significant step forward in the efficient operation of level control valves. □

GET IN TOUCH:

WIKA Instruments (Pty) Ltd
Chilvers Street, Denver
Johannesburg, 2094, South Africa

Telephone +27 11 621 0000
Email sales@wika.co.za

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Hearing protection in the workplace

Hearing protection is an important aspect of health and safety in the workplace. Our hearing can be damaged when we are exposed to loud noise, sounds with a high decibel level, or continual long-term sound emissions.

There are general guidelines specifying potentially harmful noise levels.

- 85 dB: long-term (eight hours or more) exposure to sound at the level of 85 decibels may result in hearing damage. This level of noise is comparable to that generated by street traffic or a lawn mower.
- 100 to 110 dB: noise within this range, such as loud music on headphones, may result in hearing damage after only 15 minutes' exposure.
- 120 dB: noise at this level and beyond can be immediately harmful to hearing. Examples include an emergency siren sound or a rock concert.
- 140 dB: noise at this level is considered extremely hazardous and can result in instantaneous hearing damage. Here, examples include gunshots or jet engines in operation.

Hearing damage can be cumulative: long-term exposure to lower noise levels can be just as damaging as short-term exposure to higher noise levels. It is therefore important to protect our hearing during exposure to loud noise, even if it does not cause immediate damage.

One-off short-term exposure to very high noise levels can also cause permanent hearing damage. Referred to as 'an acoustic injury', this results from a sudden, intense noise emission such as an explosion. Key influencing factors include:

- Decibel level (dB) – noise above 120 dB may cause instantaneous hearing damage
- Location of the sound source – a shorter distance from the source of loud noise increases the risk of hearing damage
- Nature of the sound – sudden, pulse-like sounds (such as gunshots or explosions) are more damaging than constant noise exposure.

Hearing damage may involve temporary or permanent hearing loss, or tinnitus (constant ringing in the ears) and requires medical attention.

Many people working in industrial facilities should be wearing hearing protection to mitigate the risk of hearing damage.

Protecting our hearing

In all circumstances where the noise level is beyond our control, disposable and multiple-use noise-reducing inserts, noise-cancelling headphones, or noise-reducing earmuffs, adjusted to the respective noise levels of the environment, personal preferences and abilities, should be used. By choosing protection measures carefully, we can take steps to protect our hearing effectively.

Potential impacts on health and well-being

Working in a noisy environment or subject to long-term noise exposure may impact not only on employees' hearing, but also on their overall physical and emotional health and performance. This may be evident in increased stress levels and related health problems; in poor sleep or sleep disorders and consequent fatigue or poor concentration; declining performance especially on tasks that require focus and precision; impaired communication between employees, which may result in misunderstandings, mistakes and resultant conflicts within teams; and permanent noise exposure can cause chronic fatigue, headaches and muscle tension, in turn affecting employees' overall well-being.

To prevent these negative effects, employers should adopt the necessary countermeasures, providing earmuffs or earplugs as required. In addition, hearing protection measures applied under the Occupational Health & Safety (OHS) regulations should include such steps as minimising noise in the workplace by using appropriate soundproofing, providing regular breaks for employees, and educating employees about the impact of noise on health and performance. Monitoring and managing noise levels and complying with the relevant OHS regulations are the most important steps.

Hearing protection in industrial facilities

Many people working in industrial facilities – as machine operators, maintenance technicians, automation engineers, production line operators or processing plant personnel – should be wearing hearing protection such as earmuffs or in-ear inserts to mitigate the risk of hearing damage.

TME, or Transfer Multisort Electronik, supplies various types of hearing protection equipment for use in industrial environments.

Noise-reducing earmuffs

Noise-reducing earmuffs (or ear defenders) are external hearing protectors which cover the ears. They consist of soft cushions filled with a sound-absorbing material, which tightly surround the ears, and a hard, often plastic, external casing. They are used in high-noise-level environments, such as industrial facilities, construction sites, and workshops. Worn for prolonged periods of time, particularly in high temperature conditions, they can cause sweating around the ears and some discomfort.

Hearing protectors, or earplugs

Hearing protectors, often referred to as earplugs, are small pieces inserted directly into the ear canals. They are typically made of foam, silicone, wax or special elastomer-based materials, which adjust to the shape of the ear canal.

Well-fitting earplugs can be effective in cancelling noise, although, at very high noise levels, their effectiveness may be slightly lower than that of noise-reducing earmuffs. However, for some people they may be more comfortable to wear for longer periods and are less conspicuous than earmuffs.

Both types of ear protection measures should be properly fitted and used as specified to provide effective hearing protection.

Passive and active hearing protectors

Hearing protectors may be classified as passive or active, and their effectiveness is measured using different methods and indices.

Passive hearing protectors are the simplest and most commonly used hearing protectors that cancel noise by physically blocking or restricting the flow of sounds into the ear. They include earplugs and noise-reducing earmuffs.

Active hearing protection requires advanced equipment fitted with electronic circuits designed to reduce noise. They ensure active noise control using external microphones to detect ambient sounds and then generate a counter-phase signal to neutralise undesirable sounds. Some models amplify quiet sounds, such as speech, while cancelling loud noises. □

For more information visit: www.tme.eu

Offshore safety training at a new level

As South Africa continues its journey towards energy security, the exploration of natural gas options has become an important focus – and with it, the need for safe and responsible exploration practices. The offshore training centre based in Cape Town recently marked a major milestone in its efforts to support this drive for safety.

"The need for skills and expertise in the energy sector has become more pressing in South Africa," said Gary Concar of OATC (Offshore Africa Training Centre). The centre celebrated its tenth anniversary in February and introduced a new survival training course that will equip students to a higher level.

"We were honoured to have Joe Meanen, one of the legendary 61 heroic survivors of the 1988 Piper Alpha disaster, as a speaker at our event," said Concar.

