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- Energy management + the industrial environment
- Measurement + instrumentation
- Transformers, substations + cables

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ArmCoil has established itself as a specialist manufacturer in the medium voltage sector in South Africa, supplying its own brand ACEM medium voltage substations.
(Read more on page 3.)

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What steps can we take, each of us, to protect our planet?

So, another year draws to a close. I write this as the COP27 conference is just kicking off in Egypt – and find myself reflecting on what we have seen this year. Floods, droughts, mayhem, political instability.

I suppose we should not be alarmed – it is after all the world we have built for ourselves.

And that's the point, isn't it?

My observations may appear facetious, but as I look at a world where many questions must be asked about political leadership, and political will to do the right thing, I have to wonder about the parallels we see in political (in)stability and how we treat the planet.

I am neither an idealist nor particularly naive – but we do need to remember that, for now, this is the only planet we can call home!

As in almost everything, there are vested interests – but where is the leadership that stands up to make hard decisions, not to implement an immediate plan or find a silver bullet, but to put in place a process leading to the right kind of change?

We seem to be looking at a world where the leadership (and by extension, us, the common citizens) is not covering itself in any glory at all. I've watched with morbid fascination as one prime minister follows another, how those on the far right seem to be gaining traction – and so on.

Yet it is the citizens who should surely hold the control?

The same must then be said for our climate – and our response to an understanding of what may influence the climate going forward. My sense is that the planet is distressed; consider the serious devastation that mother nature has wrought this past year.

I do understand natural cycles, and I do understand small percentages as part of a big picture. But what the message of where the world is heading is telling us, is that we cannot pretend there is nothing we can do about this. It is directly the responsibility of ordinary people to make a difference.

And we certainly have enough knowledge now to appreciate the direction in which we need to move.

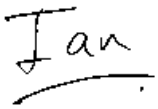
Not for one moment do I expect us all to simply turn off our power supply and become zero emissions advocates – but I would expect us all – in our various capacities – to begin to think about this very carefully.

Perhaps as we head towards the end of one year and into the start of the next, we should all be asking ourselves and our own companies what little steps we can take, to begin to make a real difference – just begin to change the tone.

Each one of us needs to have a say – and to ensure that those who are empowered to make the change actually do so!

With that said – I extend my very best wishes to you, your colleagues and your families over the end of the year festive season. Your continued contribution to the economy is acknowledged and appreciated.

I also would like to thank our publisher, Karen Grant, and deputy publisher, Wilhelm du Plessis, our editor Leigh Darroll, advertising manager, Heidi Jandrell, layout artist, Darryl James, and our circulation manager, Karen Smith, for bringing *Electricity + Control* to our readers, presenting new information across our multiple platforms, on a regular basis. We look forward to keeping you informed and up to date in 2023.



Ian Jandrell

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

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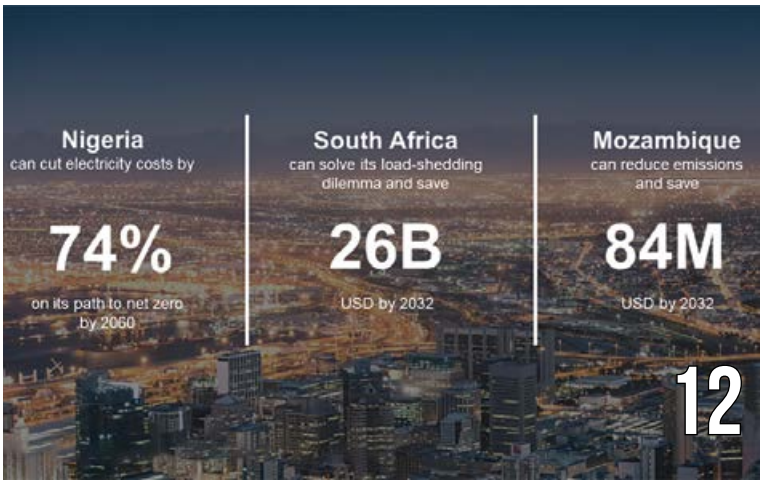

Medium voltage substations to meet industry needs

ArmCoil is an original equipment manufacturer supplying distribution transformers, medium voltage substations (MVS) under its own brand ACEM (ArmCoil Electric Machines), as well as large power transformers and cast resin type transformers. The company has a fully equipped manufacturing facility in Roodepoort, west of Johannesburg, with a factory space of 6 500 m^2. ArmCoil also owns a fully equipped facility for the repair and maintenance of medium voltage systems such as power and distribution transformers and associated equipment, and MV and dc electric motors and associated equipment.

Armcoil's own brand ACEM MVS are designed mainly for use in heavy duty mining applications, across all types of mining operations. They have been developed in response to clients' needs, which were identified through a consultative process and relate particularly to the safety of mining personnel, environmental challenges, quality and specific operational requirements.

Development challenges

In the development process, we faced many challenges: in design, in determining the suitability and availability of protection systems, in the interfacing of various parts, and in manufacturing. These pushed us – through many internal management meetings – to go 'back to basics' and we learned many lessons along the way. ArmCoil is now equipped to integrate various types of transformers, enclosures, IP ratings, MV and LV protection systems, and to meet SANS/IEC standards and others as may be required by clients. Internally, all our operations are managed according to ISO management systems, endorsed by our ISO accreditations. As a result, ArmCoil has established itself as a specialist manufacturer in the medium voltage sector in South Africa.

MVS solutions

ACEM medium voltage substations are robust miniature substations with voltages up to 33 kV and a step-up or step-down configuration, typical power ratings from 315 kVA to 10 MVA, and IP ratings up to IP65. MVS are typically used in mining and heavy industrial environments. ACEM MVS can also be used for applications in renewable energy – in solar or wind energy plants.

The MVS can be equipped with different types of transformers, such as cast resin, dry type and ONAN/F oil cooled transformers. The transformers meet IEC and SANS specifications, and others where applicable. Losses are calculated for prior to manufacture and these calculations are available on request.

MV protection and various types of switchgear can be specified up to 36 kV and incorporated into the modular design of the MVS. This allows for clients' specific requirements to be met, with components sourced from various OEM suppliers in South Africa as needed. Cable entry is positioned to provide for ease of installation and cabling. Various IP ratings are available for the MV protection cubicle to suit the environment of the application.

LV protection is also included where required; different brands can be accommodated on the panel and additional 380 V/220 V/110 V sockets can be included, for welding machines for example. Various IP ratings are also available for the LV protection cubicle to suit the respective application. Busbars and internal wiring are suitably manufactured, fitted, and insulated for additional safety.

Enclosures are typically of robust design in 3CR12 or mild steel mounted on a sturdy steel frame. The transformer compartments are also IP rated to suit the transformer and the application environment.

Various locking and security mechanisms are available for the MV and LV cubicles and transformer compartments, and various monitoring or warning systems can also be included.

Typically, the power and IP ratings dictate the physical size and weight of the MVS. Hence a 2 500 kVA, IP55 unit will be much larger and heavier than a 630 kVA, IP55 unit. All MVS units can be placed as temporary or permanent installations, on suitable plinths.

Locally designed and manufactured

ArmCoil manufactures all enclosures as well as the copper LV and HV coils at its Roodepoort facility. The cores are designed by ArmCoil and purchased locally. MV and LV protection parts are also sourced locally from various well-known OEMs; the more specialised MV protection units which are available locally are imported by these suppliers. Assembly and testing are conducted in-house in ArmCoil's test facility. The company also manages logistics for delivery and installation on clients' sites. □

Cast resin transformers.

Dry-type transformers.

For more information contact ArmCoil. Tel: +27 (0)11 763 2351, Email: sales@armcoil.co.za, Visit: www.armcoil.co.za

Andrew Cruise, Managing Director, Routed.

SA's cloud market is maturing

In 1999, CNN published an article[1] with the headline: 'Is the internet maturing?' The author referred to the first airline tickets being sold online and suggested that the internet was 'going ordinary' – in other words, it was no longer the playground of only the tech-savvy, but was becoming more ubiquitous in everyday life for anyone. Andrew Cruise, Managing Director of Routed, says experts now say cloud is going ordinary too.

"Cloud, just like the internet in the 1990s, is revolutionising the way people think about their network infrastructure." Cruise says.

"The conversation really started changing during the pandemic. Before then, people had a limited understanding of cloud – they knew only of cloud hyperscalers like Google and Azure and thought it was meant only for developers. Now, businesses are starting to see that there are different types of cloud, each with its own ideal use case. They are becoming more mature in their understanding and outlook on cloud."

Hyperscalers are suited to application redesigns, he adds, whereas local providers like Routed tend to focus on enterprises wanting to get rid of the weight (and cost) of in-house hardware. "Server rooms and data centres present huge costs for individual companies and they require specialist skills to maintain – skills that are in short supply. Cloud slashes those costs in the long term and comes with expert support," Cruise says. "It's also more secure than in-house infrastructure and, while the cloud won't stop ransomware, it will make data easier to recover. The right type of cloud solves these fundamental business issues."

Lee Syse, Lead Cloud Solutions Architect for the Cloud Providers business at VMware Sub-Saharan Africa, agrees. "Cloud used to be the buzzword, and when people talked about it, they were referring to the shiny native services in which hyperscalers specialise. These native services work great for new application development but are extremely difficult to refactor applications into.

"Over the past couple of years, we have seen interesting shifts. Large enterprises and telcos have started asking for cloud business solutions even if they are not moving over to the cloud fully, yet. They want the cloud experience and the benefits in their own data centres – such as software procured on consumption models or having the complete platform delivered as a service. They are looking to local providers and want fit-for-purpose solutions. Cloud conversations have become more mature because people now better understand how it can benefit their own business."

Businesses are recognising that there are different types of cloud, each with its own ideal use case.

In some ways, however, South Africa is still lagging behind other markets, Cruise says. "The local market is behind the curve in terms of cloud penetration, but it is useful to distinguish between different kinds of workloads here. The market for workloads born in the cloud, such as websites and mobile applications, is growing quite well organically. But enterprise apps, such as line-of-business applications that are accessed internally, are typically still being run on-premises. One big reason for this is limited internet penetration. For cloud to be used to its fullest extent, ubiquitous, fast, reliable and affordable internet is needed – something still lacking in this country."

For businesses looking to move systems to the cloud, they need to look at the reality they are facing, Syse adds. "The shift to cloud must be well timed. Some things in data centres are simply not cloud-ready yet. Other considerations include hardware lifecycles, security processes, and the fact that some technologies are not straightforward to move. In other instances it is a lack of skill. So, until those issues are ironed out, businesses are looking for some cloud benefits to start ticking those boxes, as they get their heads around a more comprehensive move."

In some cases, businesses are also realising that some workloads will never be suited to cloud, adds Cruise. "This could include workloads that need to be kept on-premises for compliance reasons. But, importantly, the market is starting to make those distinctions and taking steps towards more hosted solutions where it makes sense."

A great sign of market maturity is that businesses are realising the importance of using local providers, says Syse. "South Africa might be behind the curve in terms of uptake, but certainly not when it comes to expertise. Businesses are starting to see this – and appreciate that local knowledge is crucial when it comes to laws, compliance, and understanding of the local landscape."

"Interestingly, every time a new hyperscaler launches in the country, we see local cloud providers' businesses growing. They welcome the international competition because it is contributing to a more mature market," Cruise notes. □

References
[1] http://edition.cnn.com/tech/computing/9902/01/mature.net.idg/index.html

For more information visit: www.routed.co.za

Data management in supply chain and logistics

Nick Wonfor, Head of Sales, Data Management Professionals South Africa (DMPSA)

Nick Wonfor, Data Management Professionals SA.

In logistics and the supply chain, the market is highly competitive. If one supplier cannot deliver, customers will take their business elsewhere. There has been significant growth in connected devices, like sensors to track goods and vehicles, as well as analytics and artificial intelligence for more efficient route planning and delivery. The industry has become increasingly data-driven as lead operators seek a further competitive advantage, and there is potential to leverage significant value from data – but only if it is managed and protected effectively.

Source and target

Data lies at the core of the logistics industry. It is generated in many more areas than before, through the Internet of Things (IoT) and connected devices, and it can be very valuable for analytics and AI. However, if the data is not accessible, there is nothing to analyse, so no insights are gained and the supply chain may stall or be forced to a halt. Due to the volume and value of the data it holds, the logistics and supply chain sector is an attractive target for ransomware and other malware attacks.

An appropriate data management strategy must be implemented to ensure that the correct data is collected, that precautionary plans are in place to protect critical data, and that regular testing of data protection measures is conducted. Analytics should also be put into place to ensure that data is correct and accurate, so when it is used to gain insights, those insights can be trusted. The foundation of protecting and leveraging data is in understanding what data a business relies on and where that data resides, and ensuring that business-critical data is protected and accessible, should a data loss event occur.

Data management challenges

While data is essential, effective data management presents a number of challenges. Firstly, the explosion of data: from sensors on trucks and in warehouses to various software platforms – almost everything may be collecting data, which is growing at a massive rate. Furthermore, once data is collected, it can be enormously time-consuming to prepare the data: to identify what data is available, where it comes from, to profile it, clean it and understand what value it has and whether it needs to be kept.

