06/2024

ELECTRICITY + CONTROL

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WEG is one of the largest manufacturers of Mini Substations, Distribution Transformers, Power Transformers (up to 45 MVA, 132 kV) and Mobile Substations, including transformers for renewable energy generation (photovoltaic and wind farms) in South Africa.

Operating two manufacturing facilities, one in Wadeville and the other in Heidelberg, we have the capability to design, engineer and manufacture the complete range of transformers presently in use in the country's energy generation, transmission, distribution, mining, industrial, rail and renewable sectors. All designs are done in accordance with clients' specifications and international standards.

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The use of IIoT technologies provides for real-time proactive condition monitoring of valuable assets, even in remote areas.
(Read more on page 3.)

The challenges and successes of STEM education

I am writing this comment from the USA where I have the absolute privilege of serving as a category Co-chair at the Regeneron International Science and Engineering Fair (ISEF).

The Eskom Expo for Young Scientists in South Africa is affiliated to the Regeneron ISEF, which is the largest pre-college competitive science fair on the planet.

South Africa had an incredible team of six young scientists representing us – and they held their own against the best in the world – with three of them picking up substantial awards for their research projects.

We all know that effort must be put into the promotion of Science, Technology, Engineering and Mathematics (STEM) – speaking to the knowledge and competence base needs of the 21st century. There is no way of escaping this.

I think it would be fair to say that the Eskom Expo for Young Scientists has played a significant and consistent role in the promotion of STEM in the South African context – and its role continues to grow. I also believe it is an initiative of which Eskom, as the naming sponsor, can be very proud. Further – it should be noted that Eskom has stood by this initiative even during the darkest days of the past few years.

Why?

Well, if we reflect on where we are as a country, it is evident that we need to continue to grow support for STEM and, particularly, to grow an appreciation of the need for young scientists and engineers to understand the value of research – and the need to create knowledge, and not simply rely on knowledge and technology developed elsewhere.

If we are ever to rise above the field, we need to build our own future. And there is work to do. Basic Education is not where we need it to be, and research funding is flagging in South Africa.

So, let me summarise some highlights of the Regeneron ISEF. The event was attended by almost 2 000 students from around the world, and the competition saw prizes to the value of US$9 million handed out. This is quite remarkable.

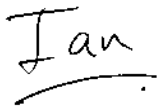
For context, there are 22 categories, from Animal Sciences to Translational Medical Science. Intriguingly, and encouragingly, a new category was introduced this year: Technology Enhances the Arts.

Every time I attend the event, I am reminded of just how competitive the world is, and how the young competitors must recognise that there are no favours, they have to face up to the final decisions, they cannot look for excuses and no amount of shouting 'off-side' will change the ranking of their work determined by this critical audience. This is a reminder too, that it is our responsibility to make certain we aim only for the very highest standards in all that we do.

I am also continually encouraged by the remarkable levels achieved by the young South Africans selected to represent the country. The challenge we face is how to elevate the basic education system as a whole to these lofty levels. Clearly, we have enough funding to achieve this. And clearly, getting basic education right – in particular with regard to STEM subjects – is a critical and urgent matter. This has been on the agenda for a few decades now, yet its effectiveness is patchy at best.

There is no doubt that our country, and indeed our continent, can play a leading role in the world. What we need to ensure is that we have the self-belief to achieve our very best at all times and never allow our eye to be taken off the ball when striving for excellence.

(For more on the ISEF see pages 30 & 31)



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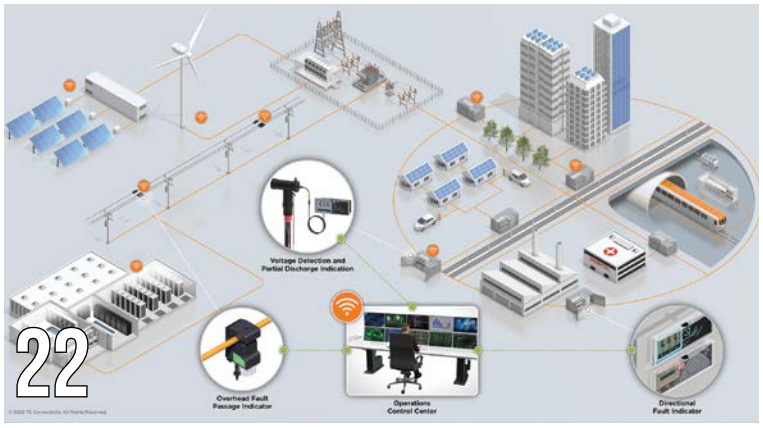
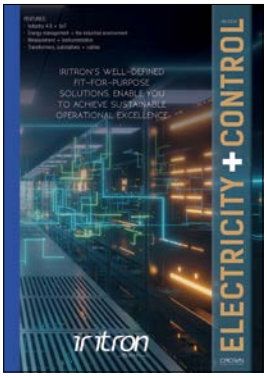


Remote asset condition monitoring using IIoT tools



Asset condition monitoring, anomaly detection and failure prediction are becoming more critical in all industries, but the real-time monitoring of assets in remote locations can become very expensive. This cost hurdle can now be overcome by leveraging the power of Industrial Internet of Things (IIoT) technologies which allows proactive condition monitoring of valuable assets, even in remote areas.

IIOT & MQTT – essential tools

The heart of this capability is the MQTT (Message Queuing Telemetry Transport) protocol – a secure, lightweight, low footprint publish/subscribe messaging protocol designed for low bandwidth and high latency networks, allowing a single server to process and transmit one million messages in a second with a millisecond level of latency!

At the centre of the solution is an MQTT broker that is accessible over the internet. For data acquisition in remote locations and at plant level, an 'edge instance' is required to collect data, and to publish the data to the broker. The MQTT protocol works on a publish/subscribe principal with MQTT brokers playing post-office for the data.

Security of the system is assured by several features.

- No open inbound ports are required on the plant side if you only want to publish data.
- Multiple edge instances connecting to single or multiple brokers allow for zoning, segregation and secure conduits based on the IEC 62443 architecture.
- All transmitted data is encrypted and user and password authentication are required.

Sparkplug B is a specification for MQTT that defines how data is sent and received allowing context to be created at the lowest level at the plant or sensor. Usage is expanding rapidly, as many software OEMs are enabling MQTT on their technology.

Real-time remote online monitoring of industrial assets

MQTT allows remote asset monitoring from anywhere on the globe and includes:

- Dashboards, recording history, trends, reports, notifications and alarms
- Information available on a PC, tablet or smart phones
- Allows end clients access to information via cloud or on-premises architecture.

Any type of asset characteristic can be monitored and recorded, be it vibration, stress, temperature, flow, pressure or energy consumption or behaviour.

Offline condition monitoring with automated upload

Mobile applications and devices are available for offline monitoring, with the ability to buffer and upload data once a network connection becomes available.

High level KPI dashboards

Augmenting existing control systems by adding additional IIOT information provides an overall picture of plant performance visualised on high level KPI dashboards.

An industrial information and analytics platform based on a central MQTT broker architecture allows the acquisition and collation of information from multiple systems, instruments and application to:

- Eliminate point-to-point spaghetti interfaces between applications
- Break down data silos
- Provide a central place for users and applications to access information via standardised communication protocols.

By leveraging the power of IoT technologies, particularly IIOT and MQTT, organisations can now proactively monitor the condition and performance of their valuable assets, even in remote areas. □

Using the MQTT networking platform and IIoT technologies, organisations can monitor plant and assets from anywhere.

For more information contact Gerhard Greeff, Divisional Manager PM&C, Iritron.
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Industry 4.0 – transforming the electro-mechanical landscape

Wesley Vorster, Product Manager, ACTOM

The electro-mechanical industry is being transformed fundamentally by Industry 4.0, ushering in more efficient and innovative practices. Increasingly, companies are integrating automation and artificial intelligence (AI) to optimise manufacturing processes, enhance productivity and deliver better solutions to clients.