Meanen shared his inspiring account – a harrowing reminder of the importance of safety offshore, and a deeply moving story of human resilience in the face of one of history's most catastrophic gas rig disasters.

As exploration ramps up and new fields are discovered, South Africa's southern seas will likely see increasing numbers of drill ships and floating production, storage and offloading units.

This growth will raise demand for internationally approved energy sector workforce members, especially for professionals who are trained according to the most rigorous safety standards. It is this demand that the OATC facility aims to meet with its new training course.

OATC in Cape Town has launched a new training course to support safety in offshore gas exploration.

Meanen spoke to guests at the launch about his experience during the fire at Piper Alpha, an event that claimed 165 lives back in 1988. His message, he explained, is about the need to realise that this can happen to anybody at any time.

"It is important to be prepared as best you can be, especially if you are working offshore or in oil and gas or chemical plants. You need to make sure you have the right equipment and machinery so you can cope with any situation."

The OATC facility – the first in South Africa to offer OPITO-accredited training – runs courses covering key topics like rigging, lifting, slinging, banksman duties, and LOLER (Lifting Operations and Lifting Equipment Regulations) and now OPITO Survival Courses. OPITO is the global, not-for-profit, skills body for the energy industry. □

Safe access to field instruments

Towards the close of 2023, Pepperl+Fuchs won recognition from the South African Flameproof Association when it was presented with a Technical Innovation Award for its Ethernet-APL Rail Field Switch. The South African Flameproof Association is a non-profit organisation and an association of companies involved in explosion prevention and protection techniques for equipment used in hazardous atmospheres in mining and industry broadly. It has a membership of close to 200 companies which include end users and manufacturers, as well as relevant government bodies and equipment testing houses. The Technical Innovation Award is presented for an innovative product or system designed for use in hazardous areas.

Ethernet-APL

Ethernet-APL is the ruggedised, two-wire, loop-powered Ethernet physical layer that uses 10BASE-T1L plus extensions for installation in the demanding operating conditions and hazardous areas of process plants. It enables a direct connection of field devices to Ethernet-based systems in a way that process industries can benefit from a convergence of their OT and IT systems. Using a switched architecture eliminates any unwanted interference between devices connected to the same network.

Ethernet-APL adopts technologies and options already established in the field of process automation. This includes the proven trunk-and-spur topology, enabling it to power up to 50 field devices with up to 500 mW each. Widely used and established cable infrastructures are specified to support the migration in brownfield installations to Ethernet-APL.

Ethernet-APL Rail Field Switch – first of its kind

The Ethernet-APL rail field switch is the first switch combining current communications technologies with Ethernet-APL – enabling IIoT applications in real time

The Ethernet-APL rail field switch, combining communications technologies with Ethernet-APL, enables IIoT access to field instrumentation in hazardous areas.

in hazardous areas. It allows users in process plants to deploy Ethernet beyond the control room throughout the plant for the first time. The field switch provides seamless, transparent and simultaneous access to field instrumentation. It enables entirely new applications and therefore new work processes for users and how they work with instrumentation and other devices installed in the field of process plants.

This brings digital communication via two-wire Ethernet into the field of process plants and allows for easy implementation of IIoT in process automation applications. All parties involved, from the planner to the user to the maintenance personnel, are thus able to reduce risks and increase safety, quality and yield.

The Ethernet-APL rail field switch is well suited to compact plant layouts. In addition to the performance features for IIot applications, it provides all the features typical for FieldConnex and the simple mounting of fieldbus installations, including: robustness, a wide temperature range, suitability for use in hazardous areas and explosion protection with intrinsic safety / Ex ic IIC or Ex ia IIC.

For Pepperl+Fuchs, this award from the South African Flameproof Association endorses its commitment to revolutionising data transmission in hazardous areas.

For more information visit: www.pepperl-fuchs.co.za

New age control centres

The interior of a control room recently installed by IntelliSEC.

In the age of the fourth industrial revolution, control rooms will be the nerve centres that ensure safety, protect critical infrastructure and assets and ensure efficiency and quality. However, while they will rely on technologies like the internet of things (IoT) and artificial intelligence (AI), it is important to design environments that look after people, says Denzil Steyn, Managing Director of IntelliSEC.

IntelliSEC is an installer and integrator of intelligent site management and security systems, but Steyn emphasises that although technology is a valuable enabler, people will always be the common denominator.

"Research has shown us that it is not humanly possible to stare at a screen for 12 hours and still pick up anomalies. These are better identified by intelligence that doesn't tire, where there's no fatigue. That is where AI comes in. It provides the intelligence that empowers staff to work effectively. We are taking well-educated, capable and competent people and enabling them to work smarter," he says.

As an example, Steyn says, a security guard, a few years ago, would have walked around the perimeter of an industrial site randomly looking for potential breaches. Today, technology can flag a potential threat, identify the threat level, and thus inform the guard to respond accordingly, without putting anyone's life in danger.

Furthermore, data is not limited to security and the installation of CCTV cameras. Control rooms today can be the interface for a range of different technologies that

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provide real-time data which equips decision makers to optimise production output and curb potential revenue loss by minimising downtime, or they may highlight a basic problem on the site such as a water leak.

"We design and build control rooms to create neural centres for businesses not only to manage security but also to pull through alerts from fire detection systems, health monitoring on fire detections systems, access control and alerts from the IoT devices that we install on site," he adds.

"We don't put in a CCTV camera so that, after the fact, a client can view footage of what happened. For IntelliSEC, it is about providing solutions that make a site and a company smarter, more efficient and more effective in what they do. With proper oversight, a business can manage by exception. That way, the managing director can pay attention to other, more important parts of a business," Steyn continues.

For example, IntelliSEC recently completed two multimillion-rand control rooms for companies in the automotive sector. As the 'nerve centres' of these complex production plants, they combine ergonomics and aesthetics with the technology needed to ensure operators can work optimally.