Once the critical data has been identified and located, the next challenge is ensuring the data is protected against malicious attacks or accidental deletion. Ransomware and security issues threaten the volumes of data collected, so the right security solutions need to be in place. Data must be always available, which makes an updated and well-maintained backup system essential – together with secure access authorisations. Without these in place, logistics organisations risk unauthorised access, deletion and lockout.

There are also governance and compliance considerations to factor in, as personal information must be managed according to legislated regulations.

Finding the solution

There is a tendency for businesses to focus on data management infrastructure rather than the data itself, but buying more storage does not necessarily protect the data, and hoarding all data can result in unnecessary storage costs as well as compliance and security challenges.

Effective data management is essential to ensuring relevant data is collected and useful analysis accessible.

For compliance purposes, it is essential to be able to identify data and who has access to it, and to ensure only relevant data is retained. This includes the ability of a business owner to prove that data has been deleted from both operational and backup systems, should a customer request their data to be removed.

Data also needs to be recoverable, and data recovery needs to be responsive, with minimal disruption. There can be severe repercussions for a business if data is not stored properly, including possibly lengthy recovery times and downtime which, in turn, may cause financial loss and reputational damage. Business continuity is key, and if supported by Disaster Recovery-as-a-Service (DRaaS), returning to a fully operational state is efficient and less cost- and time-intensive than it would otherwise be.

However, this in itself can be a challenge to implement because there is a significant skills shortage in the fields of data management and data protection. By establishing a relationship with specialists who understand data management, businesses can ensure that their data is protected and available, appropriately classified and secured to enable effective disaster recovery and zero or minimal data loss. Logistics organisations need 24/7/365 access to an expert team that knows how important it is to keep data safe from threats, and a data management partner should have the right preventive measures in place to minimise risk. The reality is that time is money, and data is money, and it is critical for businesses in the supply chain and logistics industry, as in others, to protect their data in order to maximise business productivity and profitability. □

For more information visit: www.dm-p.co.za

Improving order picking with robots

Together, shipping, receiving and storage account for less than half of all warehousing activity costs. The major share of expenses – 55% – is bound up in order picking. Breaking down the various activities associated with order picking, reveals that over 60% of the time is spent by staff walking, and writing, searching and picking tasks constitute the balance of 40% of tasks.

Based on this data, it is clear that automating the 'walking' element of an order picking operation can have a strong positive impact on overall warehouse productivity. At the recent Automate 2022 show, OMRON Logistics Strategic Account Manager, Yaqing Sun, outlined some of the ways in which autonomous mobile robots (AMRs) can be used effectively in the order picking process.

Transporting items to employees: 'Goods to person'
Using an AMR to move goods to a warehouse associate can reduce the amount of time that associate spends walking. This in turn can reduce fatigue and contribute to improving work satisfaction. In addition, it improves traceability by automating the QR code scanning process.

Potential downsides of this intervention include high upfront investment costs, a relatively long integration and/or installation time, and the possibility of infrastructure changes to the facility. Nonetheless, logistics facilities generally find that the productivity benefits outweigh the initial costs of deployment.

Autonomous mobile robots can assist in streamlining warehouse productivity.

Transporting items between zones: 'Person to goods'
This involves breaking up the warehouse into separate order picking zones, each of which will have a dedicated employee. As a single order might involve picking from more than one zone, an autonomous mobile robot can move between the zones, stopping whenever an employee needs to retrieve a particular item.

Although each employee must still do some walking, having AMRs traverse the long distances between zones cuts down on the extent of walking required. The main downside of this method is that employees continue to scan the items manually, so traceability is not fully automated.

Transporting items to a robot: 'Goods to robot'
This method has the dual advantages of high accuracy and low dependence on labour availability (making it a good option for companies finding it difficult to hire personnel). Some downsides include high investment costs and the possibility of lower throughput relative to manual picking.

Generally, collaborative robotic technology is advancing and solutions that connect an autonomous mobile robot with a cobot are likely to become increasingly efficient. Furthermore, AMRs and cobots can work around the clock with minimal downtime.

For more information contact Omron Electronics.
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Email: info.sa@omron.com
Visit: www.industrial.omron.co.za

Another hyperscale data centre expansion

Teraco, a Digital Realty company and Africa's largest vendor-neutral data centre and interconnection platform provider, has completed the first phase of JB4, its new hyperscale data centre addition to the Bredell Campus in Ekurhuleni, east of Johannesburg.

The new facility supports the growing demand from enterprises and cloud providers for data centre capacity. JB4 offers resilient and secure colocation facilities, in line with Teraco's long-term vision of enabling digital transformation across Africa.

The company sees Gauteng (the greater Johannesburg metropole), one of Africa's economic powerhouses, as a logical destination for its continuing investment in data centre infrastructure on the continent. Home to digitally connected enterprises, including telecommunications, financial services, e-commerce, logistics, and retail businesses, the Johannesburg metropole benefits from its location in the heart of southern Africa, which has led to it becoming the hub for connectivity and peering.

JB4 represents a strategic addition to Platform Teraco, offering enterprises and cloud providers a scalable platform for IT infrastructure deployment and sustaining performance, reliability, security, and the most comprehensive network choice. The first phase of JB4 comprises 30 000 m² of built space and 8 000 m² of data hall space, with 19 MW of critical power load. Teraco has secured adjacent land and power for phase 2 of the expansion, which will bring the total critical power load in the facility to 50 MW.

The JB4 addition to Teraco's data centre platform takes critical power load capacity at Teraco facilities overall to 126 MW, which includes the Isando Campus JB1/JB3 (40 MW), Bredell Campus JB2/JB4 (64 MW), Cape Town Campus CT1/CT2 (21 MW) and Durban (1 MW).

Jan Hnizdo, CEO of Teraco, says JB4 extends Platform Teraco's capacity in South Africa significantly. "In the African IT landscape, Platform Teraco, with its diverse industry ecosystems and open interconnection marketplace, is an essential part of the modern enterprise's digital transformation strategy." JB4 is connected to all the other Teraco data centres through the ecosystem of network operators in the facility, making it ideal for the distributed interconnection-defined architecture of the today's businesses.

The first phase of Teraco's JB4 campus includes 8 000 m² of data hall space, with 19 MW of critical power load.

Hnizdo says most organisations are accelerating their digital transformation strategies and placing a greater focus on cloud adoption strategies. "Enterprises are looking for the ability to scale as network strategies evolve, and in a world where fast and secure interconnection with strategic business partners is a priority, this is a source of competitive advantage."

Organisations working to accelerate their digital transformation use Teraco to scale their IT infrastructure dynamically, adopt hybrid multi-cloud architectures and interconnect with strategic business partners within the Platform Teraco ecosystem of global and local clients.

Hnizdo says the company continues to see significant growth as hyperscale requirements increase due to demand for cloud services in Africa. "The continuing increase of cloud adoption across the continent is enabled by investments in critical infrastructure, including hyperscale data centre facilities such as JB4. This will provide for global cloud clients to service the South African market and the rest of sub-Saharan Africa."

JB4 is one of the largest single-site data centres on the African continent. Once complete, it will comprise 60 000 m² of built space serviced by 80 MW of utility power supply feeding 50 MW of critical power load.

The facility has multiple fibre paths to the Teraco Isando Campus connectivity hub (JB1/JB3), some 20 km away and is a significant addition to the data centre footprint of South and sub-Saharan Africa.

Teraco has also recently started construction on JB5 – a further hyperscale data centre expansion at its Isando Campus, scheduled for completion in 2024.

For more information visit: teraco.co.za

Gigabit Ethernet extenders enable high-speed reach

Gigabit Ethernet extenders from Phoenix Contact enable broadband applications up to 1 Gbps over any two-wire cables and coaxial cables over a range of up to one kilometre.

The Gigabit Ethernet extenders are thus ahead of the Ethernet standard, which achieves ranges of 100 m at 1 Gbps. Existing cables can be used to set up extended Ethernet applications. This saves raw material resources and minimises investment costs of installations.

With the Power over Link (PoL) and Power over Ethernet (PoE) functions, the entire Gigabit Ethernet extender network and connected PoE devices are supplied with power via the data lines. This eliminates the need to install power supplies at the remote PoE devices. The plug and play installation of the extenders offers an especially flexible network design from a point-to-point and line structure to a star structure.

The Gigabit Ethernet extenders are particularly suitable for video surveillance, as modern video technology places high demands on the network infrastructure, which can be quite extensive.

Gigabit Ethernet extenders from Phoenix Contact enable Ethernet connectivity at 1 Gbps over a range of up to one kilometre.

For more information contact Phoenix Contact SA.
Tel: +27 (0)11 801 8200
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Visit: www.phoenixcontact.com/en-za

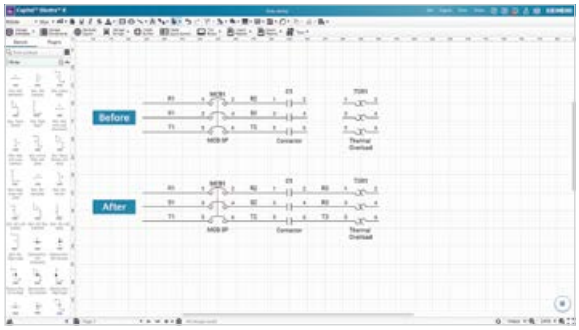
New cloud-native software for electrical design

Siemens Digital Industries Software has introduced Siemens' Capital™ Electra™ X, a new cloud-native electrical design software as a service (SaaS) offering to suit individual electrical designers or small teams that require an affordable yet powerful electrical design solution. Part of the Siemens Xcelerator™ portfolio of software and services, Capital Electra X offers users sophisticated electrical design capabilities with lower cost of ownership and shorter time to productivity than traditional on-premises solutions.

Frances Evans, Senior Vice President, Integrated Electrical Systems at Siemens Digital Industries Software, says: "Many products across multiple industries are differentiated via increasingly sophisticated electrical content, which is driving the rapid adoption of commercial electrical design tools. However, individual electrical engineers or small design teams often struggle with the higher cost of ownership and longer time to productivity of more complex enterprise-focused solutions. Instead, a browser-based SaaS solution, designed for ease of use, rapid adoption and with minimal training requirements, will enable them to create electrical schematics more easily and faster, using any device, for a low monthly cost."

The new Capital Electra X offering is based on pioneering technology from Radica Software Sdn. Bhd., based in Ipoh, Malaysia, and recently acquired by Siemens. (Siemens' acquisition of Radica Software closed on July 01, 2022.)

"As a provider of cloud-native electrical CAD, with a proven digital go-to-market model and over 300 customers across 50 countries, the Radica Software team is proud and excited to join Siemens," said Thomas Yip, CEO, Radica Software. "The combination of the Electra Cloud technology from Radica, bolstered by Siemens' technology, development capacity and global reach, provides the opportunity to better serve the SMB electrical design market with the first fully cloud-native SaaS solution tailored for individuals and small teams."



The software automatically wires circuits when the user places symbols on working drawings.

"With its broad and deep Capital product suite, Siemens is a leading solution provider in enterprise electrical design, especially in the automotive, aerospace and off-road vehicle industries," said Chad Jackson, CEO and Chief Analyst at Lifecycle Insights. "Our research has shown that companies of different sizes are building out electrical design competencies to support the development of smart, connected products. With Capital Electra X, Siemens supports small and medium-sized businesses' efforts to incorporate electrical systems into their offerings. More broadly, the acquisition bolsters the entire Capital suite, allowing Siemens to provide the right solution to those working on products of different complexity and in any stage of growth."

The Capital Electra X offering is available immediately, with an option for a 30-day free trial.

For more information visit: www.siemens.com

M12 connectors redesigned

M12 connectors are widely used in factory and process automation and for applications where robots are used.

Turck's redesigned M12 Eurofast actuator and sensor cordsets – A-coded with optional torque sleeve.

Safe and reliable communication between machines and systems is critical to productivity in manufacturing. To ensure industrial communication is secure in tough environments, Turck Banner has improved its M12 offering with a game-changing redesign.

M12 connectors are widely used in factory and process automation, including in automotive and mobile equipment manufacturing. They are also ideal for applications where robots are used, to help ensure reliable communication to a PLC or to the cloud.

With the new M12 connectors, a proprietary torque sleeve makes for faster and more secure installation and improves the ability to keep contaminants out. For installation, the user simply turns the built-in sleeve until it clicks into place, signalling that the required minimum torque is achieved.

This family of solutions also has the advantage of being highly resistant to disconnection and all product variants meet high IP and NEMA ratings. Certification of the design includes UL 2238, CE, CSA as well as IEC IP67, IP68, IP69K, and NEMA 1, 2, 4, 6P and 12.

For more information contact
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Email: sales@turckbanner.co.za
Visit: www.turckbanner.co.za

Robots and cobots: driving low cost automation

Robots are increasingly widely used in industry. However, small and medium-sized companies in particular often face the question of how a task can be automated cost-effectively with little effort. The RBTX marketplace powered by igus, brings together robotics providers and users, offering simple and inexpensive solutions. RBTX is now also working with Universal Robots, one of the world leaders in industrial and collaborative lightweight robots.