This technological evolution is not optional but essential for companies to remain competitive in a rapidly changing marketplace. Industry 4.0 marks a paradigm shift driving industry players into a digital future where they can thrive in an increasingly digitised environment.

Introducing advanced technologies in automation, the Internet of Things (IoT), data analytics and AI, Industry 4.0 is reshaping the electro-mechanical industry, as these technologies create an intelligent digital connection to historically analogue equipment. This assists companies to increase efficiencies, sustainability, and safety of their equipment.

Automation and AI also play a key role in achieving high and continually-improving overall equipment effectiveness (OEE) metrics, in turn, optimising manufacturing processes and enhancing productivity. Constantly evaluating these metrics using AI algorithms can improve many aspects of the manufacturing process. For example, it can assist in reducing downtime, optimising performance, enhancing quality control and enabling efficient changeovers, all through data-driven decision making.

Increasing profitability

Real-time data analytics enable organisations to analyse market trends, customer behaviour and operational performance to identify opportunities to improve, optimise resource allocation and, over time, increase profitability.

Digital transformation enables companies to gather more data about their equipment and processes, and AI is key to learning how to improve, progress and evolve into the next industrial revolution. This is a core requirement for traditional electro-mechanical companies to remain relevant in a market that demands increasingly innovative solutions.

Generally, South African businesses and companies in other parts of the continent are making steady progress in adopting Industry 4.0 and this is an exciting era, underscored by large-scale research and development to find solutions to our unique environmental challenges. Organisations are beginning to see the potential benefits and value these solutions could bring to them and their customers.

The electro-mechanical industry can benefit from embracing the smart technologies of Industry 4.0.

However, the uptake of digital transformation is to some extent hindered by the prevailing skills gap in the electro-mechanical sector, as well as a fear of change, infrastructure challenges and a lack of access to capital for many smaller companies. Large organisations, alongside government initiatives, are at the forefront of Industry 4.0 adoption as they endeavour to stay competitive on the international stage.

Overcoming resistance

Perhaps the biggest challenge for organisations adopting these new technologies is winning the 'buy-in' from internal stakeholders. To overcome resistance to change, organisations need to ensure every stakeholder understands the value of the solutions. Resistance can manifest in various forms, from a lack of capital commitment to perceived job uncertainty. It is up to the leadership team to explain how the new technologies can enable the organisation to reach its goals.

Companies can harness the full potential of digital technologies to drive sustainable growth in the electro-mechanical sector by using in-house experts. Additionally, they can benefit from engaging the services of a capable consultant to develop smart technologies that complement existing processes, products and services in a way that adds real value for stakeholders. Knowing which solutions will have the biggest impact on an organisation's goals should determine the priorities in selecting the steps to progress.

Companies like ACTOM Smart Technologies, a leading provider of Industry 4.0 solutions, can help organisations adapt, innovate, and prosper in the digital age, and at the same time, optimise efficiency, sustainability, and safety. ACTOM Smart Technologies is a trusted partner for businesses looking to embrace digital transformation, automation, and a culture of innovation. It offers tailored solutions that add value for clients and ensure long-term success. □

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

The potential of AI-powered engineering

USA-based Altair, which operates globally, is a leader in computational intelligence, providing cloud solutions in simulation, high-performance computing, data analytics and AI. Participating at Hannover Messe 2024, held in April in Hannover, Germany, the company demonstrated, among other things, the power of artificial intelligence (AI)-powered engineering. In a market where the industry has used commercial simulation software for decades, Altair's AI-powered engineering introduces technology that democratises AI across the product lifecycle, empowering users and organisations of all sectors and sizes to revolutionise simulation-driven innovation.

At the show, Altair demonstrated how companies can succeed in their digital transformation journeys, focusing on four key areas: AI-powered engineering, simulation-driven design, AI on the factory floor, and digital twin technology.

AI-powered engineering

Altair's AI-powered engineering technology – including generative design – can harmonise lightweight design, functional requirements, and manufacturability. At Hannover Messe the company demonstrated how AI-powered engineering accelerates computer-aided engineering (CAE) processes and outcomes, delivers rapid physics predictions, enhances shape recognition, design generation, and design optimisation, and more.

Simulation-driven design

Despite finite element method (FEM) software being commercially available for half a century, the main bottleneck in development is still in transforming a CAD design into a simulation model. Altair's solution enables designers and engineers to integrate simulation into the design process, informing the direction from the beginning and achieving performance targets quickly. Its simulation-driven design offers a smarter approach to product development, enabling innovation at lower cost.

Altair provides data solutions to assist organisations in scaling AI initiatives on the factory floor.

AI on the factory floor

While most companies are investing or planning to invest in data analytics and AI, recent data shows that only 13% of companies excel at delivering on their data strategy. At Hannover Messe, Altair featured data solutions that scale AI initiatives without requiring a big team of data scientists or expensive service engagements. Its data analytics platform optimises supply chains, helps plan maintenance, and optimises warranty processes.

Digital twin technology

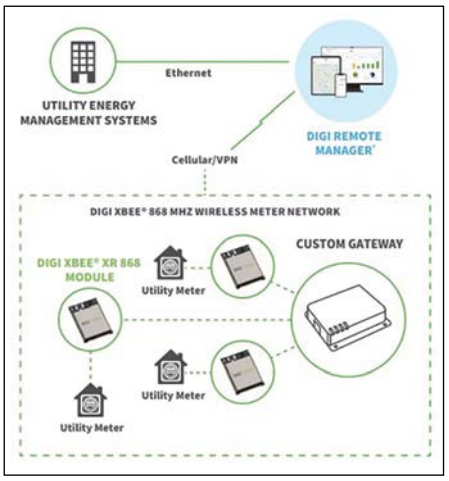
The company also showcased its digital twin capabilities and offered live demonstrations displaying its solutions in action. Additionally, visitors were invited to taste 'the most sustainable coffee' at Hannover Messe, produced by Altair and Gruppo Cimbali's innovative, digital twin-powered coffee machine. □

Local products and support for system design

In South Africa, TRX Electronics is the authorised independent representative for Mouser Electronics, Inc. Mouser is one of the largest global distributors of semiconductors and electronic components, specialising in prototyping (no minimum order) quantities for engineering design and new product development. Through TRX Electronics, customers can buy electronic components from Mouser Electronics with delivery to South Africa, and receive dedicated customer service and local support.

Among other products newly available from TRX Electronics are: Infineon CoolSiC™ Automotive 1 200 V SiC Trench MOSFETs, Digi XBee® XR RF modules, and the Bosch BHI360 Programmable IMU smart sensor system.

Digi XBee® XR 868 RF modules support the deployment of long-range connectivity applications. The RF modules operate between the 863 MHz and 870 MHz frequency range and support point-to-point and mesh networking protocols. The Digi XBee XR 868 modules leverage 868 MHz and surrounding frequencies for Listen Before Talk and Adaptive Frequency Agility (LBT + AFA). This reduces interference by listening to the radio environment before any transmission starts and automatically shifting to a new channel when interference is detected. The modules offer a line-of-sight range of over 14 kilometres. They feature DigiMesh® networking topology for redundancy and reliability. They operate within the temperature range of -40°C to +85°C and are RoHS compliant. Simple configuration using Digi XCTU accelerates time to market. The Digi XBee® family RF modules are designed to leverage wireless technology with the right combination of expertise and resource.



Application example of the Digi XBee® XR 868 RF modules.

For more information visit: www.trxe.com

Andrew Owens, Lead for Interconnection & Peering at Teraco.

NAPAfrica introduces network time protocol service

Africa's leading Internet eXchange Point (IXP) and the sixth largest exchange globally, Teraco's NAPAfrica will offer clients a network time protocol (NTP) service using Adtran's Oscilloquartz synchronisation technology. This will provide them with highly accurate, secure and reliable time-as-a-service (TaaS), enabling organisations to meet strict timing requirements.