Most control rooms are tailor-made to meet the needs of clients and these latest two are designed to accommodate 14 and four operators respectively. Although the smaller facilities are probably more applicable to most South African businesses, IntelliSEC's systems have proven effective across a broad spectrum of industries. These include large manufacturing plants, mines, retail centres, logistics and distribution facilities and large residential estates.

Speaking of IntelliSEC's latest control room refurbishment in the Eastern Cape, Steyn describes the former facility as cold, grey and without windows. Even the chairs on which operators perched for more than eight hours a day were 15 years old.

The new centre, designed from scratch, includes state-of-the-art technology and attends to all the details – from dimmable lights to ergonomically designed chairs, a breakaway room with a kitchenette and rest and recuperation area. The distance between chairs and desks is calculated to minimise neck strain and supervisors' desks are elevated to provide a bird's eye view of the entire facility.

"We are providing our clients something that also takes into account the needs of the people working in the control room. This is where it starts: design a control room that looks after your people so they feel valued. We can't ask people to perform in an environment in which they feel uncomfortable, hot, uninspired," he says.

IntelliSEC's people focus extends beyond ergonomics and design. It employs certified engineers to commission a new control room to ensure all systems are fully integrated and the company is leveraging all the capabilities of the technology that has been installed.

Although Steyn describes IntelliSEC as primarily a technology business, it also trains operators to run the sophisticated control rooms it installs.

"We empower the on-site controllers to work with the tools we provide. We build systems for businesses to provide them with reliable, valuable data and to enable higher quality work while lowering operational costs and saving time," Steyn says. □

Pratley's Flameproof Ex d Envirobox® junction box marks a major milestone for electrical installations in hazardous areas.

SA's flameproof junction box nominated for HazardEx Award

The world's first polymeric, corrosion-resistant direct-entry flameproof junction box from Pratley was nominated for the 2024 HazardEx Awards in the category of Technical Innovation.

Eldon Kruger, Marketing Director at Pratley reports that Pratley's flameproof junction box was one of five nominees shortlisted in this category, which recognises excellence in the hazardous areas sector.

Launched in 2023, the Flameproof Ex d Envirobox® junction box has already received a prestigious Technical Product Innovation Award from the South African Flameproof Association (SAFA). Pratley's Flameproof Ex d Envirobox® junction box marks a major milestone for the electrical industry in hazardous areas. Kruger describes it as a new product "unlike any other in the world".

Flameproof equipment is designed to ensure that internal ignition within a flammable atmosphere is prevented from transmitting outside the protective enclosure. However, all traditional direct-entry flameproof junction boxes made from steel, cast iron or aluminium materials can be prone to corrosion over time when used in harsh environments.

The new Flameproof Ex d Envirobox® junction box is made from a specially formulated, robust engineering polymer and is designed to withstand severe environmental conditions. It is ideal for use in areas with a high risk of corrosion, such as offshore oil platforms, underground mines, and petrochemical plants.

The specially formulated engineering polymer is unique to Pratley. The material has exceptional mechanical properties, such as strength, stiffness, creep, dimensional stability and more. This ensures, for instance, that the junction box can withstand 2 x 20-joule impact tests in a -40°C environment. It has been third-party tested to a 4 000-kilopascal internal pressure. Additionally, it is IP66/68 certified for continuous underwater depths of up to 300 m, confirming it is water- dust- and gastight. The lid and base have an accurately machined flamepath.

The junction box can be supplied with 4 x 20 mm or 25 mm entries, or smaller on request. It can accommodate Pratley Ex d flameproof cable glands and accessories and is therefore highly versatile. Each box is supplied as a standard two-way box with 2 x flameproof blanking plugs.

The internal bosses are drilled and tapped to provide an earthing point for terminal mounting rails or earth lugs. These are electrically connected to the box entries, providing complete earthing continuity.

Boxes can be fitted with an N35 terminal rail, a Pratley patented Cranked rail, an inverted Cranked rail, or Piggyback rails. Pratley Kwikblok® terminals and pre-cut lengths of cable with glands can also be factory fitted to customer requirements.

The Flameproof Ex d Envirobox® is fully certified to SANS, EN and IECEx standards, including ATEX and UKCA for use in surface and underground mining applications (Ex db I/IIB+H2 T6..T5 Mb Gb, Ex tb IIIC T85.. T100 Db) in Zones 1, 2, 21 & 22 and an ambient temperature range of -40°C to +55°C.

"Pratley's goal was to produce the only direct-entry junction box that is corrosion resistant. The launch of the Flameproof Ex d Envirobox® marks another world-first product for the company," Kruger notes.

For more information visit: www.pratleyelectrical.com

Real-time environmental monitoring in mining

The mining industry stands at the intersection of robust economic growth and critical safety concerns. It demands innovative solutions that protect workers and, at the same time, optimise productivity. In southern Africa, Probe Integrated Mining Technologies (Probe IMT) has partnered with M3SH Technology to offer environmental monitoring solutions that address these dual requirements.

Probe IMT CEO Gert Roselt, COO/CFO Bernard Tennant, and BIM Leon Jordaan recently visited the SIM Lab at Stellenbosch University.

"Real-time monitoring of various parameters, such as air quality, noise levels, dust particulate matter and air velocity can provide insights into working conditions and equipment performance. This data enables quick responses to potential safety hazards and helps optimise operational efficiency," says Gert Roselt, CEO of Probe IMT.

He says embedding real-time environmental monitoring in mining operations supports a proactive approach to occupational health and safety. By tracking environmental parameters continuously, the technology alerts operators to any irregularities, facilitating immediate action to protect employees and equipment where necessary. For example, elevated levels of dust particulate matter could suggest the need for better respiratory protective equipment or indicate a machinery malfunction that needs swift attention.