Flexible automation solutions, quick integration and intuitive operation are key goals for RBTX marketplace and leading cobot manufacturer Universal Robots. To make effective use of synergies, the two companies recently announced their partnership as part of the RBTX range from plastics specialist igus. Through RBTX.com, the marketplace collaborates with 70 companies that offer their robots, gripping systems, camera technology, conveyor belts, software and services on the online platform. The advantage is that RBTX provides a compatibility guarantee for the entire range of software and hardware, so users can be sure that all components work together.

"With Universal Robots, we have gained another well-known partner with which we can expand the product range on RBTX.com to include cobots for the first time – apart from igus's own robot ReBeL®," says Alexander Mühlens, Head of the Automation Technology and Robotics Business Unit at igus.

RBTX marketplace is now also working with Universal Robots, a world leader in industrial and collaborative lightweight robots.

"Universal Robots is a pioneer in cobots and an innovator in the intuitive programming of robots. This fits well with the concept of the RBTX marketplace for low cost automation solutions, which can be implemented quickly and easily, even by users without previous knowledge. We are pleased to win Universal Robots as a partner," Mühlens adds.

With its growing partnership network, RBTX offers customers an ever-larger low cost automation universe with the common goal of reducing hurdles in automation.

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Digital transformation for energy efficiency

Keith Watson, Eurotherm Product Manager at KVM Tech.

In South Africa, the energy crisis currently facing the country makes it increasingly critical for businesses across all industries to implement energy-efficient systems and processes. Environmental, social and governance considerations are also becoming more important for organisations looking to sustainability. Iritron, a company that provides electrical, instrumentation and control systems, says organisations in South Africa need to embrace technology at a faster pace, to enable greater efficiencies and energy and cost savings.

Keith Watson, Eurotherm[1] Product Manager at KVM Tech (which is part of the iCubed Group, as is Iritron), says, "Any steps towards digital transformation can result in efficiencies and, in turn, energy savings. It is important to take a long-term view, looking not only at energy savings and reduced maintenance costs but also reduced CO_2 emissions, in line with ESG considerations."

Within the mining, metals and minerals cluster, processes using kilns, ovens, glass lehr baths and furnaces for extracting, drying, melting and heat treatment are big consumers of electricity. And although 82% of mining CEOs are confident about their company's prospects for revenue growth over the next 12 months (according to PwC's 25th Annual Global CEO Survey), they will consider their investments carefully, in light of rising energy pressures.

Watson says plant managers need to be aware of the many variables in electrical supply. He highlights the critical impact of managing and improving the power factor in supply systems, in order to reduce energy consumption and its impact on peak demand charges. He refers specifically to energy saving and the challenges presented by legacy thyristor power controls.

At control outputs below 100%, analogue thyristors cause high harmonic distortion on the power supply and a poor power factor, reducing energy efficiency. Hence, energy is wasted and, as well as straining passive filters and capacitor banks, this leads to unnecessary utility costs. Watson adds that analogue thyristors can struggle with temperature stability and accuracy, causing process repeatability issues.

Industry 4.0-enabled thyristor control returns investment within two years: in an electric vacuum furnace, as a case in point, a substantial 10% energy reduction was achieved. Watson refers to a European CIRED (*Congrès International des Reseaux Electriques de Distribution*, or International Conference on Electricity Distribution), study that analysed the impact of non-linear loads on a 500 kVA distribution transformer and the resultant derating of its K-factor due to the eddy current effect, overheating of cables, busbars, switch breakers and related elements, and the destruction of passive filters and capacitor banks. Importanty too, he highlights that with any single instance of peak demand exceeding 15 minutes, a plant or factory or business incurs punitive billing for the next 12 months.

For furnace applications, Eurotherm's award-winning EPower™ offers a patented Predictive Load Management control system using a high-speed CanBUS network. It continually samples data that allows the main drive to distribute furnace zone firing cycles, keeping demand as low as possible while ensuring product quality is maintained.

In addition, through advanced diagnostics, the resistance of each element is measured continually for possible local failure, giving maintenance teams proactive warning to correct that element phase and remediate an unbalanced

In the mining, metals and minerals cluster, furnaces are big users of energy.

load on the star connection. All recognised communication protocols are supported, including ProfiBus, ProfiNet, DeviceNet and others, for early warning to PLC, DCS and SCADA systems.

Today, machine learning and artificial Intelligence, together with statistical process control, special cause variation, detecting and predicting anomalies, smart alarms and indicating trends in operational areas, focus on overall equipment effectiveness (OEE) and preventive maintenance. To help estimate potential energy savings, Iritron offers an energy survey service that measures up to the 50th harmonic.

This can be implemented on a furnace, for example, to obtain a 'before' snapshot of the power factor, to view energy demand and at which tariff. The data can be offset against the Capex cost entailed in the modernisation and digitisation of ageing thyristor control panels. The savings advantage is immediate, and a longer-term view reveals overall return on investment (ROI).

Intelligent thyristor control eliminates the problem at source, reducing the cost of expensive, high-maintenance capacitors, and frees up transformer capacity, making plant expansion more cost-effective. □

Note
1: Eurotherm is a Schneider Electric product, one of many that KVM distributes.

Eurotherm's EPower™ Predictive Load Management control system can be built in to the control panel to optimise energy usage.

For more information visit: www.iritron.co.za

IP67 power supplies for the field

Almost all electrical automation technology components require a voltage supply with dc 24 V. As more components are no longer mounted in the control cabinet but directly in the field, the importance of their voltage supply is also increasing. ifm has introduced new power supplies that meet IP67 protection rating and can thus be placed in the field to provide the voltage directly where it is needed.

Over the past couple of years there has been significant growth in automation solutions that function without a control cabinet. The advantages are obvious: components, such as IO-Link master modules from ifm, can be installed locally, directly on the machine or plant. However, if the power supplies for the dc 24 V voltage supply are located in the control cabinet, problems with voltage drops, due to long cable lengths, may occur. To prevent this, ifm has developed intelligent power supplies that can provide the required voltage directly on site. The power supplies meet the high IP67 protection rating and can thus be mounted together with other components on the machine or plant. Integrated electronic circuit breakers in the power supplies protect the 24 V voltage supply from overvoltage and short circuits.

An IO-Link interface renders the new power supplies intelligent. It can be used, for example, to set the output voltages and nominal currents of the individual circuits. Up-to-date values for voltages and currents of the individual circuits, input voltage, operating hours, internal temperature, and other data can be read out via IO-Link; this provides the user with comprehensive diagnostic options. If one of the circuit breakers trips, for example, the cause of the fault can be identified and eliminated quickly via IO-Link. What is more, the circuit breakers can be reset.

The power supplies are available in two versions with three-phase or single-phase voltage supply on the input side. The three-phase device has four output circuits with the option to set the maximum current to up to 12 A. The single-phase device has two output circuits with up to 4 A each. The nominal power ratings are 500 W and 300 W respectively. Together with the new intelligent power supplies, ifm also offers a comprehensive portfolio of cables, splitters, connectors and sockets for both the input side and the output side. On the input side, three- or five-pole plugs with 7/8" are used; on the output side, proven M12 connection technology with A- or L-coded plug connections is used. This presents a complete voltage supply package for applications in automation without control cabinets.

ifm's new IP67 intelligent power supplies can be placed in the field to provide voltage directly where it is needed.

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Visit: www.ifm.com

Increasing energy access across Africa

Technology group Wärtsilä flagged the climate change conference COP27, hosted by Egypt in November, as a once-in-a-generation opportunity to increase energy access and lay the foundations for decarbonisation across Africa. Just ahead of the conference the company released a new report titled* Pathways for Africa's Energy Future *and emphasised that wealthy nations must deliver on their climate finance pledges to unlock the continent's potential.

The report presents the power system modelling done by Wärtsilä for three African countries, Nigeria, South Africa and Mozambique. It finds that they can leapfrog some developed nations by not embedding inflexible fossil fuel-based systems and, to enable such a significant transformation, will require a combination of climate finance, effective planning and system reforms.

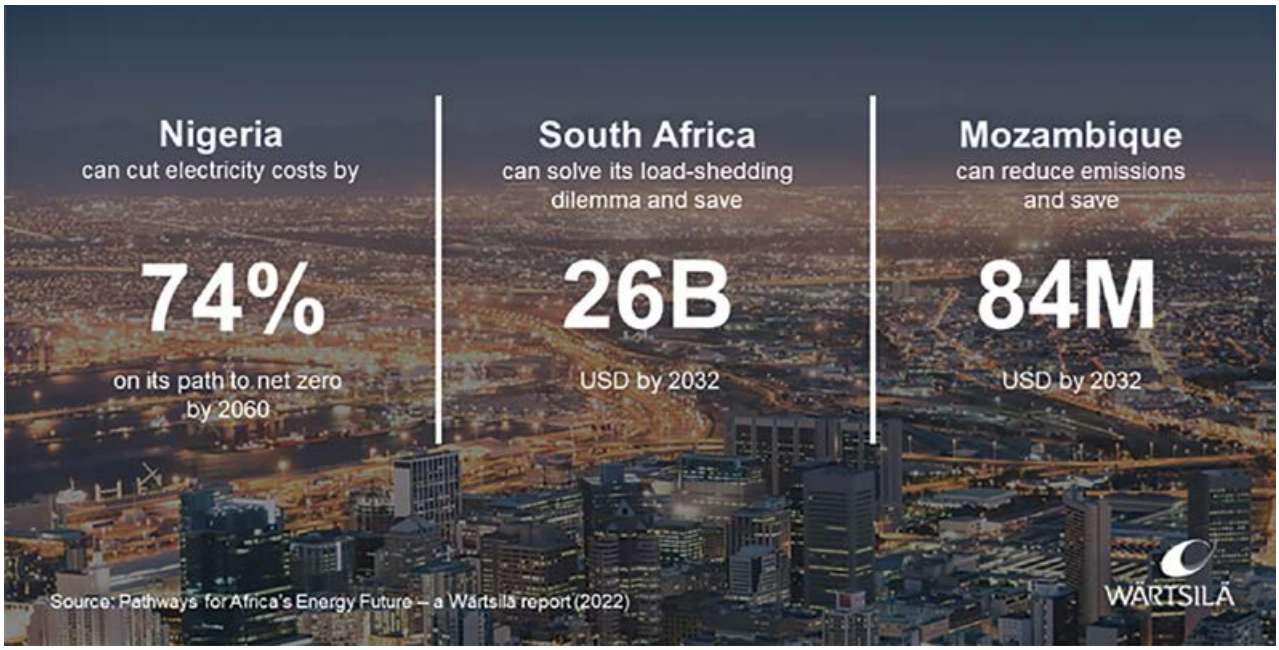
The report indicates that replacing coal with renewable energy combined with flexibility from engines and energy storage is the most effective way to reduce energy costs, increase energy access and improve reliability. The modelling shows that renewable energy and flexibility can generate enough energy to provide power for close to 100 million people in South Africa, Mozambique and Nigeria who currently do not have access to energy, if it were matched with the required grid infrastructure. These systems would require a total investment of around USD 119 billion over the next decade, which will not be possible unless wealthy nations deliver on the promise made in 2009 to provide USD 100 billion annually in climate finance from 2020.

On the release of the report, Håkan Agnevall, President and CEO of Wärtsilä Corporation said: "Despite contributing less than 3% of the world's energy-related carbon emissions, African countries are among the hardest hit by climate change. COP27, hosted in Egypt, is the opportunity to deliver on global climate finance pledges so that, as a global community, we can seize this moment to act and unlock Africa's renewable energy potential. That investment must be combined with effective planning and system reforms to increase energy access and create the renewable energy systems of the future."

Wärtsilä modelled power system decarbonisation pathways for Nigeria, South Africa and Mozambique, each with different starting points and facing differing challenges. Some key findings are outlined below.

- *Nigeria can cut electricity costs by 74% on its path to net zero by 2060.*

Wärtsilä's modelling shows that Nigeria can build a 100% renewable net zero power system by 2060, comprising around 1 200 GW of clean capacity, in line with its '30-30-30' and net zero targets as defined in the country's Energy Transition Plan. The impact is significant, with the cost of electricity generation projected to drop by 74% by 2060



Africa can leapfrog to a renewable and reliable energy future and increase energy access.

compared to 2022 levels and emissions dropping to zero.

- *South Africa can solve its load shedding challenge and save USD 26 billion by 2032.*

By adding 40 GW of wind and solar PV, South Africa can build a power system that would meet current and future energy demand. This can deliver a 17% reduction in power system emissions and reduce energy system costs by USD 10 billion per year by 2032.

- *Mozambique can reduce emissions and save USD 84 million.*

By adding 200 MW of low cost renewable energy annually, Mozambique can build 3 GW of clean capacity by 2032, supported by 205 MW of new energy storage capacity and 1 GW of grid balancing engine capacity. This would cut 5.6 million tons of carbon emissions between 2022 and 2032 and save USD 84 million on the cost of electricity production.