"As we empower our clients with precise timing capabilities, Teraco is also using this solution to synchronise its own data centre interconnect network and systems. Now available at ntp.nap.africa, this new NTP service provides enterprise clients with a more efficient, scalable, and cost-effective route to network synchronisation and an alternative to investing in their own timing and synchronisation infrastructure," says Andrew Owens, Lead for Interconnection & Peering at Teraco.

"The timing platform is set to accelerate the growth of digital services across Teraco's regional footprint. From optimising IoT processes in the manufacturing sector to providing precise time information needed for low-latency operations, the benefits will be far-reaching," Owens says.

Teraco collaborated with Adtran and NEC XON for the deployment of Adtran's OSA 5412 platform. This versatile grandmaster clock and NTP server with multi-band GNSS capabilities ensure the delivery of precision timing for network operators, utilities, financial institutions, government agencies, and others.

"Teraco's offering is now available to a wide range of businesses, giving operators access to an accurate, robust timing and synchronisation service at the push of a button," says Stuart Broome, GM of EMEA sales at Adtran.

NAPAfrica has consolidated its position as the cornerstone in addressing the internet, communication, and cloud adoption needs of organisations. The surge in network demand and the substantial investments in critical telecoms infrastructure across Africa have contributed to NAPAfrica's growth. This expansion has happened in tandem with the continent's rising demand for cloud services from organisations such as Akamai, Amazon Web Services, Cloudflare, Microsoft Azure, and Zscaler.

Enterprises are capitalising on peering advantages within the NAPAfrica ecosystem, connecting with cloud deployments, content providers, networks, and security providers to transition towards a more streamlined digital economy. □

Next generation distributed control system

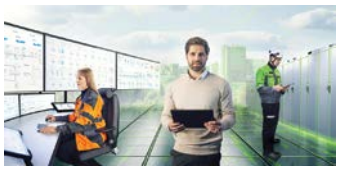
With the introduction of its next generation distributed control system (DCS), the Valmet DNAe, Valmet is taking process automation further.

The fully web-based process control system incorporates a new cybersecure system architecture, control software and hardware, engineering and analytics tools, helping customers improve efficiency, productivity, sustainability and safety in their operations.

"The new Valmet DNAe represents a major milestone in process automation. It provides a solid platform for moving towards more digitalised, autonomous operations, helping our customers thrive in the changing business environment. In the development of this new system, we have focused on usability and performance, with a modular approach that also enables upgrade paths from our previous generation systems," says Emilia Torttila-Miettinen, President, Automation Systems business line at Valmet.

As the company grows its automation business, this new system will enable Valmet to continue to extend its automation solutions to a wider base of process industries globally.

Valmet DNAe is a web-based process control system engineered for demanding process control.



For all process automation applications

Valmet DNAe is designed to empower people to perform better and collaborate more easily across an organisation. The system provides a common user interface for controls, analytics, configuration, and maintenance. Intuitive workflows simplify operations and enable users to manage larger process areas with less effort. Advanced analytics tools enable real-time and historical data to be translated into actionable insights. Additionally, the new web-based configuration environment provides a unified environment for all engineering needs, from office to field, enhancing flexibility in configuration and maintenance tasks. These features are designed to help customers increase their operational efficiency.

Advancing digitalisation and autonomous operations

Valmet DNAe has been engineered for demanding process control. The system empowers users to run industrial applications seamlessly, on premises, at the edge server, or in the cloud. It features a scalable, redundant data platform, granting easy and controlled access to all data. The system architecture is cybersecure by design, with role-based access control, authentication, audit trail and encryption mechanisms for proactive prevention of cyber threats. With smooth OT/IT connectivity through secure communication interfaces with external systems, Valmet DNAe establishes a robust base for advancing digitalisation and autonomous operations.

Step-by-step upgrade paths

Key in the development of Valmet DNAe has been to make it easy for the company's existing process automation customers to benefit from the latest technology.

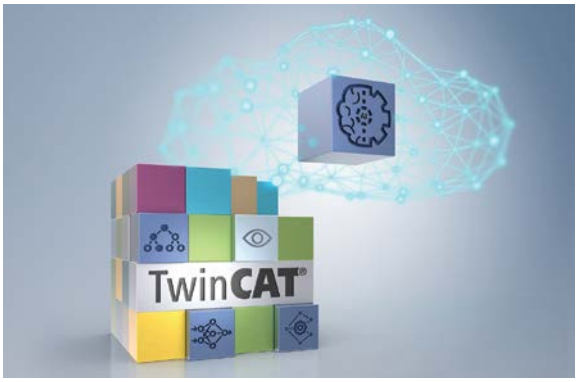
"This enables flexible step-by-step upgrade paths for cost-efficient system evolution," says Torttila-Miettinen. □

Automated creation of AI models

TwinCAT Machine Learning Creator from Beckhoff is designed for automation and process experts and adds the automated creation of AI models to the TwinCAT 3 workflow. This allows users to handle the entire process, from data collection to the trained model, themselves – without any AI expertise of their own. The finished model is optimally adapted to real-time requirements in the control environment in terms of latency and accuracy.

A prime application for the versatile TwinCAT Machine Learning Creator (TE3850) is in AI-supported image processing for quality assurance. This, as well as various other applications, taps into the ease and standardisation of creating AI models for automation through Beckhoff's no-code development platform. It leverages open standards, interfaces, and best practices, and provides the trained models in the open standard format ONNX. The latency-optimised AI models for control applications are specially adapted to run on Beckhoff Industrial PCs and with TwinCAT products, although they can also be used as ONNX models beyond the Beckhoff product world.

With TwinCAT Machine Learning Creator enabling fully automated creation of AI models, the potential of artificial intelligence is available to all – including smaller companies – offering a competitive edge and a solution for the growing shortage of specialist skills. For seasoned AI experts, this solution serves to streamline their workload considerably, and to minimise the potential for errors.



TwinCAT Machine Learning Creator facilitates the automated training of AI models for industrial applications.

The ability to speed up project development processes offers another clear advantage in that the development tool provides extensive and transparent methods for displaying the behaviour of the models created and comparing them with each other. Users can also benefit from automated report generation, which supports auditing processes for AI model creation. Another important aspect is that the required application-specific data remains protected, as it does not leave the company.

For more information visit: www.beckhoff.com

Robust connector hoods for HDC connectors

Heavy duty connectors (HDCs) are robust industrial connectors designed to transmit electrical power, data and signals in harsh environments. In some production and processing plants, selecting suitable HDC connectors can be a challenge. For such applications, Transfer Multisort Elektronik (TME) recommends the Han-INOX® series from HARTING, one of the leading suppliers of industrial connectors for machines and industrial installations. The Han-INOX® series is designed for chemical resistance and mechanical durability.

TME has expanded the range of Harting Industrial HDC connectors it offers to include solutions from the Han-INOX® series. The product group includes connector hoods in sizes: 6B, 10B, 16B and 24B, which are compatible with other products from the supplier, such as Han® inserts and Han-Modular® frames.

General specification

The Han-INOX connector hoods are made from stainless steel and, consequently, can be used in environments where they may come into contact with corrosive substances. With a well-fitted cable gland, the connection provides a high degree of protection (IP65/67), which means it is fully dust-tight and resistant to water or moisture ingress, as well as to pressurised water jets.

Fully compatible with the Han® industrial inserts and Han-Modular® inserts, the Han-INOX® hoods can support several different solutions offered by HARTING: they can be used in signal, power and measurement applications as well as with data transmission cables (in industrial Ethernet systems, for example) and compressed air hoses.

Harting's Han-INOX connector hoods can be used in wide-ranging industrial applications.