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Gender inclusivity in safety wear

Women are often under-represented in technical industries, and particularly in South Africa's power and energy sectors. According to Desiree Hlubi, Brand Manager at Sisi Safety Wear, in the coal sector, women account for just 21% of the workforce, and the figure is only marginally higher in the electrical utility industry. In South Africa's renewable energy sector, women currently make up only 14% of the labour pool, although Hlubi notes that this is changing, as the sector, being relatively new, is not 'tradition bound' like many industries are. And despite entrenched gender stereotypes and industry practices, more women are pursuing careers across various industrial sectors. Initiatives that focus on women's empowerment and skills development have played a role in this trend, yet there is still work to be done to make industrial sectors more inclusive and accessible for women, Hlubi says.

She highlights that a typical example of this is in Personal Protective Equipment (PPE). A seemingly inconsequential consideration, but one that can make a big difference in enabling women to reach their full potential in traditionally male-dominated working environments.

Gender equality in the workplace does not mean treating everyone the same; rather, it means treating everyone equally and fairly. With regard to PPE, the physiological differences between men and women call for the provision of gender-specific PPE.

Fit-for-purpose PPE

This is critical in industries where high voltage arc flash can occur. The sudden release of electrical energy due to a breakdown between conductors and formation of a high voltage gap can create an explosion, with intense heat, force, noise, and light, and temperatures as high as 20 000°C. The intense heat and flames can lead to fatal burns – but that risk can be greatly reduced by following strict health and safety practices and wearing the correct PPE.

Hlubi makes the point that simply purchasing inherently flame-resistant arc flash safety wear in smaller men's sizes is not the solution for women working in such environments. These are specialised garments made with specific fabrics, seams and construction that undergo extensive testing and certification and they cannot be altered outside of the manufacturer's specifications.

PPE for women is often an afterthought. Women working in industrial roles involving high voltage equipment are usually given the same PPE as men, just in smaller sizes or they are provided with 'unisex' PPE. Hlubi emphasises that it is not only the responsibility of the employer to provide a safe working environment, but also their duty to ensure the provided PPE is tailored for its intended use. Delivering the necessary level of protection to match the risk presented is not always possible when women are given safety wear designed to protect men.

Meeting the needs of a diverse workforce

Hlubi says to fulfil their obligations in respect of health and safety, procurement managers and safety officers must prioritise providing PPE that meets the needs of each member of their workforce. This is particularly important in hazardous environments where PPE is potentially the last line of defence between life and death. It is essential that women be provided with PPE that properly caters to the female form so they are afforded the same measure of protection against workplace risks as their male colleagues – without the need to compromise on comfort. □

Desiree Hlubi, Sisi Safety Wear.

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Tracking parameters like air velocity helps to forecast potentially dangerous events like gas leakages or ventilation failures. These predictive capabilities can prevent serious incidents, avoid injuries, and reduce downtime and associated financial losses.

Monitoring devices must be designed to operate effectively in the harsh conditions typical to mining sites – and they should deliver real-time data, which is key to ensuring safer work environments and more efficient operations.

"Beyond immediate safety applications, the data gathered also serves as a tool for strategic decision-making," says Roselt. "Analysing trends over time can reveal patterns and correlations to drive continuous improvement in working conditions and productivity."

As a leader in advanced electronic equipment manufacturing, M3SH Technology provides a range of devices specifically designed to monitor and ensure safety and productivity in mining environments.

These include the P50 Environmental Monitor, an advanced, multifunctional, sensor-rich device that accurately tracks conditions in the work environment. This fixed installation monitor is designed to operate in extreme and hazardous environments such as explosive and gaseous atmospheres. The S50 Smoke and Early Fire Monitor is designed to detect smoke and potential fire hazards at an early stage. The P511 Air Velocity Monitor assists in monitoring airflow in mining spaces, and the D52 Dust Particulate Matter Monitor is dedicated to track levels of dust particles. Noise Monitoring devices serve the monitoring and control of noise pollution in mining environments.

M3SH solutions are backed by advanced Industrial Internet of Things (IIoT) capabilities and cloud computing, offering a spectrum of standalone monitoring devices as well as custom-manufactured wearables and communication networks. This technology-driven approach enables compliance with strict industry standards and legal requirements, enhancing safety and productivity.

The Probe IMT and M3SH Technology partnership is changing the scope of environmental monitoring in southern Africa's mining sector, enabling safer workplaces. □

Understanding lithium-ion batteries for safety

The SafeQuip range of fire extinguishers for lithium-ion battery safety is available to residential, commercial and industrial markets.

Lithium ion (Li-ion) batteries are increasingly being used for energy storage in renewable energy installations, in hybrid energy plants and other applications. A leading distributor of fire safety equipment in South Africa, SafeQuip, outlines some of the key concepts of Li-ion batteries to inform the selection of appropriate fire safety equipment for related installations.

As a rechargeable battery, a lithium-ion battery is valued for its high energy density, which makes it relatively lightweight and capable of storing a substantial amount of energy. The components include the cathode (positive), made of materials that store the lithium ions, and anode (negative), usually made of carbon-based material such as graphite, and the electrolyte solution, a liquid or gel that helps the lithium ions move between the cathode and the anode. It is important to note that this liquid or gel is flammable.

The separator can be seen as the battery's 'security guard'. It is the membrane that keeps the cathode and the anode apart to prevent short circuits. It also allows the movement of ions which generate the electrical potential but blocks the electrons.

The current collectors are like the wires in the battery, helping the electricity flow in and out.

The state of charge (SOC) indicates the percentage level at which the battery is charged. The higher the charge, the bigger the potential fire risk.

Battery management system

A battery management system (BMS) is an electronic system that monitors and manages various aspects of a lithium-ion battery's performance and safety. It is crucial in protecting batteries from overcharging, over-discharging, and other potentially harmful conditions. A BMS is commonly used in electric vehicles and renewable energy storage systems.

Cycle life

The cycle life refers to the number of charge and discharge cycles a lithium-ion battery can undergo before its capacity and performance start to degrade significantly. It is essential to consider cycle life when evaluating a battery's long-term durability and cost-effectiveness, particularly in applications with frequent charging and discharging.