Wärtsilä undertook the power system modelling using independent market simulation software PLEXOS to support African countries that are looking to shape multi-year plans to build optimal power systems for the future. Across the continent, countries can help to stimulate investment by setting out clear strategies to build well-functioning flexible renewable grids, showcasing the new opportunities those conditions create, such as green hydrogen production. Regulatory reform is also needed to place a value on flexibility and encourage the market. Doing so will help to lay the foundations for more flexible and reliable grids that can support high levels of renewable energy and increase energy access. □

Note: COP – the Council of Parties – is the decision-making forum of the United Nations Framework Convention on Climate Change (UNFCCC). It brings together signatory governments once a year to discuss and agree jointly, how to address climate change and its impacts.

For more information visit: www.wartsila.com

Heineken's Sedibeng brewery goes solar

Heineken South Africa has taken a bold step in moving closer to reducing carbon emissions in all its operations with the launch of a solar power plant at its Sedibeng, Midvaal brewery.

The solar photovoltaic plant began producing power in May this year and is the largest freestanding solar plant powering a brewery in South Africa, and the largest in the Heineken group. With 14 000 panels the PV plant has an energy capacity of over 6.5 MW, providing 30% of the brewery's electricity demand. The 19-ha project will generate 17 000 MWh per annum.

Richard Kriel, Heineken's Engineering, Strategic Projects & Sustainability Manager, said at the launch: "This project supports Heineken's Brewing a Better World goal to achieve net zero status at all its production sites by 2030. It is the latest move made by the company on its journey towards more sustainable brewing.

"The newly installed solar plant follows the installation of a water reclamation plant, which we opened at the same facility earlier this year," Kriel added.

He highlighted a number of distinguishing features of the new solar plant. "This will be the largest solar power plant in the Sedibeng municipality. Unlike many solar plants in South Africa, constructed in parking areas or on roofs, or in a desert area, the Sedibeng brewery solar plant is built in a field covered with wild grasses."

The development of the plant, which has an estimated lifespan of 25 years, has been undertaken in partnership with The SOLA Group, a vertically integrated provider of renewable energy solutions in South Africa.

This embedded grid-connected solar project incorporates single axis tracking technology that enables the panels to move with the rising and setting of the sun.

"SOLA is proud to be associated with Heineken and its commitment to procuring clean, low-carbon energy. Embedded generation projects right at the source of consumption help in reducing the load on the electricity supply network without the need for additional grid infrastructure upgrades," says Dom Wills, CEO, Sola Group.

With 14 000 panels and covering a land area of 19 ha, the solar plant has an energy capacity of over 6.5 MW.

The construction process took about seven months to reach completion. During this time, 127 job opportunities were generated of which 100 were filled by people from the local Sedibeng community. The various job opportunities include technicians, construction teams, general workers and community members who will continue to attend to solar panel cleaning and vegetation control to support optimal performance of the plant.

For more information visit: https://solagroup.co.za/

A regional renewable energy partnership

Anglo American and EDF Renewables recently announced their agreement to form a new, jointly owned company, Envusa Energy, to develop a regional renewable energy ecosystem (RREE) in South Africa – launching 600 MW of wind and solar projects in the first phase.

In March 2022, the two companies signed a Memorandum of Understanding to explore the development of a renewable energy ecosystem, designed to meet Anglo American's operational power requirements in South Africa and support the resilience of the local electricity supply systems and the wider decarbonisation of energy in the country. The RREE is also expected to catalyse economic activity in South Africa's renewable energy sector, supporting the country's broader just energy transition.

As part of the agreement, Envusa Energy (Envusa) is launching a mature pipeline of more than 600 MW of wind and solar projects in South Africa – a major first step towards the development of an ecosystem that is intended to generate 3 to 5 GW of renewable energy by 2030. This first phase of Envusa Energy's renewables projects is expected to be fully funded – including via debt financing as is typical for high quality energy infrastructure projects – and ready for construction to begin in 2023.

Envusa Energy will supply Anglo American with a mix of renewable energy generated on Anglo American's sites and renewable energy transmitted via the national grid. This energy portfolio approach will aggregate energy from geographically dispersed renewable generating assets and allocate this energy optimally to meet the load demand for Anglo American's sites.

Nolitha Fakude, Chair of the Anglo American Management Board in South Africa, said: "I'm delighted to confirm our ground-breaking partnership with EDF Renewables to form Envusa Energy. This is a significant milestone in Anglo American's global decarbonisation journey and another step forward for South Africa's clean energy future. We are making great strides towards our 2040 target of carbon neutral operations, and contributing to South Africa's just energy transition through our responsible approach. We believe the energy transition presents a fresh opportunity for South Africa and the region to build a clean and inclusive energy ecosystem that can create significant new economic opportunities. I am encouraged by our progress – affirming Anglo American's commitment to South Africa's next phase of development towards a low-carbon future."

Tristan de Drouas, CEO at EDF Renewables in South Africa, said: "We are very pleased to be part of this innovative venture and look forward to bringing our global expertise in renewable energy infrastructure development, design and delivery to Envusa Energy. This partnership with Anglo American confirms our long-term perspective in the country: the 600 MW first tranche of projects will be added to the almost 1 000 MW that EDF Renewables will be building or operating in the country by 2023, including 420 MW of wind energy projects in REIPPPP Bid Window 5, for which PPAs were signed with Eskom and the DMRE in September 2022. Together, these projects further EDF Group's CAP 2030 strategy, which aims to double our net renewable installed energy capacity worldwide (hydropower included) from 28 GW in 2015 to 60 GW by 2030."

The rollout of the RREE will also serve as a clean energy source for the production of green hydrogen for Anglo American's nuGen™ Zero Emission Haulage Solution (ZEHS) – a planned fleet of hydrogen-powered mine haul trucks. This will significantly reduce on-site diesel emissions In line with a carbon-neutral future and support the development of South Africa's Hydrogen Valley.

Through the formation of Envusa Energy, Anglo American and EDF Renewables are committed to supporting South Africa's economic transformation and empowerment goals. The process to identify an appropriate Black Economic Empowerment (BEE) partner for Envusa Energy is under way.

Furthermore, and in line with both companies' commitment to a just energy transition, Envusa Energy is exploring a range of community partnership models that will enable host communities to share in the benefits created by the development of the RREE, along its value chain. The RREE is 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. It is expected that the development of the ecosystem will generate a range of new economic opportunities and contribute towards unlocking South Africa's growth and development potential.

The name Envusa is inspired by the Nguni word, 'vusa', which means 'to awaken' or 'new beginnings' in other contexts.

For more information visit: www.angloamerican.com or: www.edf-re.co.za

RBM to secure solar power through Voltalia partnership

Werner Duvenhage, Managing Director, RBM.

Through a recently announced partnership agreement involving Richards Bay Minerals (RBM), international energy company Voltalia, and local Black Economic Empowerment (BEE) partners, RBM will be supplied with solar power by Voltalia for its operations in Richards Bay, KwaZulu-Natal.

In terms of the agreement, Voltalia will begin construction of the Bolobedu solar PV renewable energy project in 2023, at a site about 120 km east of Polokwane in Limpopo. The power plant is scheduled to be complete by 2024 and will deliver an annual generation capacity of up to 300 GWh. It will feed into the national power grid to supply RBM's smelting and processing facilities through a wheeling agreement, in line with the recent amendments to the Electricity Regulation Act.

With the shift to supply of renewable solar power, RBM expects to cut its annual greenhouse gas emissions by at least 10%, or 237 kt per year.

On announcing the agreement, RBM Managing Director, Werner Duvenhage said: "This marks a first step for RBM towards reducing our carbon emissions through the use of renewable solar power, so that we contribute to a net zero future. We look forward to working with Voltalia as it develops this solar power plant and delivers significant benefits for the surrounding communities."

Voltalia CEO Sébastien Clerc said: "We are pleased to support RBM in its decarbonisation journey. The Bolobedu photovoltaic power plant will be our biggest project to date in Africa. We have built a number of other solar plants, for Voltalia or for clients, elsewhere on the continent – in Zimbabwe, Burundi, Tanzania, Kenya, Mauritania and Egypt. This project is the first of our South African large solar-and-wind portfolio under development, in areas with grid connection available. With this portfolio, we will be ready to support our clients to move beyond the energy crisis with affordable, clean and stable electricity."

Voltalia will ensure the Bolobedu solar PV project creates local employment opportunities for the surrounding communities. A workforce of more than 700 people is expected during construction, and a workforce of around 50 people once the plant becomes operational.

The project will also provide skills development opportunities for members of the surrounding communities, and a bursary programme for young local learners. In support of South Africa's growing renewable energy sector value chain, Voltalia will work to source goods and services locally.

The Bolobedu solar PV power plant will be 51% black-owned through BEE partners (to be confirmed in due course), with a minimum 10% stake going to black women, and the host community will also participate.

Richards Bay Minerals is a world leader in heavy mineral sands extraction and refining and is South Africa's largest mineral sands producer. RBM mines the mineral rich sands of the northern KwaZulu-Natal province and produces predominantly ilmenite, rutile and zircon – materials used in diverse goods from paint and smart phones to sunscreen and toothpaste. RBM is a joint venture between Rio Tinto (74%) and Blue Horizon – a consortium of investors and the mine's four host communities (kwaMbonambi, kwaSokhulu, kwaMkhwanazi and kwaDube) – which owns 24%. The remaining shares are held in an employees' trust.

For more information visit: www.riotinto.com/en/operations/south-africa/richards-bay-minerals#

Protecting the environment in SA's first RMIPPPP project

The Kenhardt project will have a total solar capacity of 540 MW and battery storage capacity of 225 MW/1 140 MWh.

Engineers from renewables company Scatec have started work on the Kenhardt solar project in the Northern Cape, which forms part of South Africa's Risk Mitigation Independent Power Producer Procurement Programme (RMIPPPP). Scatec reached financial close on the development of the Kenhardt project earlier this year and, thus far, it is the only approved project within the RMIPPPP to have reached this point.

Once operational the project will have a total solar capacity of 540 MW and battery storage capacity of 225 MW/1 140 MWh. It will provide 150 MW of dispatchable power under a 20-year power purchase agreement and is due to begin supplying power within 15 months of the start of construction.

The facility will comprise three colocated projects and will be stretch over a distance of some 10 km.

Jan Fourie, Executive Vice President for Scatec in sub-Saharan Africa says, "We were particularly careful when we began to lay out the facility on the site. Learning from a rigorous Environmental Impact Assessment process, we realised that there is rich biodiversity in the region, and every precaution is being taken to minimise the environmental impact of the project.

"We have adopted the approach of avoidance, or relocation, and only if that is not possible, destruction." This means the company will do everything possible to avoid – and so protect – any sensitive local fauna and flora and safeguard local ecosystems.

The Kenhardt region is rich in plant biodiversity. The 99 species of flora and 16 species of fauna that are of 'conservation concern' raise a particular responsibility

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Securing power supply on the DRC's Inga-Kolwezi HVDC link

Hitachi Energy, a global technology leader advancing sustainable energy for all, has signed a long-term service agreement with *Société Nationale d'Electricité (SNEL)*, the national electricity company of the Democratic Republic of Congo, to secure power supply in the country's most important power transmission asset: the Inga-Kolwezi high voltage direct current (HVDC) link.

The link supplies up to 1 000 megawatts of emission-free electricity from the Inga Falls hydropower plant in the far west of the country to the Kolwezi mining region in the south. It is 1 700 kilometres long, the longest HVDC link in Africa. The link also enables the DRC to export surplus power to member countries of the Southern African Power Pool.

The recently signed agreement continues the close collaboration between SNEL and Hitachi Energy that has run over the past 40 years to ensure the link operates at maximum availability and reliability through its long operating life. Hitachi Energy supplied the two converter stations at each end of the link in 1982 and has subsequently upgraded them and doubled transmission capacity. As part of the agreement, Hitachi Energy will assess the service needs of the converter stations, develop a preventive maintenance programme, and supervise its implementation over the next five years. The agreement includes training, knowledge sharing and expertise enhancement for SNEL service personnel.

"We are delighted to be continuing our long collaboration with SNEL to protect the nation's investment in its most important power transmission link," said Andreas Berthou, HVDC and HVDC Service Global Product Group Manager at Hitachi Energy. "This long-term service agreement demonstrates how we work closely with the customer to secure availability and reliability over the lifetime of the asset."

The agreement will ensure the 1 700 km link operates at maximum availability and reliability.

Jean-Bosco Kayombo Kayan, CEO of SNEL, said, "Hitachi Energy has been a close and valued partner of SNEL for almost 50 years, since we first collaborated on the design of what was then a ground-breaking HVDC link with the world's longest transmission line. From that time, we have worked closely together to increase the capacity and maximise the reliability of this critical national infrastructure."

Hitachi Energy's HVDC solution combines world-leading expertise in HVDC converter valves, the MACH™ (Modular Advanced Control for HVDC) digital control platform, converter power transformers and high voltage switchgear, as well as system studies, design and engineering, supply, installation supervision and commissioning.