For the toughest environments

The use of stainless steel as a construction material provides a suitable response to the requirements of the food processing, chemical and pharmaceutical industries, among others. Additionally, the high IP rating means the Han-INOX® products can be used outdoors (and exposed to precipitation) and applied in heavy machinery, in the shipbuilding industry and ports, for example. Connectors that offer this level of durability can also be washed with pressure washers or used in automated car washes.

The Han-INOX® products across the range of sizes include hoods with a side or top cable entry. With this diversity and their compatibility with other types of HARTING connectors, the INOX hoods can be used for new installations or to update or modify existing installations.

For more information visit: www.tme.eu/za/en

igus robolink makes automation easy and affordable.

Automating precision tasks

The new low-cost modular robotics kit from motion plastics manufacturer, igus, makes automation easy and affordable for manufacturing companies in South Africa.

robolink components can be arranged for various tasks and offer a cost-effective means of ensuring more efficient processes. The robotics kit provides a solution for precise gripping, turning, pivoting and placing items and returning them to their initial position and is ideal, for example, for automating simple pick-and-place tasks that are performed continuously over long periods of time.

igus South Africa Managing Director, Ian Hewat, says the kit suits small and medium-sized enterprises that are increasingly exposed to external competitive pressure. "Our robolink modular robot joint kits give manufacturers easy and cost-effective entry into the world of automation."

Highly configurable

The robolink range of products offers low-cost components made of lubrication-free and maintenance-free plastics. The modular kit principle means the user can create a simple automation solution in a short time. In addition, the user can put together systems individually – with single components such as gearboxes that can then be combined, or with fully pre-assembled articulated arms; their lightweight construction and size make them especially flexible.

"With the possibility of modular combinations, the customer receives a system that can be used for various robotics tasks. A key advantage of robolink is that it provides for repetitive and time-consuming tasks that are mostly performed by hand to be automated easily. And it can be done at a fraction of the cost of a classical industrial robot. In this way, better and more efficient use of resources can be made," says Hewat.

He says the robolink modular kit enables the user to assemble a system consisting of joints with different gearboxes, motors and connecting elements. The robolink D joints are the moving connecting pieces that are located between the robot arm's individual connecting plates and are operated with a direct drive and a stepper motor.

Made to last

Different joint sizes with worm gears or strain wave gears are available. In the case of worm gears and strain wave gearing, the motor is located directly on the axis and, depending on the application, can be installed as a waterproof motor – for instance, where spray water occurs. The joints can be operated with motors from other manufacturers, or those obtainable from igus.

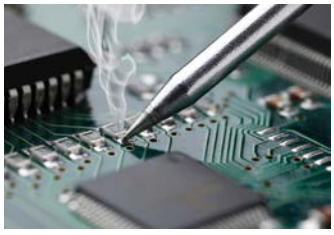
As all robolink components are also available as individual joints, they can be combined with each other or with special components as well as with highly durable drylin E kits for gantry robots. For example, a multi-axis articulated arm can move on a lubrication-free drylin E linear axis. The robolink D connecting elements link the robot arm's individual joints to each other. They include the base with which the robot can be mounted on a surface and the connecting elements for joints.

The robolink joint systems are available as ready-made robot arms with two to five axes. The modularity of the kit allows for them to be extended and adapted as often as required as all components are also available as individual units. This provides maximum flexibility in the automation process and makes it possible to construct an articulated joint system according to individual needs. Flexible additions include control units, grippers, suction and other components.

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

A single source for electronic products, services and design tools

RS provides an extensive range of electronics technologies including semiconductors and soldering equipment.



RS South Africa, a trading brand of RS Group plc, a global provider of product and service solutions for industrial customers, recently profiled its range of more than 250 000 electronic products.

"Electronics has been at the heart of our business for over 80 years, and we still help our customers source the products, services and design tools they need to get the job done," says Erick Wessels, RS Sales Director. "From board level components to development kits, connectors, or displays and optoelectronics, RS has a comprehensive range of products from over 700 electronics manufacturers including leading brands such as TE Connectivity, Amphenol, Molex, Infineon, ST, Microchip, Renesas, ams OSRAM, SEGGER, Würth Elektronik, and ebm-papst."

Key technologies for electronics available from RS include: semiconductors in small pack and bulk options, passive components for electronics design, and displays and optoelectronics, including LED lighting parts, couplers, and indicators; plus development tools and kits, such as evaluation boards, emulation and simulation tools, programmers, prototyping tools and accessories; connectors, such as power, signalling and data connectors for board, panel and machine level applications; on- and offboard power supplies; and soldering, ESD control, test and measurement, and electronic tools.

In addition, the DesignSpark community connects over a million like-minded engineers from all walks of life, using RS's design resources to improve productivity and innovate responsibly. They use programming software, CAD libraries, and tech updates made available by RS. □

Listed among the continent's fastest growing companies

Andrew Cruise – Managing Director, Routed.

Integrated cloud platform provider, South Africa-based Routed, has again been recognised among the continent's fastest growing companies – in the FT/Statista 2024 rankings.

In the announcement of the third annual *Financial Times'* rankings of Africa's Fastest Growing Companies, Routed made the list for the second successive year, ranking 98th in the overall ranking and 14th in the category for IT & Software Services.

The FT/Statista 2024 annual ranking of Africa's fastest growing companies looks at a range of industries, ranking them based on the common denominator of their compound annual growth rate (CAGR) in revenue.

"With fewer than half the companies that were listed in 2023 making the grade again in 2024, Routed's second successive annual ranking is a significant achievement," says Andrew Cruise, Managing Director at Routed.

He points out that cloud computing remains one of the biggest trends in 2024, adding that Routed has built its business on addressing all enterprise cloud, recovery and modern application development requirements.

"The cloud market is continuing to grow exponentially and our work in this space has helped us to make the FT list again. Today, Routed is positioned as one of the best cloud providers in the local market, as a result of the trust we have built up with channel partners, and our ability to enable a seamless cloud journey," he says.

"We describe ourselves as a service provider to service providers, and our strong cloud skills and experience, together with our commitment to our customers, are factors that have helped us build our business into one of the best subscription-based private cloud platforms available."

Cruise adds that Routed's ability, working with its partners, to deliver some of the most complete VMware cloud-based infrastructure deployments available locally is a key driver of company revenue.

He notes too that as a South African company, Routed is in a position to deliver personalised, local support when clients need it. This is backed up by a team of local experts who understand the local business environment and local organisations' needs and are well-equipped to deal with issues promptly.

He says, "Routed is thrilled to be recognised again by the FT for its continuing growth." □

Sabine Dall'Omo, CEO of Siemens Sub-Saharan Africa.

Enabling the energy transition in Africa

There are a number of factors that will play a role in enabling a successful energy transition in Africa: policies, technologies, people, skills, infrastructure and finance are among them. Just ahead of Enlit 2024, Leigh Darroll, Editor of* Electricity + Control*, spoke to Sabine Dall'Omo, CEO of Siemens for Sub-Saharan Africa, about the elements that Siemens sees as essential primary steps to support the success of the transition.

Looking first at the energy transition in South Africa, Dall'Omo says Siemens' focus is aligned with the priorities set out in the Just Energy Transition Implementation Plan 2023-2027, as published by the Presidency in November 2023[1]. This encompasses six defined portfolios: Electricity Generation, Transmission & Distribution; Mpumalanga in the Just Transition[2]; New energy vehicles (NEVs); Green hydrogen (GH_2); Skills; Municipalities.

A practical perspective

Addressing the practicalities of implementation in this context, Dall'Omo says key focus areas for Siemens are in grid enablement and municipalities where new digital technologies and new skills to implement, use and manage them can make a significant difference and – most importantly – support effective revenue collection. This, she emphasises, reduces the burden on the fiscus and is fundamental to enabling investment into infrastructure development and, equally, infrastructure maintenance. "Municipalities manage the 'last mile' of the distribution network connecting to businesses, industry, households. Here, digital technologies like meter data management (MDM) can help municipalities to limit non-technical losses – or illegal connections – to ensure accurate meter readings and accurate billing, and this in turn builds trust between the utility and the consumer," Dall'Omo says.