Thermal runaway

One of the most significant safety concerns associated with lithium-ion batteries is a phenomenon known as thermal runaway. Thermal runaway occurs when a lithium-ion cell enters a state of uncontrollable self-heating. This situation can lead to exceptionally high temperatures, the forceful release of gases from the cell, and the potential for smoke and fire to erupt. If a cell goes into a thermal runaway, it runs the risk of setting the other cells also into a thermal runaway.

Fire suppression systems

AVD (aqueous vermiculite dispersion) is a fire suppression technology used in lithium-ion battery fire extinguishers. It consists of a water-based solution containing vermiculite, a naturally occurring mineral. AVD is designed to cool and suppress lithium-ion battery fires rapidly, making it an effective tool for mitigating fire hazards associated with batteries. In the context of lithium-ion batteries, Lith-Ex Fire Extinguishers are compact and powerful. They incorporate state-of-the-art technology that provides users the assurance that they are equipped to handle any lithium-ion battery fire emergency.

SafeQuip is committed to raising fire safety standards in South Africa and worldwide and ensuring the effective mitigation of lithium-ion battery fire risks. □

SANAS accreditation for NDT services provider

Integrity NDT Projects has achieved SANAS accreditation, confirming the high standard of its NDT services.

Integrity NDT Projects, a member of the Two Roads Group of companies (2Roads) and a provider of conventional and advanced non-destructive testing (NDT) services, has achieved SANAS accreditation, effective from October 2023. The accreditation confirms that all its technical processes are aligned with the rigorous standards set by the South African National Accreditation System (SANAS).

For Integrity NDT Projects, it marks a significant achievement and underscores the company's commitment to delivering top-tier NDT services characterised by reliability and excellence. The accreditation encompasses the broadest spectrum of SANAS-accredited NDT methods, standards, and regulations in South Africa at this stage, positioning Integrity NDT as a leader in the industry.

"With SANAS accreditation, we are setting new standards – ensuring precision and excellence in every test we do. It reinforces our commitment to quality," said Thandy Mokgobu, INDTP Director.

Integrity NDT Projects is the first SANAS-accredited NDT company within specific power generation national contracts. As such, it consolidates its position as a trusted and innovative partner in the power generation sector, among others. The company's dedication to excellence and transparency reflects its ongoing commitment to delivering top quality advanced and conventional NDT services. □

Training gets under way at IEPA's new training centre

The IEPA – the Institute of Energy Professionals Africa – recently opened its new International Training and Assessment Centre in Rynfield, Benoni on Gauteng's East Rand. It celebrated the launch of this new facility on 19 February 2024, the date of its 4th birthday. At the event the IEPA acknowledged the many supporters and suppliers that assisted it in establishing its new training centre and thanked them for sharing its commitment to making a difference in the energy sector, supporting innovation and sustainability.

Sustainable energy solutions for Africa

Africa is at the forefront of sustainable energy innovation, with a growing focus on renewable energy sources and energy efficiency. Leveraging natural resources like solar and wind energy, promoting energy-efficient practices in industries, business and households, and investing in clean energy infrastructure all play a part in building a sustainable energy future. As well as reducing carbon emissions, these efforts create new opportunities for economic growth and job creation.

Bookings are open for the 2024 training calendar.

Certified Energy Manager training

The institute conducted its first Certified Energy Manager (CEM) training classes at the new training centre in early March. The CEM programme equips participants with the knowledge and skills they need to drive energy efficiency and sustainability initiatives in their organisations. The IEPA aims to empower students to become leaders in the field of energy management.

AEE Carbon Auditing Professional course

The CAP course will be conducted 12 to 13 June and 28 to 29 November 2024. It covers a range of topics, including global trends, history, terminology, policy and legislation, CSR (corporate social responsibility) strategies, reporting on reducing emissions, programme design, auditing, trading, financing and selling.

This course is especially valuable for professionals working in sustainability, environmental management, and energy management roles. To earn the CAP certification, candidates must pass a voluntary four-hour examination that tests their knowledge and understanding of carbon auditing principles and practices.

AEE Certified Renewable Energy Professional course

The REP training course is scheduled for 19 to 21 November 2024. This course equips participants to use their knowledge and expertise in renewable energy, making them valuable assets in the growing renewable energy industry.

They learn about the latest developments in renewable energy, as well as best practices for design, installation, and maintenance of renewable energy systems. The course also covers policy and regulatory aspects related to renewable energy, helping participants understand the broader context in which renewable energy projects are implemented.

EPC Skills Development Programme

The Energy Performance Certificate (EPC) Skills Development Programme is designed to support the skills needed to promote energy efficiency and sustainability in buildings. The programme, starting 25 March, runs until May and is open to public enrolment.

The IEPA opened its new raining and assessment centre on the East Rand in February 2024.

The course aims to train professionals and develop new skills in assessing and certifying building energy performance. It presents a step-by-step curriculum to provide understanding and insights into the local EPC context and regulations. The course covers several knowledge modules which include:

- Fundamental principles of energy
- Energy conversion and efficiency
- Fundamentals of electrical energy
- Theory of energy audits
- Policies, regulations and standards.

The programme contributes to building a skilled workforce capable of promoting energy efficiency and sustainability in buildings in South Africa, over time helping to reduce energy costs and the country's greenhouse gas emissions. This course is suitable for individuals new to the energy sector or for solar installers looking to expand their range of services for potential clients.

AEE Certified Industrial Energy Professional course

The CIEP training course is designed for professionals who focus on energy management and efficiency in industrial settings. The CIEP certification confirms that successful participants have a deep understanding of energy management principles and practices specific to industrial operations.

The CIEP course covers a range of topics including:

- Energy management fundamentals
- Industrial energy systems and technologies
- Energy auditing and analysis
- Energy efficiency opportunities in industrial processes
- Measurement and verification of energy savings
- Regulatory compliance and standards related to industrial energy management
- Project financing and implementation for industrial energy efficiency projects.