HVDC Light® is a voltage source converter technology developed by Hitachi Energy. It is the preferred technology for many grid applications, including interconnecting countries, integrating renewables and 'power-from-shore' connections to offshore production facilities. HVDC Light's defining features include compact converter stations and exceptionally low electrical losses.

For more information visit:
https://www.hitachienergy.com

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for anyone who does any kind of construction work in the vicinity.

"If you look at the map and the configuration of our site, you can see clearly how we identified local sensitive areas. Among other concerns of ecological sensitivity, we took into consideration the location of quiver trees and the hydrology of the site. Even the access roads have been carefully planned. We have avoided protected plant communities and animal life as far as possible," says Fourie.

He says Scatec partnered with a specialist team to undertake the Environmental Impact Assessment, which was required as part of the site development process. "They guided us through it and set out what needed to be done to mitigate the impact of the project. We had to apply for flora relocation permits and every single relocated plant was tracked and monitored. We made use of the latest Geographic Information System (GIS) technology to record the attributes of plant species in the field during the search and relocation process. The field data was fed, in real time, to an interactive management dashboard with consolidated species information."

Legislation requires the project to maintain a continuing net gain of species. In the case of quiver trees, the flora permit requires that 10 new trees be planted for each tree relocated.

"At first impression, the Kenhardt region may look like a barren, dry, and desolate landscape. However, as our research and planning have shown, there is an enormous richness of life in the area," says Fourie.

Scatec was awarded preferred bidder status by the Department of Mineral Resources and Energy for the Kenhardt project in June 2021, under the technology agnostic RMIPPPP. The three colocated projects that constitute the Kenhardt development, involve a total estimated Capex of USD 1 billion.

For more information visit: www.scatec.com

Investing in development of green hydrogen in SA

ACWA Power, a leading Saudi developer, investor and operator of power generation, water desalination and green hydrogen plants worldwide, and the Industrial Development Corporation of South Africa (IDC), the government-owned development finance institution, recently signed a memorandum of understanding (MoU) outlining a prospective partnership in the development of green hydrogen and its derivatives in South Africa.

The signing of the MoU and the formation of the prospective partnership took place during President Cyril Ramaphosa's state visit to the Kingdom of Saudi Arabia in October 2022. The agreement was signed digitally by Paddy Padmanathan, Vice Chairman and Chief Executive Officer of ACWA Power; Clive Turton, Chief Investment Officer of ACWA Power; Rian Coetzee, Head of Industry Planning and Project Development at the IDC; and Russell Wallace, Manager of Legal Services at the IDC, with agreement copies exchanged at a gathering attended by executive dignitaries.

This is the first agreement of its kind between ACWA Power and the IDC, although the parties have previously collaborated on equity in a renewable energy plant in South Africa. The potential value of this MoU is estimated at US$10 billion. ACWA Power will function as a developer for green hydrogen and its derivatives in South Africa, with the IDC acting as co-developer and equity partner in the proposed projects.

Padmanathan said: "With its renewable energy development commitments in South Africa already contributing to the country's clean energy goals, ACWA Power's signing of the MoU with the IDC for the development of green hydrogen is a significant step towards further investing in diversifying the country's energy mix and accelerating its green economy.

"As a company involved in driving the energy transition, ACWA Power is proud to work closely with the IDC with which we share a robust working history, and we are delighted to take our collaboration further. I am confident that our expertise in developing mega-scale green hydrogen projects in other geographies will enable us to create a new avenue of sustainable energy generation successfully, one that will pave the path to further progress."

South Africa has a net zero target for 2050 and plans to become a significant producer and exporter of green hydrogen and its derivatives. The government has mandated the IDC to lead the development and commercialisation of the green hydrogen economy. The IDC, in partnership with the Green Hydrogen Panel, is in the process of finalising the South African Green Hydrogen Commercialisation Strategy (GHCS).

Joanne Bate, Chief Operating Officer at the IDC, said: "The IDC recognises the substantial value and benefits the green hydrogen economy will bring to South Africa. It presents new economic, skills, employment and community opportunities for the country. We are pleased to explore potential partnership opportunities with ACWA Power, given its pedigree and expertise in this industry."

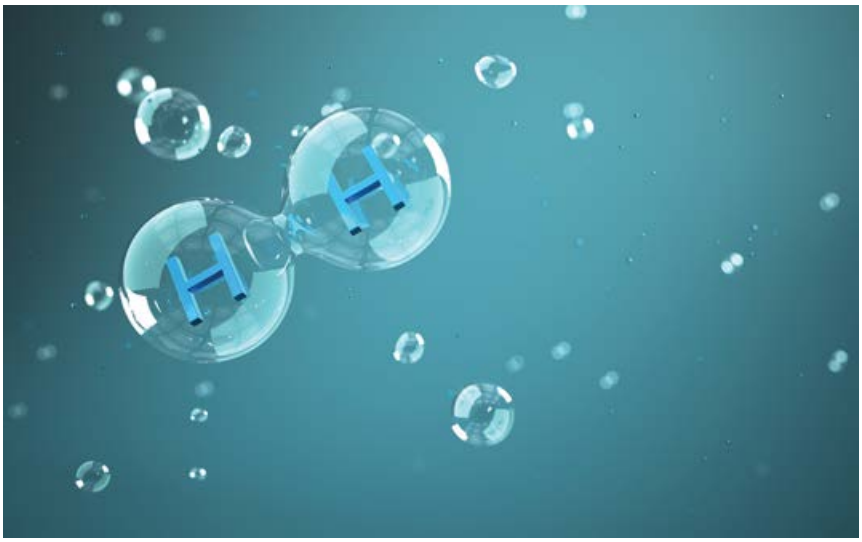
Paddy Padmanathan, CEO and Vice Chairman, ACWA Power.

The IDC is currently supporting the development of several catalytic projects in the green hydrogen value chain, including green hydrogen and ammonia production, mobility projects and decarbonisation of hard-to-abate sectors using green hydrogen. It is also exploring bespoke funding solutions with co-funders for green hydrogen projects and supporting the required regulatory and policy changes to foster an enabling environment for the development of a new green hydrogen industry for South Africa.

With its experience in the South African renewable energy industry and in green hydrogen projects abroad, ACWA Power can play a valuable role in supporting the objectives of the GHCS. Both parties will carry out a feasibility study, potentially cooperate, jointly develop and co-invest in projects in the green hydrogen value chain in South Africa. The signing of the MoU with ACWA Power is intended to support the implementation of the GHCS and contribute towards the country's green hydrogen production targets.

ACWA Power has been active in South Africa since 2016, and currently has two solar energy plants – Bokpoort and Redstone – in the country. Both projects use concentrated solar power technology.

For more information visit: www.acwapower.com/en/



South Africa plans to become a significant producer and exporter of green hydrogen and its derivatives.

Digital measurement is key to high quality Li-ion batteries

The fast-growing demand for batteries, for applications ranging from powering vehicles to storing energy from renewables, is seeing a rapid increase in the number of new factories being built to produce them. Here, Frenk Withoos for ABB Measurement & Analytics looks at the role that the latest generation of digital measurement equipment can play in helping to ensure the highest levels of quality and consistency in battery production.

With countries around the world striving to reach the goal of zero emissions, consumers, manufacturers and governments are looking for ways to replace fossil fuels with sustainable, pollution-free energy sources. A major part of bringing this to reality will be in the availability and use of reliable and efficient battery technologies – for storing energy from renewable sources like wind and solar, providing reserves of power for the grid, and powering transport.

Driven largely by the electric vehicle industry, Lithium-ion (Li-ion) batteries have emerged as the frontrunner for many of these applications. Compared to other types of batteries, Li-ion batteries offer a long life, flexibility in material composition and the versatility to power a wide range of products, from electronic devices to heavy electric vehicles.

From 2015 to 2022, demand from the automotive and transport sectors accounted for 450 GWh of Li-ion battery capacity, and there has been a 921% increase in demand from all sectors over the same time period. The battery industry is ramping up production dramatically to meet this need; China currently dominates, providing more than 76% of global manufacturing capacity, but the rest of the world is catching up fast. Europe plans to have 850 GWh of capacity on stream by 2030 – Germany alone will account for 330 GWh of this total.

A battery of processes

Li-ion battery cells consist of an anode, a cathode, a separator and a liquid electrolyte.

Battery cells in production; this entails a complex sequence of processes, whether for smaller or larger units.

Digital measurement and monitoring in production contributes to top quality batteries.

Electrode manufacturing begins with mixing active materials, binders and additives into a slurry. In the next step, the slurry is coated on both sides of the current collectors. These take the form of webs of aluminium, for the cathode, and copper for the anode. The webs move on through a drying section to remove the solvent, which is usually recovered and reused.

The copper and aluminium foils are compressed by a pair of rotating rollers in a calendering process, helping to adjust the electrodes' physical properties such as bonding, conductivity and density.

Following a slitting and stamping stage to form the electrodes to the required dimensions, they go through a vacuum drying stage to remove excess water.

The electrodes are then sent to the dry room, along with dried separators for cell production. The electrodes and separators are wound or stacked, layer by layer, to form the internal structure of a cell.

The final two stages of production involve enclosing the electrodes and separator in the package, sealing them and then filling the package with electrolyte in a dry vacuum environment.

Measuring quality

Each of these production stages presents particular factors that affect quality, requiring that parameters such as temperature, pressure, force, level, and flow are all measured accurately.

For example, slurry mixing is conducted at a temperature of 20 to 40°C, and other quality parameters – including the

homogeneity of the slurry, the particle size, purity and viscosity – all need to be measured.

Coating requires a dry film thickness in the micrometre range, with a coating accuracy of +/- 2 g/m^2. Other quality parameters include surface quality and adhesion between the substrate and the coating.

During drying, the speed at which the aluminium and copper webs are moving must be maintained at between 35 m/min and 80 m/min, and the temperature profile in the dryer zones maintained between 50°C and 160°C. Residual humidity and adhesion to the substrate and surface finish are also critical quality parameters.

The calendering process demands a constant roller speed of 60 to 100 m/min. Factors influencing quality here include the roller temperatures, which may be between 50°C and 250°C. Slitting can introduce burr waste, so an important quality parameter to be measured is the degree of particle contamination during the cutting process.

As a pressure process, the vacuum drying stage requires a working pressure of between 0.07 and 1 000 mbar, and a temperature between 60 and 150°C.

After winding and assembly, the final process of electrolyte filling involves measuring pressure to approximately 0.01 mbar and measurement of the correct electrolyte quantity. Aging of the cell again involves measuring temperatures during an extensive process, with temperatures that can reach 50°C.

With so many intricate processes and valuable materials involved, manufacturers cannot afford to scrap parts and start again if quality parameters go out of specification.

Going digital enables top quality production

Although analogue instruments are still employed in many industries, they are increasingly being replaced by digital versions. The accuracy and reliability of the latest generation of digital measurement solutions make them particularly suitable for the long and complex Li-ion battery production process.

With analogue meters, data is transmitted as an electrical signal representing a particular measurement range, such as 0 - 500 ml/s in a flow metering application. The issue here is the potential mismatch between the transmitting range of an instrument and the input scaling range of the receiving instrument. If incorrect readings are created, this can lead operators to waste time looking for apparently lost measurements.

Digital measurement eliminates this problem. By sending zeroes and ones from A to B, the displayed value will always be a faithful representation of what is happening in the process. This means that each stage of battery production is monitored to conform to the required parameters, ensuring safety, avoiding wasted materials and producing high quality products.

Another advantage of digital protocols is that they allow multiple different values to be combined into the signal, whereas traditional analogue transmission allows only one signal to be sent at one time. With digital transmission, additional measurements can be sent with the primary measurement: density and temperature or pressure, for example.

Digital instruments also promote quality and reduce errors because they are easy to set up and to use. Graphical displays

ABB supplies a range of digital instruments to measure pressure, level, temperature, flow and other parameters.

make it easier for users to operate measurement devices, reducing reading errors, and many incorporate set-up wizards, making commissioning easier. For example, pressure, level and temperature measurement devices from ABB feature a common HMI, reducing the need for training.

Digital instruments are also more helpful in fault finding. Previous generations of instruments would simply activate a fault light, without any indication of what was causing it. Digital instruments automatically self-check the validity of their data, helping operators pinpoint which particular function is presenting a problem, and noting any difficulties encountered. Some advanced instruments incorporate GSM, allowing users to connect to, say, a flowmeter, remotely to obtain data and change configurations.

With digital instruments communicating over protocols such as Fieldbus, there is more opportunity to manage them remotely. For example, for a major Li-ion battery manufacturer in Sweden, ABB has provided its Ability™ Field Information Manager (FIM). This is a device management tool that makes the configuration, commissioning, diagnostics, and maintenance of Fieldbus instruments easier and quicker, cutting connection time from between 15 and 30 minutes to only three minutes.

Another solution provided to the client is ABB Ability Verification, which enables device condition monitoring in the cloud to reduce maintenance.

Overall, digital instruments produce more accurate data, and are much more reliable and controllable than analogue instruments. By choosing the digital route, Li-ion battery manufacturers can safely produce the quality products that customers are looking for, and keep their operational and material costs to a minimum. □

For more information visit: www.abb.com/measurement

The F31K2 provides reliable valve position feedback even in adverse outdoor applications.