Digital technologies can also make a difference in enabling centralised and real-time monitoring and control of assets. From a central control centre, municipal utilities can keep track of assets, identify and locate problems online, without having to wait for the customer to alert them to an issue, and dispatch maintenance and repair teams efficiently. Thus, digital technologies provide for more efficient use of resources and a better service to customers.

"If we look at Africa more widely," Dall'Omo says, "although the challenges are unique in each country and for each utility, the problems of illegal connections, inaccurate billing systems, poor revenue collection and a lack of trust between users and the utility supplier are widespread. When electricity networks are managed non-digitally using paper-based manual systems, illegal connections – tapping into the grid without paying – are quite easy. So there is significant scope for Siemens to make a difference, to support more efficient management of electricity distribu-

With the microgrid installed, Upper Blinkwater in the Eastern Cape, a small remote village never previously served by the national electricity supply grid, now has access to electricity.

tion, accurate billing, and consistent revenue collection."

Dall'Omo notes that different countries take different routes to progress. In Botswana, for example, when the country experienced a drought through 2016/2017 which severely affected water supply, this led the government to invest in new infrastructure and it recognised the value of digital technology to enable it to better manage such impacts in future. Botswana is adopting a similar approach in extending and improving its power infrastructure.

Siemens is also active In Kenya, Ghana and Nigeria, for instance, all countries that are adopting digital technologies because of the benefits they offer. Nonetheless, each country presents particular obstacles too. She reiterates that meter data management based on digital systems offers the best form of return on investment – enabling revenue collection and in turn maintenance and the development of new infrastructure. She indicates however, that funding is generally a challenge, whether for upgrading technologies or investing into the grid.

Investing in the grid

Noting that so much focus has gone into increasing generation capacity, and certainly successes have been achieved there, Dall'Omo emphasises that it is as important to invest in the transmission grid and electricity distribution networks, to enable new grid connections – especially for renewables – to ensure delivery and enable a return on that investment.

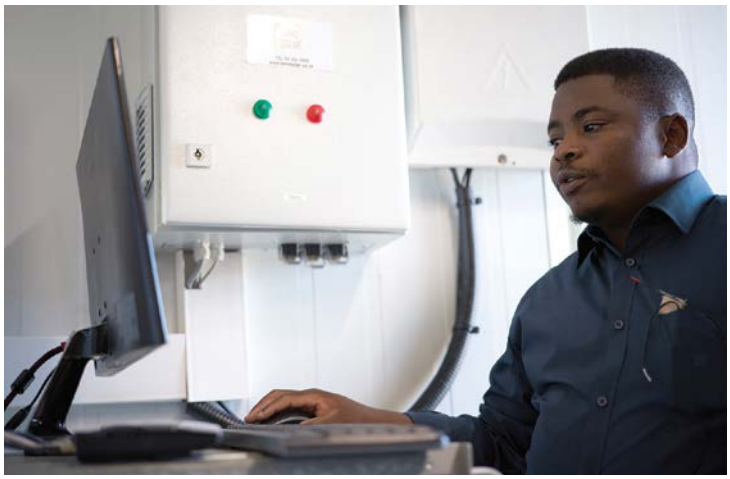
From a practical perspective, it is essential also to attend to issues such as lightning protection – from power lines to substations to mini-substations at the point of consumption.

Microgrids too, play an important role, especially in extending access to remote communities and to remote sites like mines, and in enabling independent embedded generation for individual industrial sites or industry clusters. Dall'Omo notes that Eskom is doing a lot of work in this area, extending access to electricity for communities that have not had it before now. Siemens has also been involved in a few microgrid projects – at Upper Blinkwater in the Eastern Cape for one example. "In this small, remote village, having electricity for eight hours a day when the sun is shining to power the PV system, makes an enormous difference in what the villagers can or can't do."

Access to electricity can be life-changing, enabling education, connectivity, small businesses, cold stores, seemingly simple but significant changes. In this project, developed in partnership with Lamo Solar, the Eastern Cape Provincial Government, the Federal state of Lower Saxony in Germany and the German international cooperation and development agency GIZ, it is important to note that the community takes responsibility for maintaining the microgrid on an ongoing basis.

This brings us back to the concerns around skills and financial management (poor revenue collection) at the last mile of the distribution network municipal level, which hinder investment in development. In South Africa, she points out, there are constraints on the extent to which the private sector can get involved to assist in sharing skills and developing capacity within municipal structures as all projects are subject to the PFMA (Public Finance Management Act) and strict budgeting processes are managed by National Treasury. "We know the law and the statutory regulations are in place for good reason, but they raise multiple roadblocks to the possibilities of providing support and fast-tracking implementation," Dall'Omo says.

The microgrid incorporates a 75 KWp photovoltaic (PV) system, a diesel generator, and a battery storage system, all controlled by a Siemens SICAM Microgrid Controller.



Importantly, the Upper Blinkwater microgrid is maintained by people in the community.

She emphasises that we need to invest in long-lasting solutions rather than patching an ailing system, which is generally where we are now in most municipalities in South Africa.

MV and LV products

Siemens has a portfolio of medium voltage and low voltage products which support grid management at national and municipal levels. It supplies grid protection equipment, digital technologies that provide for centralised monitoring and control of transmission and distribution networks and meter data management, systems to support microgrids – such as inverters and inverter skids, and digital microgrid controllers – whether for rural electricity or energy independence for industry.

Dall'Omo highlights that industry in SA and Africa is increasingly responding to growing demand in global markets for low-carbon production and this is motivating the move to energy independence, the use of renewable energy, and a shift to microgrids, which enable businesses to better manage their emissions.

All Siemens products support energy efficiencies, reduced energy usage and reduced costs. Across its portfolio of drives, relays, switches, switchgear and more, its products are designed to optimise energy efficiency and are supplied with energy consumption certificates, which provide customers the confirmation that they are using energy-efficient products. Siemens also supports circularity in its own production – conserving resources and using recyclable materials among other things – and in this regard too it provides product certificates for customers, supporting them in the international market.

The company has recently introduced a product designed to measure CO_2 emissions in production processes and this can provide a direct feed into ESG (environmental, social and governance) reporting, now a requirement for most international markets. It provides auditable numbers, which are tracked automatically, to inform ESG accounting and audits. Siemens has seen a major uptake of this new product, especially among the multinationals with which it works.

She notes that in South Africa the transition to greater use of renewable energy and hybrid systems in industry is also supported by the amended electricity regulations which allowed for uncapped private generation. This drew a huge response from industry, with the development of independent power generation at bigger and smaller scale, and now, 18 months on, we are seeing the benefits of that private investment. SA can gain more from investment in green resources, she says.

In closing Dall'Omo emphasises again the importance of consistent revenue collection in municipal utilities and how digitalisation and meter data management can make a big difference here. She says appropriate SCADA (supervisory control and data acquisition) systems should be installed to manage municipal networks. These are fundamental: providing for control centres to be automatically and immediately alerted to any outages, to dispatch maintenance teams accordingly and restore supply more quickly. This supports more uptime, a better service for customers, and more consistent and stable revenue for the utility – delivering a sound return on investment.

She notes: "During the pandemic we learned the value of staying connected and informed – and this is evident now in the continuing development of data centres, in South Africa and across the continent, to handle increasing digitalisation and the flow of data in almost all sectors of the economy." □

The JET Implementation Plan was developed from the Just Energy Transition Investment Plan[3] which was prepared by the Presidential Climate Commission and maps out South Africa's Just Energy Transition. It states that the country seeks to build a pathway towards a low-carbon and climate-resilient society; to decarbonise the economy within the target range (of SA's nationally determined contribution to emissions reductions) of between 350 and 420 Mt CO_2 equivalent by 2030; and to implement a transition that: Protects vulnerable workers and communities; Builds energy security; Expands energy access; Promotes industrial development; Drives innovation; Develops sustainable livelihoods; Enables economic diversification; Spurs inclusive economic growth; and is aligned with SA's NDP and the Just Transition Framework.