The CIEP certification is recognised globally and signifies a high level of expertise in industrial energy management. It is ideal for professionals working in industries such as manufacturing, mining, and processing, where energy costs and efficiency are critical factors.

To earn the CIEP certification, candidates must pass an examination that tests their knowledge and understanding of industrial energy management principles and practices. The AEE offers training courses and study materials to help professionals prepare for the CIEP examination.

For more information visit: www.iepa.org.za

Industrial cybersecurity – 2023 in review, outlook for 2024

At the 9th annual Cybersecurity Weekend META (Middle East, Turkiye, and Africa) conference held in February in Kuala Lumpur, Malaysia, Kaspersky presented an industrial cybersecurity review for the countries in the region and outlined key challenges for industrial enterprises in the year ahead.

According to Kaspersky Security Network (KSN) statistics, in the second half of 2023, 32.6% of ICS computers globally had been attacked with malware. In the META region, the figures reflect 36.5% for Turkiye, 36.8% for Africa (27.5% in South Africa, 34.5% in Kenya, 28.8% in Nigeria), and 33.5% for the Middle East region. There is a slight decrease in the figure for this region compared to 2022, which may be the result of industrial organisations paying more attention to cybersecurity.

African countries are undergoing rapid digitalisation and integration into the world's economy, and at the same time are facing a significant cybersecurity under-investment problem. In the second half of 2023, 7.55% of Operational Technology computers in Africa were exposed to threats via USBs (that is 20 times more than the figure in Western Europe); 7.2% faced threat by worms (28 times more than in Australia and New Zealand); and 9.1% of OT computers were exposed to spyware (7.7 times more than the figure for North America).

Looking back at 2023, Kaspersky predicted the industrial cybersecurity landscape continuing to evolve, with several key trends emerging. The pursuit of efficiency in IIoT and SmartXXX systems fuelled an expanded attack surface and the surge in energy carrier prices led to heightened hardware costs, prompting a strategic shift towards cloud services. Growing government involvement in industrial processes also introduced fresh risks, including concerns about data leaks due to underqualified employees and inadequate practices in responsible disclosure.

This retrospective analysis lays the groundwork for understanding the cybersecurity landscape faced by industrial enterprises in 2024.

Kaspersky Industrial Control Systems Cyber Emergency Response Team (ICS CERT) predictions for 2024 highlight the persistence of ransomware threats, the rise of cosmopolitical hacktivism, an outlook on the state of 'offensive cybersecurity', and transformative shifts in logistics and transport threats.

The graphic highlights the main sources of cybersecurity threats in industrial enterprises in Africa, in the second half of 2023.

Ransomware targeting high-value entities

Ransomware is projected to persist as the primary concern for industrial enterprises in 2024. Large organisations, unique product suppliers, and major logistics companies face increased risks, with potentially severe economic and social consequences. Cybercriminals are expected to target entities that have the resources for substantial ransom payments, causing disruptions in production and delivery.

Cosmopolitical protest hacktivism

Geopolitically motivated hacktivism is forecast to intensify, presenting more destructive consequences. In addition to country-specific protest movements, the rise of cosmopolitical hacktivism is expected too, driven by socio-cultural and macro-economic agendas such as eco-hacktivism. This diversification of motives may contribute to a more complex and challenging threat landscape.

Subtler threats and detection challenges

The use of 'offensive cybersecurity' for gathering cyberthreat intelligence is anticipated to have controversial consequences. While it may improve corporate security by providing early signs of potential compromises, the thin line between the grey zone and the shadows may be breached. Profit-driven cyber activities, armed with commercial and open-source tools, could operate more discreetly, making detection and investigation challenging.

Threats to logistics and transport

The rapid automation and digitisation of logistics and transport are introducing new challenges, intertwining cyber and traditional crimes. These include theft of vehicles and goods, maritime piracy, and smuggling. Non-targeted cyberattacks may lead to physical consequences, especially in river, sea, truck, and special-purpose vehicles.

"Cybersecurity in the industrial sector is seeing continual significant changes emerging in new types of attacks and more sophisticated versions of old ones. Ransomware attacks are still a big problem, and hackers are getting better at targeting large, profitable companies with more advanced methods. Hacktivists who are motivated by social issues are also becoming more active, adding another layer of complexity to the threats. The transportation and logistics industry is especially vulnerable to these changes because its systems are increasingly becoming digital. The combination of cyber and traditional crime presents a serious threat to global supply chains. To protect themselves, organisations need to prioritise cybersecurity and keep improving their defences," commented Evgeny Goncharov, head of Kaspersky ICS CERT.

For more information visit: https://ics-cert.kaspersky.com/

Interventions now are critical for water security

Alison Groves, Discipline Lead: Built Ecology, WSP in Africa

South Africa's National Water Week (20 to 26 March), and World Water Day (22 March), coincided this year with the uproar in Johannesburg as large swathes of the city faced recurring water outages or low supply – not for days, but for months. The situation is seen similarly in parts of Tshwane and other cities around the country. The challenges that have led to this crisis include load shedding, failing infrastructure, and climate change, lower average summer rainfall and unprecedented high temperatures.

Alison Groves, WSP in Africa.

The country's water crisis

However, South Africa has always been a water scarce country, receiving average annual rainfall of about 40% less than the world average. The recent challenges only exacerbate an already overstretched supply. A report released by the Institute for Security Studies in 2018[1] stated that: "More than 60% of South Africa's rivers are being overexploited and only one-third of the country's main rivers are in good condition."

It noted several factors that contribute to increasing demand for water – including population growth, urbanisation and continued reliance on non-renewable energy. It also outlined intervention strategies to prevent a crisis by 2035. The report concluded that it would be possible for South Africa to reconcile its water system at national level, bring demand in line with available supply through policies to incentivise efficiency (such as tiered pricing), improve the quality of its water infrastructure (including wastewater treatment plants) and increase the amount of groundwater used in a sustainable way. The report also stated that South Africa could not afford to delay the implementation of more aggressive water policies. [Yet today it seems clear there has been little such implementation.]