Robust dual inductive sensor to monitor valve position

In the process industry, powerful sensors are needed to monitor the correct position of valves. Some outdoor applications, such as seawater desalination plants, oil rigs or phosphate mines, place particular demands on the sensor technology used. With a tight and corrosion-free housing, the F31K2 dual inductive sensor from Pepperl+Fuchs offers a solution for valve position feedback under such extreme conditions. The company's optimised sensor series now also includes a non-intrinsically safe variant with IECEx approval for worldwide use in Zone 2/22 hazardous areas. In addition, a low-power variant enables simple modernisation of existing systems with mechanical limit switches.

Optimised for outdoor use

Exposed to heat or cold, salt water or UV radiation, the F31K2 has the robustness and durability to withstand the most adverse outdoor conditions. Two separate inductive sensor elements enable noncontact and wear-free detection of the valve position. The high-density housing (up to IP69) makes the F31K2 insensitive to water and dust. The materials used – V4A stainless steel, high-performance plastics and coated aluminium – additionally protect the sensor against corrosion. With an extended operating temperature range of -40 to +70/+100°C, the F31K2 can be used in extreme weather conditions. In addition, a protective cover is available to protect the actuator from mechanical damage and dirt.

Variants offer greater flexibility

The dual sensors of the F31K2 series are available with different approvals and electronic outputs. A special highlight is the 2-wire dc low-power variant. Due to patented Pepperl+Fuchs technology, this dual inductive sensor has a virtually volt-free contact. As a result, the residual current is so low that the sensor can be used in combination with all programmable logic controllers and process control systems. This means that a modern inductive solution is also available for systems that previously relied on mechanical contacts.

In areas where explosive atmospheres rarely occur, the required explosion protection can be implemented particularly easily with the 2- or 3-wire dc variants. The sensors are designed for use in Zone 2/22 where Ex ec (increased safety) and Ex tc (protection by enclosure) types of protection with ATEX and IECEx certifications are required. Consequently, neither isolated switch amplifiers nor intrinsically safe wiring is needed when these devices are used. For hazardous areas up to Zone 0/20, the intrinsically safe NAMUR version of the F31K2 provides the appropriate ATEX and IECEx approvals. This variant of the dual inductive sensor can also be used in safety applications up to SIL 2.

Simple mounting, convenient operation

The compact F31K2 dual sensor can be mounted directly on valve actuators without additional accessories, making it easy to install. A large terminal compartment with plug-in terminals provides additional convenience. Pepperl+Fuchs offers a selection of actuators in different sizes so that the F31K2 can be adapted to different drives. The portfolio also includes an actuator with a highly visible, coloured valve position indicator: This makes it possible to see at a glance whether the valve is open or closed, even from a distance. The F31K2 thus offers maximum convenience for valve position feedback in process plants.

For more information contact Pepperl+Fuchs.
Tel: +27 (0)87 895 0797
Email: info@za.pepperl-fuchs.com
Visit: www.pepperl-fuchs.com/southafrica/en

Kobold's NEK conductive level switches monitor the limit level of conductive media in various applications.

Fast-switching conductive level switches

Kobold's NEK conductive level switches are available from Instrotech. These are complete, functional units that reliably monitor the limit level of conductive media, even under heavy process conditions.

Used for monitoring chemical or fresh water tanks, mixing vessels or for run-dry protection in pumps, the conductive level switches type NEK more than meet the demand for efficient and cost-effective measurement technology. The compact, space-saving but robust design means the devices can be integrated efficiently into existing industrial processes.

The NEK device is designed as a complete functional unit which can be screwed into a tank. The compact housing with process connection has a hexagon and male thread for installation. The devices made of polyphenylene sulphide (PPS) tolerate pressures of up to 20 bar, and those made of polypropylene (PP), tolerate pressures up to 6 bar. Two electrodes made of stainless steel extend into the process. As soon as both come into contact with a conductive liquid, the electronics detect it and output a corresponding switch signal.

The NEK switches, with protection class IP68, can operate at temperatures up to 85°C (maximum) and feature R ¾ or ¾" NPT connections. Installation lengths of 36 mm or 73 mm can be selected. The installation depth can be adapted individually by means of an additional protection tube and installation can be done from the top or the side of the vessel.

For more information contact Instrotech.
Tel: +27 (0)10 595 1831, email: sales@instrotech.co.za
Visit: www.instrotech.co.za

VEGA South Africa opens its new Lanseria HQ

VEGA South Africa – a leading supplier of level, switching, pressure and nucleonic instrumentation, and a wholly owned subsidiary of VEGA Grieshaber KG – officially opened its new headquarters in Lanseria, Johannesburg on 31 October 2022. The new 15 000 m² facility is a key investment in the company's customers, employees and community.

Many of the company's 60+ employees spent around three days moving to the new premises in stages, in an effort to minimise disruptions in the midst of a record-setting year for sales and shipping of its level-sensing and other measurement products.

VEGA South Africa relocated some 20 km north, to Lanseria, after more than two decades overall – initially in its Ruimsig home office and subsequently its Honeydew head office, which provided space of only 1 000 m². Managing Director, Frikkie Streicher says the steady growth the company has experienced over the past six years demanded expansion, to complement the long-term vision for local manufacturing and assembly. The current facility and land space allow for expansion as and when the need arises.

"We can double our staff complement and still be comfortable in our new building," he says. The facility offers greater scope for providing insightful tailor-made product and industry training. It also enables VEGA South Africa to increase its stockholding. "We intend to keep our fast-moving goods stock up, so we can fulfil orders within a day or two," says Streicher.

VEGA South Africa's new headquarters in Lanseria provide the space for the company to grow.

The 6 000 m² head office and warehouse is architecturally designed to meet the company's needs. It also incorporates a solar system that can meet 100% of VEGA South Africa's energy demand during daytime hours, as well as a greywater harvesting system that makes use of VEGA level sensors and controllers. Global Managing Partner, Isabel Grieshaber, explains the unique features such as the "wall-less" design, making use of large, curved windows to optimise sunlight inside the building, contribute to saving more on energy costs.

The employee-centric design provides a range of amenities that support unity within the company and the values of curiosity, humanity, connectivity and simplicity.

For more information contact VEGA South Africa.
Tel: +27 (0)11 795 3249
Email: miguel.petersen@vega.com
Visit: www.vega.com/en-za

View voltage and current safely, on one screen

Comtest, local representative for Fluke, has the Fluke T6-1000 PRO True-RMS Electrical Tester available for safe electrical testing without touching a wire. It can be used to measure voltage up to 1 000 V ac and current up to 200 A ac, through the open fork and without test lead contact to live voltage. The user connects the black lead to ground with the included heavy-duty alligator clip, slides the wire into the open fork and can read voltage and current at the same time. The T6-1000 PRO works with most wires up to AWG 4/0 (120 mm²), carrying as much as 200 A and 1 000 V ac. It can also be used with gloves.

The T6-1000 PRO allows electricians to test in otherwise impossible places. Instead of pulling wire nuts, the user just slides the open jaw over a single conductor. The instrument enables test technicians to work more quickly and more safely than they can if working to find a metallic contact point. Measuring voltage and current at the same time, also saves time.

The T6-1000 PRO is equipped with Fluke FieldSense technology, a proprietary method of measuring the voltage value without making live electrical contact. Users benefit with measurements that are more reliable and more accurate than those that can be obtained using existing go/no-go testers.

Not having to probe live conductors also makes jobs safer for the electrician. As there is no need to make electrical contact, the chance of human contact with an energised wire is reduced. This also reduces the chance of making contact with the wrong conductor, which can produce unexpected results.

The T6-1000 PRO is especially designed for electricians working in potentially dangerous environments. Because users will almost always be wearing gloves or other personnel protection equipment (PPE), the T6-1000 PRO is designed to use an external ground clip 100% of the time. In addition, the area where FieldSense technology measures voltage is extended further down the open fork. This means getting consistent, accurate voltage and current measurements without touching a live wire is easier than it has previously been.

The Fluke T6-1000 PRO used in an open-jaw application.

For more information contact Comtest.
Tel: +27 (0)10 595 1821
Email: sales@comtest.co.za, visit: www.comtest.co.za

Eskom's updated TDP 2022:
+53 GW of new generation capacity by 2032

Presenting its Transmission Development Plan (TDP) 2023 - 2032 at the Public Forum hosted by Eskom on 27 October, the utility stated that an additional 53 GW of new generation capacity, particularly from renewable energy sources, and especially wind and solar, will be required for the period up to 2032 to ensure energy security in the country. This 53 GW of additional power also covers the current deficit of some 6 000 MW.

This latest TDP marks a significant revision of the TDP 2021, in which the assumptions for new generation capacity were based on the 2019 Integrated Resource Plan's (IRP2019) proposed 30 GW of new capacity by 2030. To accommodate the additional capacity, and on the assumption that obstacles to the implementation of the rollout plan are removed, the transmission infrastructure will need to be augmented by some 14 200 km of extra-high voltage lines and 170 transformers by 2032.

Given the uncertainty over the longer term, and noting that the Integrated Resource Plan, as a policy document, is currently being updated, Eskom is placing a strong focus on the implementation of projects over the next five years. The analysis carried out reflects a requirement of about 2 890 km of extra-high voltage lines and 60 transformers, requiring a capital investment of R72.2 billion by FY 2027. Delivery on this five-year focus means that some challenges which are beyond Eskom's full control, such as the lead time to obtain servitudes and other relevant authorisations, as well as the resource capacity in the country, need to be urgently addressed.

The updated TDP takes into account the deterioration of the energy availability factor (EAF) of the Eskom coal fleet, which was a key input in the drafting of the IRP2019.

Eskom's updated TDP sees an additional 53 GW of new generation capacity needed by 2032, plus 14 200 km of extra HV transmission lines and 170 transformers.

The additional generation capacity requirements also take into account Eskom's 2035 corporate strategy and have considered the connection applications received from the various procurement programmes managed by the Department of Mineral Resources and Energy (DMRE) and applications received from non-DMRE integration programmes, as well as input from various renewable energy associations.

Accommodating this increased generation capacity requires a reliable and adequate transmission system to integrate and dispatch the additional capacity to the load centres across the country.

Eskom's Managing Director for Transmission, Segomoco Scheppers, emphasised that, "The next five years are critical for security of supply. If the TDP 2022 requirements to deliver an adequate transmission network capacity by 2027 are to be met, a significant investment of R72.2 billion will be required to expand and strengthen the transmission grid over the next five years. Of this amount, R50.8 billion is required for new capacity expansion projects to meet the reliability requirements, connection of new generation capacity and loads, as well as to acquire servitudes. A further R21.4 billion is required to refurbish the existing asset base and for the procurement of production equipment."

In his keynote address headlining the series of presentations on Eskom's development plans for the transmission grid for the 2023 to 2032 period, Scheppers commented on maintenance of the grid and the required strengthening of the grid to serve current and increasing generation capacity. He acknowledged that the forum was hosted against the backdrop of a severely constrained power system, which has necessitated the implementation of the longest round of rotational load shedding yet.

"As you well know," he said, addressing the forum, "load shedding remains imminent as a last resort to protect the integrity of the power system.

"However, our focus today is on the challenges and opportunities flowing from the TDP."

Grid maintenance

Commenting firstly on required maintenance on the Transmission grid, Scheppers noted that for the financial year ended 31 March 2022, Transmission carried out an estimated 98.8% of

the planned maintenance. He noted too, continuing high levels of damage and vandalism of Eskom's network assets. "This clearly presents a serious safety risk and can lead to interruptions of supply," he said. However, he also conveyed Eskom's appreciation to the communities, farmers and landowners, who report defects or damage to the utility's infrastructure across the country.

He added that Transmission is continuing with the focused implementation of its asset replacement and modernisation strategy: monitoring obsolescence and focusing on asset condition assessment, which enables it to identify and plan proactively for assets to be replaced or renewed.

New generation connection capacity

Scheppers emphasised that, "Addressing South Africa's generation capacity challenges will continue to require a collaborative multi-stakeholder approach characterised by openness and transparency.

"In this spirit of transparency, we have recently developed and published the transmission network's Generation Connection Capacity Assessment (GCCA) report, which is available on the Eskom website. This serves to guide potential developers of new generation capacity as to where Transmission grid capacity is available. The information is intended to contribute to the efficient development of new generation capacity, and contribute to alleviating the energy crisis."

Strengthening the grid

Touching briefly on progress since the TDP2021 was delivered in October 2021, Scheppers said notable progress has been made in implementing identified capital projects – and this had been achieved despite the negative impact of the pandemic over the past two years.

He highlighted specific projects commissioned across the country's provinces, including the Western Cape, KZN, the Free State, Limpopo, and Northern Cape and noted that:

- A total of six IPP projects contributing 682 MW were commissioned, bringing the overall total to 91 IPP projects providing a contribution of over 7 000 MW
- The additional IPP projects were integrated into the national transmission grid in the Northern, Western, and Eastern Cape, underpinned by investments in new substations and enhancements of transformer capacity.