References

[1] https://www.stateofthenation.gov.za/assets/downloads/JET%20Implementation%20Plan%202023-2027.pdf

[2] considering the impact the planned shutdown and repurposing of coal-fired power stations will have on related jobs and communities in Mpumalanga, the need for new skills, and the potential migration of skills to other provinces where renewable energy resources are located;

[3] https://www.stateofthenation.gov.za/assets/downloads/climate/South%20Africa%20JET%20IP%202023-2027%20At-a-Glance.pdf

For more information visit:
www.siemens.com/global/en.html

Understanding the value of battery energy storage

Lance Dickerson, MD of REVOV.

Lance Dickerson, co-founder and MD of REVOV, points out that in investing in solar energy generation – government institutions, corporate organisations, other investors, households too – need to recognise the importance of battery energy storage, which is essential to avoid losing a significant share of that investment.

Although South Africans have witnessed a welcome stretch of stable electricity supply – more than 50 days without loadshedding at the time of writing – Eskom has stated that it is not yet in the position it wants to be with regard to energy availability and the performance of its fleet, and Minister in the Presidency for Electricity, Dr Kgosientsho Ramokgopa has consistently said that the country needs to build more generation capacity.

Investment in new solar (and wind) energy generation capacity continues and here Dickerson emphasises that a concomitant investment in battery energy storage systems (BESS) is critical to addressing energy security in South Africa, no matter the size of the generation investment.

He notes that the national electricity regulator, NERSA, has recognised this, but understanding its importance is not yet widespread in the marketplace. Referring to NERSA's warning, he says the regulator highlighted the R7.8 billion investment in solar power generation facilities, including three commercial solar generation facilities, at a value of R1.7 billion, in the last quarter of 2023. And by comparison, NERSA said only R4 million – or 1 MW – was invested in battery energy storage.

This is a problem, even though it is only half the problem, Dickerson says. "Solar panels work to convert solar energy into electricity when the sun is shining – but that is for only half the day, at best. More likely for about six hours, if the sunrise and sunsetting hours are excluded.

If there are no batteries, none of the electricity being produced is saved. When the grid needs the electricity generated, it can be fed into the grid, but when the grid does not need the supplementary power, it is lost."

The three commercial solar generation facilities registered by NERSA in the last quarter of 2023, have a total capacity of 77 MW. If one of those is a 50 MW solar plant, it is not simply producing 50 MW and feeding it into the grid. (Apart from the issue of grid access, which in this example we assume to be in place) that solar plant will produce only what is demanded of it, which may be 1 MW. The other 49 MW is merely hypothetical, Dickerson says.

This is where batteries are critical. A bank of batteries and an inverter configured for a 50 MW facility could feed say 25 MW into the grid if the grid demanded that, and 25 MW would be stored in the batteries, instead of being wasted. This also means that, especially during peak demand periods, 6am to 9am and 5pm to 9pm, the energy stored in the batteries could serve to cover a potential shortfall in the national utility's generation capacity.

Dickerson says in many cases, at smaller and larger scale, batteries and inverters are not considered and the focus is only on the solar panel installation or developing the solar farms.

He emphasises that it is in the engineering of batteries and inverters that the real value lies and says the billions of rand invested in solar generation projects without batteries represents an inordinate waste of money. In his view, one third of the amount could have been invested, with an equivalent investment in battery energy storage, to achieve the same impact and provide a fully backed up buffer to cover peak demand periods and limit load shedding.

He says installing solar panels without installing batteries represents an eyewatering waste or money and energy – every day. Although the panels may serve well in supplying the energy demand during the daylight hours, the plant could better serve to bridge the gaps in Eskom's capacity when they occur, and provide a backup when Eskom needs to replenish its energy reserves. □

High voltage battery energy storage technology is applicable and scalable across various sectors.

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

Batteries are growing fast in the energy sector

Many clean energy technologies are growing very quickly – but none faster than batteries, which are set to play an increasingly important role alongside renewables and electrification in the global transition away from fossil fuels. This is according to a special report published by the International Energy Agency (IEA).

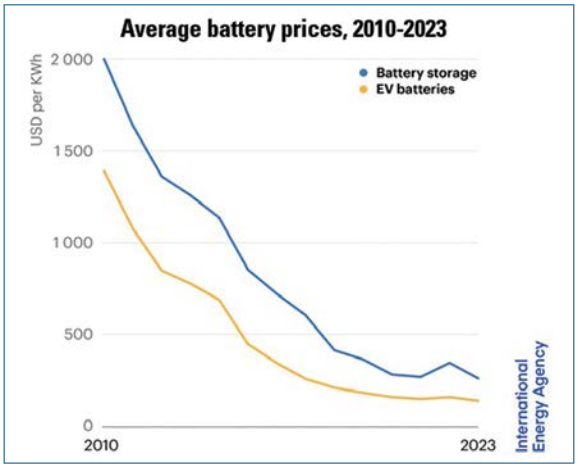
Batteries and Secure Energy Transitions – the first comprehensive analysis of the battery ecosystem – finds that in less than 15 years, battery costs have fallen by more than 90%, one of the fastest cost declines seen in clean energy technologies.

The most common type of batteries, those based on lithium-ion, have typically been associated with consumer electronics such as smartphones. But today, the energy sector accounts for over 90% of overall battery demand. In 2023, battery deployment in the power sector increased by more than 130% year-on-year, adding a total of 42 gigawatts to electricity systems around the world.

In the transport sector, batteries have enabled electric car sales to surge from 3 million in 2020 to almost 14 million last year, with further strong growth expected in the coming years (as noted by the IEA in its recent *Global EV Outlook*).

Nonetheless, beyond this rapid growth, according to the IEA's special report on batteries, battery deployment will need to scale up significantly between now and the end of the decade to enable the world to get on track to achieve its energy and climate goals, including those set recently at the COP28 summit in Dubai. In this scenario, which aims to triple global renewable energy capacity, double the pace of energy efficiency improvements, and transition away from fossil fuels, overall energy storage capacity rises sixfold by 2030 worldwide, with batteries accounting for 90% of the increase.

The report highlights that the versatile nature of batteries means they can serve utility-scale projects, behind-the-meter storage for households and businesses and provide access to electricity in decentralised solutions like mini-grids and solar home systems. Moreover, falling costs for batteries are fast improving the competitiveness of electric vehicles as well as storage applications in the power sector.



In less than 15 years, battery costs have fallen by more than 90%.

The IEA's Special Report on *Batteries and Secure Energy Transitions* brings together the latest data and information on batteries from around the world, including recent market developments and technological advances. It also offers insights and analysis on leading markets and key barriers to growth. Looking at the entire battery ecosystem, from critical minerals and manufacturing to use and recycling, it identifies synergies and potential bottlenecks across different sectors. The report also highlights areas that call for greater attention from policy makers and industry.

For more information visit: https://www.iea.org

New single-phase, GV UPS models

Global provider of critical digital infrastructure and continuity solutions, Vertiv, has introduced an extension of the Vertiv™ Liebert® GXT5 lithium-ion double conversion, online uninterruptible power supply (UPS) system for 5 kVA to 10 kVA global voltage (GV) (200 V to 240 V; default 230 V) applications. This expansion of the Liebert GXT5 lithium-Ion line to 10 kVA (from 1 to 3 kVA) rounds out the Vertiv portfolio of lithium-ion UPS systems and solutions for the network edge. The new 5 to 10 kVA GV models are now available to the Europe, Middle East and Africa (EMEA) region.

The Liebert GXT5 lithium-ion models are designed for the smaller spaces typical of the network edge, with a convertible rack/tower design and only a 3U (5 kVA to 10 kVA UPS) rack height. The new models include an integrated maintenance bypass cabinet preserving additional rack U-space. All Liebert GXT5 lithium-ion UPS systems are supplied with a five-year limited warranty.