South Africa's citizens are often pointed to as the cause for the country's water challenges. Statistics cited state that South Africans use 61,8% more water per day[2] than the international average of 173 litres per person per day. And while it is true that South Africans could do more to conserve water and use it more responsibly, this statistic does not present the full picture. The Blue Drop Report 2023[3] found that 47% of all South Africa's clean and treated water is lost through leaks and other factors before it even reaches consumers. Furthermore, 46% of the country's water supply systems pose acute risks to human health, and 67.6% of all wastewater treatment works are close to failure. To call the situation a crisis is not an overstatement.

Accountability

Urgent, systemic intervention is imperative. And we – as individual South Africans – need to take action in our own homes and businesses. But before installing JoJo tanks or drilling for borehole water at home (or to meet business or industry needs), we should consider the differences between the country's water crisis and the energy crisis. Where private households and businesses are now generating more than 5 000 MW of renewable energy with rooftop or other solar installations, taking a similar approach to the water crisis would have unintended, negative consequences.

This is because solar and wind energy are abundant and renewable, and water is neither. Drilling a borehole to find an alternative supply source removes water from the water table, leaving less of this finite resource to feed into the water system. Similarly, putting water storage tanks on private property to store municipal water for use during outages relieves the pressure on that property, but removes water from the system and does nothing to reduce the system's time to recovery or prevent future outages.

Storing rainwater or harvesting grey water are better options, but they come with their own set of challenges. Energy can be generated and used immediately (or stored for later use). Water needs to be treated to ensure it is safe for human consumption. Most private businesses simply do not have the expertise to maintain potable water on premises, the same can be said for individuals at home.

Even so, reusing grey water to flush toilets or water gardens is a good start. Active steps to conserve water are essential in our homes and businesses. From promptly repairing leaking plumbing to planting water-wise gardens and taking shorter showers, we can all make improvements one way or another.

Global standards

South Africa is not alone in facing issues of water security. This is highlighted in a recent World Green Building Council (WorldGBC) report[4] – which was compiled in partnership with industry leaders, including WSP. Internationally, as much as 30% of treated drinking water is lost before it reaches a tap. Predictions are that there will be a 40% gap between global water supply and demand by 2030 – just six years from now.

This means large-scale systemic interventions are critical to resolving the water crisis, in South Africa and globally.

All stakeholders in the value chain, from suppliers to regulators and users, need to recognise the urgency of the challenge, understand where the greatest risks and opportunities can be found, and collaborate to develop and implement appropriate water strategies. To optimise resources, water management principles must guide the prioritisation of measures, starting by preventing unnecessary consumption and promoting appropriate disposal without endangering human health or harming the environment. We need to look for further opportunities to do more to counter the crisis we face.

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[2] https://www.iso.org/contents/news/2023/06/managing-south-africa-water.html

[3] https://ws.dws.gov.za/iris/releases/bdn_2023_report.pdf

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For more information visit: www.wsp.com

Deregulation in Africa's energy sector is driving innovation

A deregulated power sector presents enormous opportunity for key markets in Africa, as individual countries start to contribute to an efficient, sustainable and competitive renewable energy ecosystem. This is the view of Paul van Zijl, Group CEO at Starsight Energy. Here he shares some insight into the potential benefits of deregulation and how these changes can create a ripple effect across the African continent – providing a blueprint that many African countries will use to overcome their own energy challenges.

Van Zijl says the deregulation of the energy sector holds significant potential for the continent, but it must be approached with a view to long-term and sustainable impact. Deregulation is already happening in several African countries, at differing paces, and particularly in countries in sub-Saharan Africa, as more independent power producers (IPPs) collaborate with local regulators and stakeholders to determine the best way to optimise natural resources and harness their full potential.

Although the route to deregulation in each country is different, the principal benefits are the same. Each country stands to gain from a revitalised power sector that offers more opportunities to IPPs, attracts more local and international investment into the local energy sector, and makes electricity and renewable energy more accessible to consumers at competitive prices.

In Nigeria, for example, we are seeing the first exciting steps in deregulation as the Nigerian Electricity Regulatory Commission (NERC) moves towards transforming the sector. A new federal law, the Electricity Act (2023), has been enacted, which enables different states to pass their own laws and establish state electricity markets. Once a state establishes its electricity market, the federal government will cease regulation of electricity distribution within that state. This first step is a collaborative effort that will go a long way in creating a sustainable, privatised and deregulated market in Nigeria.

In Kenya, the eagerly anticipated Open Access (wheeling) regulations have also recently been gazetted. The regulator fast-tracked Open Access to the grid, enabling IPPs to supply electricity directly to large customers through the national network, under regulation guidelines from the Energy and Petroleum Regulatory Authority (EPRA). Further impetus will derive from the recent announcement that the Eastern Africa Power Pool (EAPP) aims to go live with a competitive power trading market by the end of December 2024 – taking the region from bilateral trade to trading among all countries. This will allow the EAPP's 13 member countries to sell excess electricity in cross-border transmission projects. Considering that countries in the EAPP are already trading over 3 400 GWh annually, this move is set to transform the region's interconnectivity increasingly. Kenya has already reaped the rewards of bilateral trading, including an energy exchange engagement with Uganda and the importation of 200 MW of renewable energy from Ethiopia.

Deregulation of the energy sector, already happening in several African countries, holds significant potential for the continent.

Meanwhile, in South Africa, deregulation has seen the introduction of innovations such as self-generation, electricity wheeling, and energy trading from IPPs. The increasing development of utility-scale solar farms is a direct result of deregulation, which in turn has been accelerated by local funders deploying funds to grow IPPs. The funders invest in the construction of solar farms, allowing them to meet their mandate to fund the low-carbon transition. At the same time, the IPPs can leverage this financial backing to bring Direct Foreign Investment on board to support the project until completion. These initiatives demonstrate the power of collaboration between the private and public sectors.