TDP 2022

Turning to TDP 2022 Scheppers reiterated that the TDP is an evolving document that is updated annually, taking account of new developments in the energy landscape. These informed Eskom's upscaling of the requirement for new generation capacity over the next 10 years to 53 GW. It envisages this will come mainly from renewable energy sources, including in areas with limited transmission infrastructure.

He said the TDP 2022 and the Grid Connection Capacity Assessment 2024 (GCCA-2024) have highlighted the

Recognising constraints on transmission networks in some parts of the country, Eskom plans to accelerate investments in developing new corridors and substations.

significant constraints of transmission networks, mainly in the Northern, Eastern, and Western Cape. "This will require accelerating investments in transmission infrastructure by developing new corridors and substations, while also strengthening existing substations. We are taking steps to fast-track what we call accelerated transformer projects to unlock grid capacity."

Regarding the longer term 10-year plan to extend the transmission grid by 14 200 km of extra-high voltage lines – this was covered in more detail in subsequent presentations, looking at specific requirements across the different regions of the country.

"To expedite delivery of the grid strengthening projects planned over the next five years requires us, collectively, to take extraordinary measures," Scheppers said. "It will require careful planning on our part, as well as alignment, coordination and support from all key stakeholders. We continue to participate in the NECOM/NatJoints initiatives, and to collaborate with various key stakeholders to enable the successful rollout of the TDP."

Integrating renewable energy resources

Scheppers also highlighted that, "As the energy mix changes, and in particular, as we retire more of the large synchronous generators and increase the portfolio of inverter-based renewable energy resources, the behaviour of the power system changes drastically. We must design and engineer the power system in such a way that we can ensure stability of the power system. Ancillary Services requirements play a key role, here," he said.

"In addition, we have commissioned further advanced power system modelling and analysis focused specifically on system stability. We expect to conclude these studies during the first half of next year. "This is a new and exciting chapter for Transmission," Scheppers said, "which I am sure our network planners are looking forward to."

Progress on the NTC

Providing a brief update on the legal separation of the

Transmission business as a wholly owned subsidiary of Eskom Holdings SOC Ltd. Scheppers said the process is at an advanced stage, with the Transmission entity having been registered as the National Transmission Company South Africa (NTC) SOC Ltd.

"A binding merger agreement has already been signed with suspensive conditions to be fulfilled for the effective transfer of the business from Eskom to the Transmission entity. Following the fulfilment of suspensive conditions, NTC will be operationalised, and employees will be transferred to the company on the same conditions of service, without disrupting their years of service.

"Lender engagements for consent are at an advanced stage, with lenders expected to provide their decision in due course. The electricity licence application for NTC was resubmitted to the National Energy Regulator of South Africa (NERSA) in September 2022 and is under consideration.

"Eskom depends on the government and lenders for the conclusion of key requirements. The timeline for start of trade for the NTC is anticipated to be in the new financial year, with the proviso that all suspensive conditions are fulfilled."

Scheppers concluded by restating: "Transmission remains committed to providing non-discriminatory access to the transmission grid to generators and distributors, regardless of ownership. This position is fully supported by Eskom Holdings." □

For more information visit: www.eskom.co.za

Increasing production of inverter transformers

ACTOM Power Transformers (APT) is currently increasing the production capacity of its Wadeville, Germiston, plant, mainly to meet the anticipated upsurge in demand expected from South Africa's growing renewable energy generation sector.

APT has identified IPPs' (independent power producers') renewable energy projects as a growing market sector with Rounds 5 and 6 of the REIPPP Programme gathering momentum – and recent legislative changes around power generation allowable by the private sector driving further demand for power transformers.

Round 6 of the REIPPPP, which is targeted to generate a total of 4 200 MW of power, was oversubscribed, receiving 33 solar PV and 23 wind generation project bids, totalling 9 600 MW. The projects in this round are also substantially larger than those of previous rounds due to the relaxation of cap limitations.

"All these new public and private sector projects add up to greatly increased demand for electrical infrastructural equipment. ACTOM's Transmission & Distribution divisions are in a strong position to supply 'balance of plant' equipment," said Steve Jordaan, Power Transformers' Divisional CEO.

Working with its Switzerland-based transformer design partner, APT has developed a range of inverter transformers for wind and solar inverter applications and recently expanded the size range up to 12 MVA. "This is in line with the larger capacity projects that are being introduced in Round 6, compared to the earlier bid windows in the national renewable energy programme, as well as the bigger individual wind and solar generator units being brought into play in the latest round," Jordaan added. "This application requires specific design criteria for the step-up transformers, to mitigate the effects of harmonics and dynamic response characteristics of the inverters," he said.

One of the padmount 2.7 MVA 0.69/33 kV inverter transformers produced for the wind turbines of the Kangnas wind farm in the Northern Cape.

For the Perdekraal and Kangnas wind farm projects developed under Round 4 of the REIPPPP, APT supplied 109 x 2.7 MVA 0.69/33 kV inverter transformers. Jordaan confirms that these have proven to be efficient and, he says, "They are completely 'gas free', which places APT at the forefront among local manufacturers of inverter transformers for renewable energy generation projects.

"Furthermore, APT offers the solution of combining the low voltage and medium voltage switchgear with the step-up inverter transformers in a skid-mounted or containerised configuration, which is generally preferred by developers and EPCs. This simplifies the installation of the equipment significantly and mitigates the risk of interconnecting cable faults on site," he says.

APT's plant expansion caters for the skid-mounted/containerised products as well as the larger inverter transformers up to 12 MVA and increases the division's annual production capacity by more than 40%. The expansion, which includes the installation of a second vapour phase oven, additional vertical and horizontal winding machines, two additional assembly stations as well as a state-of-the-art air cushion system, is due for completion by the end of March 2023.

For more information contact ACTOM Power Transformers.
Tel: +27 (0)11 824 2810, visit: www.actom.co.za

New cable cleats well received internationally

The international standard governing cable cleats used in electrical installations is IEC 61914:2015. In this standard cable cleats are defined as “devices designed to provide securing of cables when installed at intervals along the length of the cables”. In simple terms, cable cleats are used to secure, fix and route electrical cables in the positions required in an electrical installation. They can consist of single or multiple parts, may be of plastic or metal material, and include some sort of provision to secure them to a surface or structure. Mounting surfaces that may be specified include: ladder, tray, strut, rail, and beam.

Cable cleats should be designed to ensure that cables are fixed, supported and routed in a manner that provides safe operation and reduces the risk of damage or injury in the event of a short circuit fault, emergency or accident. Improper clamping of cables can result in loss through unnecessary downtime or for personnel through injury or death. At a minimum, cable cleats should:

- Be rated for the specified cable OD (overall diameter)
- Provide a means of securely fixing the cable
- Have adequate strength to secure the cable
- Prevent excessive cable movement and damage
- Avoid chafing and undue stress in the cable.

Selecting and specifying cable cleats

- *Cable arrangement*

Primarily, the cable arrangement/configuration will dictate the type of cleat required. Cable arrangements for 3-phase installations using single conductor cables are typically flat spaced, flat touching or trefoil. A parallel or flat arrangement of single core cables can be completed with a range of single or two-part cleats, whereas a trefoil requires a trefoil type cleat.

- *Cable type*

The type of cable being used, single or multi-core, as well as its voltage levels and construction, low voltage (LV), medium voltage (MV) or high voltage (HV), should be considered.

- *Cable diameter*

Knowing the overall diameter of the cable (measurement across the entire cross-section) is essential in ensuring the correct size of cleat is selected. It is also required to calculate the short circuit forces to which the cleat may be subjected; this can be used to determine correct cleat spacing.

- *Performance*

A range of factors will dictate the level of performance an installation requires. The size, weight and length of run of the cable and spacing will usually influence whether polymer or metallic cleats are required. Aspects such as the support structure material and environmental conditions (corrosion) can also affect the decision on cleat material. Other factors such as project specification may require special provision for performance in the event of a fire, such as Low Smoke or Zero Halogen.

Cleat installation: securing, fixing and routing electrical cables.

In summary, to select the correct type of cleat for a specific application, the following information should be taken into account:

- Calculate the system peak fault current
- Confirm cable type and arrangement, including the overall diameter and manufacturing tolerance
- Confirm the support structure type and material
- Consider any other environmental conditions and project specification requirements.

Stainless steel single and trefoil cleats

CCG’s range of stainless steel cleats is designed to restrain single or trefoil cables onto ladder, tray or strut systems. The cleats are manufactured from corrosion-resistant, magnetic-free, 316 stainless steel with LSOH and UV protected polymeric linings for cable protection. CCG’s cleats are designed to withstand mechanical forces caused by fault currents of up to 180 kA.

The cleats have an open hinge single bolt fastening system, allowing for ease of installation for a wide range of cables from 13 mm to 128 mm.

Although only recently launched worldwide, CCG’s range of simple to use, robust cleats has already been chosen by customers in Australia, Papua New Guinea and South Africa, for use in: gas fields, solar farms, wind farms, petrochemical plants and mines as well as an export shipping hub for iron ore.

For more information contact CCG.
Tel: +27 (0)11 394 2020
Email: info@ccgcablegland.co.za
Visit: www.ccgcablegland.co.za

Dumisani Dlamini, Energy Systems Engineer at Zest WEG.

SA manufactured mobile switching station for EDM, Mozambique

Reinforcing its reputation as a supplier of cost-effective custom-designed mobile power solutions, Zest WEG has recently completed the delivery of a mobile switching station to Mozambique's national power utility EDM (*Electricidade de Moçambique*).

The 33 kV switching station, complete with 36 kV rated switchgear, is housed in a purpose-built enclosure installed on a double-axle trailer and includes all protection requirements to allow for quick connection and safe operation at all times.

"At Zest WEG we regard Mozambique as a key strategic market and we are delighted to have completed this order successfully," says Sollie Herbst, Senior Manager, Energy Systems at Zest WEG. He adds that although Zest WEG does not have a branch in Mozambique, it has an established Value-Added Reseller in the country that can provide support – together with Zest WEG in South Africa – to customers in the country.

The switching station was designed and manufactured in South Africa by Zest WEG, with the lead engineer on the project being Dumisani Dlamini, Energy Systems Engineer in the company's Energy Systems division. Mozambican engineering company MESAT, acting on behalf of EDM, set out the specifications and end-user requirements to be met.

Dlamini says the main challenge on the project was to incorporate all the functionalities required by EDM into a single, compact, prefabricated solution and, at the same time, to minimise the overall size and mass of the unit to enable it to travel along public roads without any special permits being needed.

In addition, the switching station had to be able to interface with the most recently developed technology for supervision, control and protection and incorporate advanced safety interlocks, both mechanical and electrical. Secondary plant, such as protection relays and devices, was sourced to be in line with EDM's substation standards.

Dlamini points out that one of the advantages Zest WEG has in designing projects of this nature is its ability to build its own enclosures. "We don't make use of standard containers and therefore are not limited by standard sizes," he says. "By undertaking our own fabrication, we can produce enclosures which can comfortably house all the components of the switching station without any need for compromises due to space restrictions."

Dlamini adds that the design adopted by Zest WEG simplifies on-site installation. "The unit is completely pre-tested, prefabricated and pre-wired. In essence, it's a 'plug-and-play' solution which can be rapidly deployed to wherever it is needed. There is no need for support infrastructure on site, such as a specially prepared laydown area, and no requirement for craneage, as would be needed with a skid-based solution. This means the switching station can become operational soon after arriving on site."

Zest WEG can normally supply its mobile switching stations within 28 weeks of receiving an order but, in this case, was able to slightly better this time. "The design and fabrication proceeded smoothly and we were able to deliver well within the promised timeframe," says Dlamini.

Commenting on the possible applications for the switching

The 33 kV mobile switching station is ideal for routine maintenance or as a temporary stand-in when an existing station has failed.

Continued from page 26

station, Herbst says EDM stipulated that it should be a self-contained, multipurpose unit able to accommodate a range of operational scenarios, including working in areas with limited infrastructure.

"It can be used in emergency applications where it replaces an existing switching station that might have failed, or it can be used in a standby role where it assists with temporary 33 kV distribution," he says. "It's also ideal for routine maintenance projects, where it might replace – for example – a switching station that is temporarily taken offline. It is also, of course, suitable for any project under construction which might need a temporary 33 kV network distribution. It is a simple operation for this unit to be tapped into an overhead line and feed power directly to the site."

The mobile system delivered to EDM follows closely on another recent notable success in Africa, which saw Zest WEG supplying a 50 MVA mobile substation, one of the largest ever built in South Africa, as well as a 33 kV mobile switching station, to *Electricité de Guinée*, the national electricity utility in the West African country of Guinea.

The scope of the turnkey project included three trailers with specialised equipment, one of them being a cable reel trailer with all power and control cabling needed to connect the mobile substation and the mobile switching station trailers into an integrated mobile energy system.

By design, safe and quick MV switching is possible at any site.