The higher power density of lithium-ion batteries enables Vertiv to pack more runtime into less space compared to a UPS with valve-regulated lead acid (VRLA) batteries, and that runtime can be extended with up to eight external battery cabinets. With improved performance at higher operating temperatures and longer life expectancy, the lithium-ion batteries in the Liebert GXT5 lithium-ion model reduce the total cost of ownership by up to 50% compared to VRLA solutions. In addition, lithium-ion batteries typically last eight to 10 years, compared to about three to five years for VRLA batteries, reducing or eliminating the cost and inconvenience of battery replacements during the life of the UPS. □

The Vertiv™ Liebert® GXT5 lithium-ion UPS family now includes 5 kVA to 10 kVA GV models for critical edge deployments.

Managing power quality at a new level

Although we generally expect uninterrupted and stable electricity access, this is not always the case. For the efficient distribution of electricity to consumers, the power quality of the network is a crucial factor in ensuring a reliable power supply.

Low voltage harmonic filters address power quality issues by mitigating harmonic distortions, compensating for reactive power, and stabilising voltage levels. They are key in improving reliability, efficiency, and productivity as well as reducing downtime and costs in industrial, commercial, or residential applications.

The impact of poor power quality

Power quality issues often arise from compatibility problems between the electrical grid and a constantly changing array of electronic devices and equipment. The increasing prevalence of electronic devices, from LED lamps to personal computers, sophisticated equipment and industrial machinery, has heightened susceptibility to power disruptions.

Poor power quality can have many consequences, which may include damage to electrical installations, unexpected production downtime, inefficient production processes, and high energy consumption due to system losses. The financial implications are significant, hindering peak performance and restricting assets from meeting their full potential.

Calculating the economic effects of poor power quality can be challenging, but the consequences are clear. For instance, a power quality disruption during production in the food and beverage industry could result in thousands of spoiled products. In other cases, the malfunctioning of electrical or electronic equipment due to power quality problems can pose significant health and safety risks. Recognising these consequences underscores the need for specific action to improve and safeguard power quality.

An innovative filtering solution

For decades, passive filter technology has been the preferred solution to address power quality issues. This technology employs capacitors and inductors to filter out unwanted harmonics and electrical noise at a pre-defined frequency, providing a cost-effective solution. However, passive filtering has limitations in cancelling varying harmonics over the load range and may be less suitable for changing operating conditions. In contrast, active filter technology, pioneered by Hitachi Energy (formerly the Power Grids division at ABB) in the 1990s, actively eliminates harmonics and electrical noise in real time at nearly any frequency using electronic components, resulting in a cleaner, more stable, and safer power supply.

PQactiF is the latest technological development from Hitachi Energy. It is a low voltage active harmonic filter that raises the bar for power quality. Building on the best digital technology available, PQactiF uses sophisticated algorithms to analyse and eliminate electrical disturbances, leading to greater accuracy and efficiency in power quality management. In a single device it offers harmonic filtering and compensates for low power factor and load imbalance. This innovative solution, providing compactness, modularity, flexibility, and scalability, is suitable for residential, commercial, and critical industrial applications. □

As well as producing the turbine towers for three new wind farms in the Eastern Cape, NESA will supply 57 Nordex WTG Delta4000 series turbines to the project.

Manufacturing wind turbine towers locally

Independent power producer and leading wind turbine manufacturer, Nordex Energy South Africa has announced plans for a 75% increase in the generation capacity it currently has in operation as well as to manufacture concrete tower sections locally in the Eastern Cape, opening up to 300 new jobs in the region. This is a reflection of the growing private off-taker market – already evident in the first quarter of 2024 – and its potential to drive new investment, new business opportunities and new jobs.

Nordex Energy South Africa (NESA) indicates that the additional 830 MW of operational capacity will start feeding into the country's energy grid by mid-2025, delivering thousands of GWh per year to the private market to help drive industry and economic recovery.

David Moncasi Hortet, Head of Sales, Africa, at NESA said: "Our increased commitment in South Africa, including a significant addition to our order book and growing market share, demonstrates our confidence in the renewable energy sector here. We're focused on adding valuable energy resources to the country's grid, supporting the broader shift towards sustainable energy, and delivering jobs."

The announcement follows closely on the financial closure of EDF Renewables' Koruson 2 cluster, which includes the Umsobomvu and Hartebeesthoek wind projects (as well as the Mooi Plaats solar project), on the border of the Northern and Eastern Cape. 50 Nordex 5.9 MW turbines with a total capacity of 295 MW will be supplied to the wind projects.

Nordex has similarly confirmed its role in supplying 57 Nordex WTG Delta4000 series turbines for a R9-billion cluster of three wind farms in the Eastern Cape, with a combined capacity of 336 MW, which will make for the largest purely private renewable energy facility in South Africa.

About 1 400 keystones which will conform the 57 towers for this cluster of projects will be produced locally at a newly established manufacturing facility in Humansdorp, some 1.5 hours' drive from the Port of Ngqura. The manufacturing facility, dedicated to fabricating the 120 m-high towers, is expected to begin operations by June 2024, with the initial turbine installations scheduled for the latter half of 2024. The subsequent delivery of energy to the grid, anticipated in the second half of 2025, will contribute significantly to mitigating the country's energy shortages.

NESA is additionally tasked with the Operations and Maintenance (O&M) of the wind farms through their 20-year lifespan. This underscores the demand for skilled personnel in the sector. "To address the skills gap and meet market demand, we've introduced new generation technology that enhances unitary power and we've initiated an Internship Programme to build a pipeline of future technicians," said Zelrese Brair at NESA. □

Increasing power output from solar panels

Trina Solar's proprietary 210 mm n-type i-TOPCon module has achieved a maximum power output of 740.6 W, setting a new record and certified by TÜV SÜD, according to the company's State Key Laboratory of PV Science and Technology in Changzhou, Jiangsu Province. This is the 26th time Trina Solar has set a new record in PV module conversion efficiency and output power, underscoring its leadership in the photovoltaic industry.

"Every breakthrough is the result of our pursuit of technological innovation and excellence," said Gao Jifan, Chairman and CEO of Trina Solar and Director of the State Key Laboratory of PV Science and Technology. "The continuing developments in i-TOPCon technology illustrate Trina Solar's competitiveness and drive in spearheading the 700 W+ era and 210 mm n-type advanced technology platform. Fostering innovation also serves as a growth catalyst for the industry."

With a power output of 740.6 W, Trina Solar's 210 mm n-type i-TOPCon module sets a new record.

The latest achievement is made possible by a sophisticated integration of advanced processes including i-TOPCon, laser-induced firing, edge passivation, high-resistance dense grids and high-density encapsulation technology for low-resistance connections. These innovations significantly improve cell passivation, maximise optical usage and minimise electrical losses, resulting in a substantial increase in module power and efficiency.

Trina Solar was an early mover in n-type technology and leads the way in the industrial application of i-TOPCon technology. It set the first world record in industrial large-area n-type i-TOPCon cells in 2015 and took the lead in promoting TOPCon cell technology from the laboratory to industrialisation in 2018. Trina Solar announced its mass production of Vertex N 700 W+ series modules last August, the first module maker to mass produce TOPCon modules with power exceeding 700 W. The company has upgraded its i-TOPCon technology, and the power output of its 210 mm n-type module reached 720.53 W, the highest among mass-producible TOPCon modules. Its high-efficiency and high-power n-type modules are widely recognised and are used in utility power stations and commercial and industrial power plants. □

Close to 1.2 GW of renewable energy in construction

Erecting one of the wind turbines on the site of Koruson 1.