The positive impact of deregulation on South Africa's power infrastructure runs deeper than boosting generation capacity. In some cases, IPPs also provide a main transmission substation to the national utility provider, Eskom, as part of their project to bolster connectivity to the transmission network. In other instances, IPPs are installing utility-scale battery storage alongside their farms to store the solar energy produced. These installations help the IPPs mitigate their risk to ensure their projects are not hampered by the complexities associated with the local grid. Such widespread deregulation is not necessarily to be expected across the continent, but lessons can be taken from South Africa to apply on a country-by-country basis.

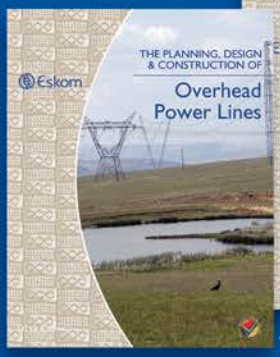
Starsight Energy's South African operation, trading as Solar Africa, is working with Eskom to bring projects like these to life in the country, while Starsight Energy and Starsight Premier Energy Group are working with regulators, stakeholders and various industry players in Nigeria and Kenya to see how they can shape each region's changing energy landscape.

The impact of deregulation has been – and will continue to be – transformative. Van Zijl says Starsight Energy believes a well-considered deregulated market will be to the benefit of the end consumer and allow economies to grow and thrive with the private and public sectors working together.

For more information visit: https://starsightenergy.com/

Eskom

The Eskom Power Series was conceived in response to the continuing worldwide loss of critical technical skills and experience. The aim of the series is to promote international best practice, including experience acrued by Eskom over the years, as a guide and legacy and to serve as a source of reliable, reputable and highly technical information.



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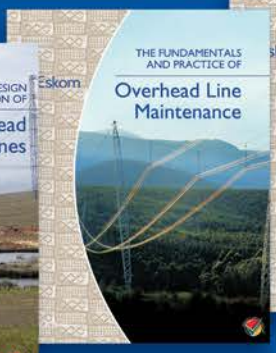

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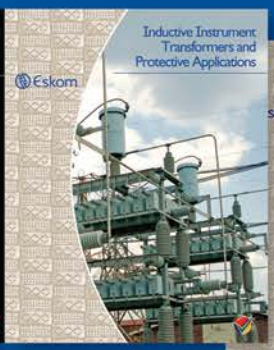

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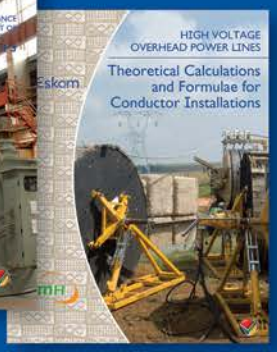

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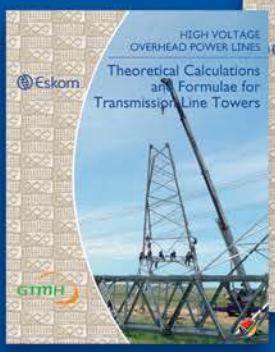

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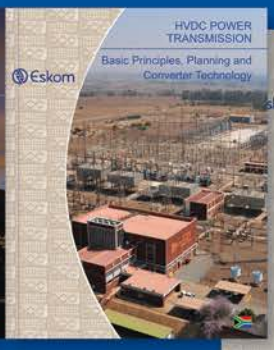

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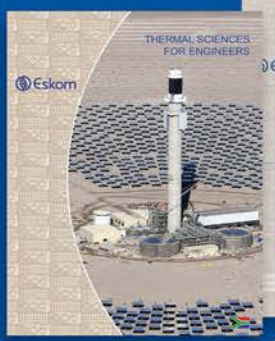

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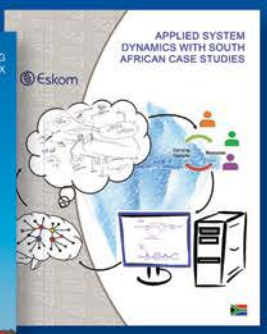
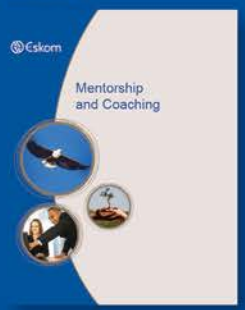


Volume 13: Applied System Dynamics with South African Case Studies

The Eskom Leadership & Management Series was introduced by Eskom at the request of readers and stakeholders of the Power Series who felt that the series should be expanded to include non-technical topics. These topics are often not well understood by technical practitioners and can pose a risk to the sustainability of their businesses. To date, the Power Series team, with assistance from experts in the various fields, has produced two volumes.



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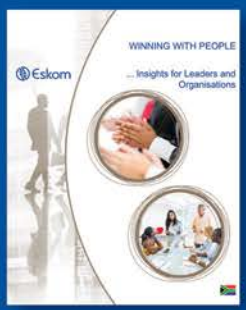

Volume 2: Winning with People ... Insights for Leaders and Organisations

Volume 1: Procurement Management Key Concepts and Practices

Based on the success of the Eskom Power Series and the Eskom Leadership & Management Series, the Professional Development Series was created. It aims at developing various professions within South Africa so that large state-owned enterprises and the private sector can grow and facilitate job creation in the country. Unlike the Power Series, both the Eskom Leadership & Management Series and the Professional Development Series have a broad readership, including those residing in the private sector, State Owned Companies (SOCs) and academic institutions.

Eskom has also published: GENERATION, TRANSMISSION AND DISTRIBUTION: A large Southern African utility. This is an introduction to the technology that has developed, over time, in response to growing demand in the electricity utility industry in South Africa. It provides a 'soft-landing' for those who need, or want, to engage with the technology in a large electricity utility.

Contact: Sanjeev Bisnath
Tel +27 11 629 5072 Email: sanjeev.bisnath@eskom.co.za

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