"The latest Mozambican order as well as the Guinean project highlight Zest WEG's ability to design and manufacture mobile solutions for almost any application, anywhere in Africa," says Herbst. "We believe there is a significant and growing demand for solutions of this type, given that the continent's electrical infrastructure is growing fast. Our delivery on these latest contracts underlines our ability to meet this demand."

For more information visit: www.zestweg.com

Reliable power supply to new mine ventilation shaft

Sasol Mining selected the flexible ABB Relion® protection relays for a new substation at the Syferfontein mine in South Africa. The scope of functionality, event and fault recording capabilities, reduced footprint, and cost reductions were key factors in the decision.

Sasol Mining, part of South African integrated energy and chemical company Sasol, undertakes the company's coal mining operations. It operates six coal mines that supply about 40 million tons of thermal coal feedstock per year. At the company's largest colliery, the Syferfontein mine in the Secunda area, Sasol Mining identified that an existing ventilation shaft was inadequate to provide the required ventilation of the mining zone. To ensure uninterrupted power supply to a new ventilation shaft, it needed a new substation.

ABB's Unigear switchgear line-up at the Syferfontein substation.

In underground mining, ventilation systems are critical to ensure safe working conditions. Ventilation systems provide clean air, dissipate and remove dust as well as natural and machine exhaust gases, and provide cooling for personnel and machinery. The systems need to run continuously 24 hours a day, throughout the year, which means uninterrupted power supply is a key requirement. The energy demand is significant and ventilation systems are one of the biggest users of power in underground mines, accounting for as much as 50% of energy use.

For the new substation that feeds the new ventilation shaft, Sasol Mining chose a protection and control solution with ABB's Relion® relays from the product family's 615 and 620 series, as well as the all-in-one protection relay REX640, to be installed in the medium voltage switchgear. This is the first installation with ABB's Relion® protection and control relays for Sasol Mining.

"A key consideration for us when deciding in favour of the Relion® relays was that they offered all the functionality we need," said Divesh Ramasur, Senior Electrical Engineer at Sasol Mining. "They are also flexible and offer a range of event and fault recording capabilities."

An external view of the substation.

Sasol Mining chose the protection and control relays for the circuit breaker control functions they provide and because they have arc flash protection embedded for increased safety. They also include the simpler GOOSE (Generic Object-Oriented Substation Event) protocol and all have the R/L (remote/local) switch available on the relay faceplate for easier operation.

Additionally, the customer chose Relion® 620 series relays for motor protection. The relays offer stall protection functionality and thermal overload protection, considering the actual starting time of the motor.

The installation of Relion® relays has enabled cost reduction and a reduced switchgear footprint. "With REX640 we can use only one relay for transformer protection, whereas previously we have had to use a number of different relays to achieve the same level of protection," said Ramasur. "The REX640 relay has various transformer protection functions available: low impedance differential protection, low impedance restricted earth-fault protection, sensitive earth fault protection, and tap changer control, for example, are all integrated into the relay. It also has multiple binary inputs and outputs and can incorporate analogue inputs, too."

The footprint of the switchgear was reduced as there was no need to install three different relays to obtain the same functionality. In addition, the built-in R/L switch and master trip relay obviated the need to install separate switches on the panel. A cost reduction of about 25% was achieved.

Ramasur also notes the configurable LEDs on the relays which help to find faults quickly. The 11 configurable LEDs and up to 33 configurable LEDs in REX640 can be used to indicate the different functions, making it easier for the operator to find the fault." Further, with the Relion® 615 series (REF615) and 620 series (REM620) protection relays in the substation, the customer estimates the total costs were reduced by 10%.

For more information visit: go.abb/electrification

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Substations are critical in grid stabilisation

The increasing demand for electricity, the phasing out of coal and to some extent nuclear power, and the necessary expansion of renewable energies pose major challenges to the energy system. Typically, the backbone of the energy supply system is the extra-high voltage grid, and in Bavaria, Germany, this enables the transport of renewable energies from north to south as well as the integration of regionally generated green electricity. The linchpins are transformer substations that link the transmission network – the highways, so to speak – with the subordinate distribution networks – that is, the rural and urban roads. Together with power lines, substations are a key factor in the success of the energy transition and, in this instance, in ensuring that Germany and Bavaria remain strong industrial locations with reasonable energy costs.

The Schwandorf substation is the supply centre for the Upper Palatinate region and is currently being modernised during ongoing operations to make it fit for the energy transition. Leading European grid operator, TenneT, is investing a total of around €68 million in the Schwandorf substation, including €2.5 million in a new MSCDN system from Maschinenfabrik Reinhausen (MR) in Regensburg.

The main task of the plants is to provide static reactive power, which is used in stages for reactive-power control and voltage control. At the same time, the systems can improve the voltage quality and dampen resonances in the grid. The plants have many advantages, such as low losses, economic efficiency and high availability.

This so-called reactive power must be available in a stable and uniform way, as was previously provided by fossil fuel power plants. With the phase-out of coal and nuclear power, these rotating generators are gradually becoming fewer and, due to the increasing feed-in of renewable energies, the voltage in the power grid is subject to ever-greater fluctuations that have to be absorbed by the transmission system operators.

TenneT Germany and MR recently symbolically commissioned the new MSCDN plant.

in an ac voltage network, current can only flow with the right ratio of active to reactive power. It is needed to build up and dissipate a magnetic field 50 times per second and thus to maintain the voltage during current transmission. If there is too much reactive power in the network, less active power is transported; if there is too little reactive power, the voltage drops and power supply disturbances can occur. With the MSCDN system, TenneT can absorb the voltage fluctuations in the substation effectively and thus stabilise the operation of the transmission grid.

In early October 2022, Tim Meyerjürgens, Managing Director of TenneT Germany, and Wilfried Breuer, Managing Director of Maschinenfabrik Reinhausen, symbolically commissioned the new MSCDN plant. Tim Meyerjürgens said, “Every milestone reached and every partial commissioning helps us to achieve the ambitious climate policy goals of Bavaria, to integrate more renewables

The Schwandorf substation is a key regional supply node.

Continued from page 30

into the grid, to make supply security affordable and sustainable, and to achieve greater independence from fossil fuels and electricity imports by using renewables.

"In implementing the energy transition, we are also dependent on innovative developments and the production of highly complex technology components. TenneT can draw on years of experience and know-how from Bavarian companies, as we have done here at the Schwandorf substation. These developments support grid expansion and ensure that Bavarian industry is also benefitting from the energy transition."

MR Managing Director, Wilfried Breuer added: "As a medium-sized global market leader from the Upper Palatinate, we are particularly pleased to be able to contribute our many years of global experience in the control of electrical load flows to the energy transition near our home base of Regensburg. With our innovations and services, MR is also represented in SüdLink, SüdOstLink as well as other major projects in the German transmission grid. For 25 years, our team of specialists from Thuringia has been designing and constructing power quality plants such as this MSCDN worldwide and, together with our partner Omexom, has ensured reliable completion on schedule here in Schwandorf. Confirming our customer TenneT's satisfaction are two follow-up orders, which will also advance the energy transition in Germany."

As Germany's largest transmission system operator, TenneT is aware of its responsibility and the important role it plays and is therefore investing some €60 billion in the energy transition to 2030.

This is focused on grid expansion and the renewal and optimisation of numerous substations.

For more information visit: www.reinhausen.com

MSCDN technology

Reinhausen Power Quality (PQ) has worked with Omexom transformer stations GmbH to optimise a proven technology that, when placed at the appropriate network nodes, stabilises the power supply. the so-called MSCDN system. MSCDN stands for Mechanically Switched Capacitor with Damping Network. As the name suggests, the system consists of a mechanically switched capacitor bank with damping network. The plants serve primarily to provide reactive power for voltage regulation. If more power is drawn from the grid than is produced, because, for example, hundreds of thousands of people are plugging their cars into charging stations, the grid voltage drops. If more energy is produced because the weather is ideal or consumers are using less, the voltage rises. In both cases, this can cause disturbances in the grid. Hence the need for stabilisation. MSCDN systems improve voltage quality and effectively dampen resonances in the grid.

Condition monitoring on cables

Doble Engineering Company has introduced a new cable monitoring solution – pushing the boundaries of condition monitoring, offering the electric power industry new insights on critical high voltage and medium voltage cables, and helping it to operate cable systems in a more reliable, safe and secure way. Using near real-time asset health and condition data, Doble's Calisto® cable condition monitoring solution helps users protect critical power cables and connected assets, safely ensuring uptime, and reducing traditional operating costs. The Calisto® cable condition monitoring solution provides information on cable systems beyond insulation and accessories health. It allows for virtual asset inspections and predictive data-driven maintenance programmes, both of which can reduce the total cost of ownership for HV cables substantially. It is a flexible platform that integrates multiple monitoring parameters and is supported by Doble's expert engineering team. Built on the same core technology used for manufacturing and commissioning acceptance testing, the Calisto® cable condition monitoring solution helps customers prevent major faults in transmission and distribution cables by identifying:

- Internal partial discharge (PD) in the cable and its accessories
- Surface PD on cable terminations
- Corroded shield
- Broken jacket
- Temperature anomalies
- Cable movement.

Doble's new cable condition monitoring solution helps the electric power industry protect critical power cables and connected assets.

For more information visit: www.doble2.com.

Africa's solar power potential

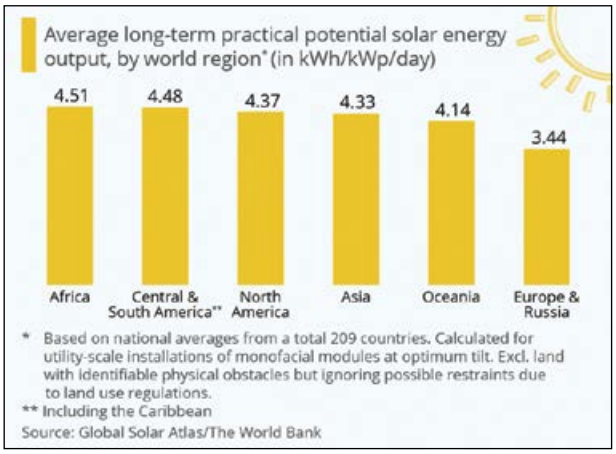
One of the key topics in focus at next year's Africa Energy Indaba, set to take place from 7 to 9 March 2023 at the Cape Town International Convention Centre, will be Africa's natural solar energy potential.

Africa's resource-rich landscape has attracted many investments that continue to power its economy. However, as the world grapples with the critical challenges presented by the use of non-renewable energy sources, now is the time to turn the conversation to 'the sun continent's' unrivalled potential to harness solar energy.

Across the region, electricity generation from renewables has more than doubled over the past two decades, with Egypt and South Africa leading the way. As many African governments recognise the need to increase access to electricity and to service the high levels of demand, opportunities arise for investors looking to support these countries not only to achieve universal access and distribute electricity more equitably, but also to meet net zero emissions targets.

Africa enjoys long periods of bright sunshine throughout the year, and large stretches of land experience minimal cloud cover. For people living on the continent, these geographical and climatic advantages mean that solar power can be leveraged and distributed locally without the need for large-scale grid infrastructure.

Data recently published on statistics portal Statista shows that globally, Africa has the lead with regard to long-term potential solar energy output, calculated at slightly above 4.5 kWh/kWp per day, ahead of all other world regions assessed.



[Source: statista]

Statistics indicate that globally, Africa has the highest long-term potential solar energy output.

Solar energy as a catalyst for good

Considering that only 20% of the world's population lives in 70 countries where conditions are ideal for solar power generation, the data confirms Africa's huge potential for economic development and socio-economic progress. Historically, many rural and geographically dispersed communities throughout the continent have been excluded from grid-based electricity supply, which has hindered development and limited access to basic amenities.

[Photo credit: Halima Bouchouicha on Unsplash]

Africa – the sun continent – has rich potential to harness solar energy.

By making the most of its abundantly available renewable resources and moving away from fossil fuels, Africa could create multiple opportunities for its people to improve their quality of life with affordable and sustainable electricity services.

Investing in solar power in Africa

Africa's solar power potential equally presents multiple opportunities for investors seeking long-term, scalable financial projects – and the prospects for investors are supported by several favourable factors:

- *Population growth and development*
- *Untapped potential*
- *Political commitment*
- *Varied and scalable opportunities.*

Africa has clearly signalled to investors looking to the development of solar power and renewable energy technologies that the continent is ready and open for business. Clean energy and sustainable growth are high on the agenda and present a considerable incentive to capitalise on the continent's mix of extraction and manufacturing capabilities to support the adoption and implementation of solar energy. As demand for electricity services continues to grow, achieving socio-economic development goals for the continent's population will depend to a large extent on access to versatile green energy sources.

The upcoming Africa Energy Indaba will offer participants a platform to explore challenges and opportunities and to promote innovation in energy operations. The conference will bring together leaders and experts to share their knowledge and experience in Africa's energy sector, to consider advanced solutions and new business models, and to develop competitive and sustainable projects, in turn contributing to the growth of the countries and the economies in which they operate. The indaba further offers a forum to network and collaborate with energy stakeholders across the industry.

For more information visit: https://energyindaba.co.za

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