EDF Renewables in South Africa is currently leading the construction of almost 1.2 GW of low-carbon power generation capacity in the country, including 763 MW wind power, 355 MW solar PV and 75 MW of battery storage. This new build programme, which extends to eight sites in the Northern and Eastern Cape, is being developed by EDF Renewables and its partners. The projects, as set out below, reached Financial Close between November 2022 and February 2024, and will contribute significantly towards alleviating South Africa's power shortage.

- The Koruson 1 cluster of three wind farms (Phezukomoya, San Kraal and Coleskop), being developed in partnership with H1 Holdings, GIBB-Crede and a local community trust, will have a total installed capacity of 420 MW.
- The Koruson 2 cluster, being developed in partnership with Anglo American via the joint venture, Envusa Energy, comprises the Umsobomvu, Mooi Plaats, and Hartebeesthoek wind and solar farms and will have a total electricity generation capacity of 520 MW. The project will incorporate a 20% equity investment by Pele Green Energy (Pty) Ltd alongside a local community trust.
- The Umoyilanga hybrid power plant, being developed in partnership with Perpetua Holdings (Pty) Ltd, is an innovative virtual power plant that will deliver 75 MW of dispatchable power, combining 115 MW of solar PV, 63 MW of wind power and 75 MW of battery storage across two sites, Dassiesridge and Avondale, which are 900 km apart.

The total investment across these projects amounts to some R34 billion (about 1.65 billion Euros). Construction works are now progressing towards commissioning, and the respective commercial operations dates are planned between the end of 2024 and 2026.

These new power plants will contribute to reducing the energy deficit in the country by providing close to 4 TWh of low-carbon electricity to the national grid per year. Eskom indicated that the total energy shortage in South Africa reached 14.4 TWh in 2023.

Less than 1 GW of utility-scale generation projects have been commissioned in the country since 2020, but this new capacity shows that the deployment of renewable power is now accelerating.

The EDF Renewables projects are also creating a significant number of jobs and small business opportunities in the localities of their construction and entrepreneurial programmes are implemented locally to encourage new enterprise development. Local resources are used wherever possible. South African goods and services will constitute about 40% of the projects' value, and about 1% of revenue generated by the projects over their contractual period will be directed to socio-economic development initiatives for nearby communities.

Tristan de Drouas, CEO of EDF Renewables in South Africa, commented: "Our projects under construction will contribute towards meeting the energy needs of South Africans, through government programmes, and through private channels for Anglo American mines via our joint trader Envusa Energy. These developments will have an evident impact on reducing the current power shortage, which is good news for the country, and a source of pride for the teams. They demonstrate the capabilities of the EDF Group to deliver low-carbon energy solutions in South Africa." □

Kenneth Oyakhire, MD and CEO of Services in Sub-Saharan Africa for Gas Power at GE Vernova, speaking at Enlit Africa 2024.

Leading technologies to power the continent

Participating at Enlit Africa 2024, GE Vernova encouraged power sector stakeholders collectively to assume responsibility to develop and support solutions that address the energy trilemma of reliability, affordability, and sustainability. A recent (February 2024) S&P Global Strategic Report – *Africa Energy & Economy: 2023 Review & 2024 Outlook* – shows that up to 50% of sub-Saharan Africa's population, some 600 million people, lack access to electricity, and power demand is projected to grow by about 3% in 2024, bringing into focus the need to balance energy transition aspirations with electricity availability.

At Enlit Africa GE Vernova exhibited some of its innovations across the power generation, transmission, and distribution sectors, giving delegates at the event the chance to explore its industry-leading technologies – in electrical systems, decarbonisation solutions for the energy sector, and breakthrough developments that can help to accelerate the journey to net zero.

As a keynote speaker at the conference, Kenneth Oyakhire, MD and CEO of Services in Sub-Saharan Africa for Gas Power at GE Vernova, said: "Energy enables growth and progress – which is why investing in reliable and affordable power is as critical as advancing lower carbon power to support health, connectivity, safety, security, and improved quality of life. At GE Vernova, we believe that the strategic deployment of renewables and gas power together can help accelerate the continent's energy transition efforts, enabling substantive reductions in emissions quickly and at scale, and at the same time continuing to advance the technologies for low or near-zero carbon power generation.

"We also recognise that there is no one-size-fits-all solution. Multiple technologies and fuel sources will be needed, together with investments in transmission and distribution systems, as well as software solutions, with local conditions dictating what works best. The public, private, and not-for-profit sectors must work together, with governments taking the lead to structure transparent and predictable market mechanisms and policies, incentivise reductions in power sector carbon intensity, allow lifecycle economics to drive investment decisions, and encourage research on new technologies and business models."

Across Africa, countries continue to progress in addressing their respective energy challenges. An example of this commitment and GE Vernova's efforts to support them, is the synchronisation of the first 60 megawatts (MW) Francis hydro turbine at a 420 MW power plant in Cameroon. It represents a significant milestone for the project and for the energy transition plan in the country, as the plant is expected to cover up to 30% of Cameroon's electricity demand, helping to provide reliable and sustainable electricity. In addition to providing seven Francis units to equip the plant, GE Vernova's Hydro Power team is responsible for the overall coordination of the project, including the design, manufacture, erection supervision, and commissioning of the turbines and generators, the control system, and the mechanical balance of plant.

GE Vernova spun-off from GE and began trading as an independent company on the New York Stock Exchange on April 2, 2024. With about 55 000 wind turbines and 7 000 gas turbines in operation, GE Vernova's technology base helps generate about 30% of the world's electricity and can play a valuable role in the energy transition. The company has a legacy spanning more than 100 years in Africa, working across the electricity value chain from generation through various power sources including wind, hydro, gas, nuclear, and more, to providing transmission, distribution, and software solutions.

Also at Enlit Africa 2024, Bernard Dagher Chief Strategy Officer – MEA, Grid Solutions at GE Vernova, spoke about the grid of the future, saying: "The grid is one of the most complex machines built by people. Historically, it has continued to expand to accommodate continuous, one-way supply of electricity, from stable sources such as gas, coal, and nuclear power plants, and that has been coupled with fairly predictable electricity demand. The grid of the future is going to need to accommodate a very different landscape. Driven by the imperative to address climate change, tomorrow's energy systems must accommodate significantly larger proportions of variable renewable energy from solar, wind, hydro, and other sources. We are also seeing the shift from pure play producers and consumers of energy, to 'prosumers' – people and organisations that are not only consuming power generated by utilities and others but are also able to generate their own power, through rooftop solar installations, for example, and send it back to the grid. Additionally, grids will need to expand their capacity and flexibility to meet the growing demand for electricity. Electric vehicles, for instance, may increase local electricity demand and peak load, requiring grid infrastructure upgrades and load management to ensure stability.

"To incorporate these changes, we will need solutions like digital substations, flexible ac transmission systems and predictive software applications to coordinate and orchestrate the grid. This can be challenging in some places where existing systems have been in place for decades and need to be adapted and retrofitted. Here in many parts of Africa, however, we have the opportunity to leapfrog directly to the grid of the future for greenfield projects, and adopt these digital systems from the start, in a similar way to how many people on the continent skipped landline phones completely and moved directly to cellular technology. With our legacy on the continent, deep understanding of generation from various sources, and portfolio of advanced grid solutions and digital applications, GE Vernova is well placed and committed to supporting Africa on the journey to developing the grid of the future." □

Lightning research uses an 8-channel digitiser system

A research team at Duke University, North Carolina, chose ADC cards from Spectrum Instrumentation to process the volume of data within the seconds of a lighting event.

The causes of a lightning flash are complex and still unclear. At Duke University, North Carolina, USA, Professor Cummer and his team try to understand these secrets. Lightning often occurs entirely in opaque clouds which makes it impossible to see what is happening. However, a flash also produces radio waves in the UHF and VHF frequency ranges that can be captured and studied. The challenge is that a huge amount of data needs to be processed and recorded in the seconds before and during the lighting event. The scientists chose ADC (analogue to digital converter) cards from Spectrum Instrumentation to manage this challenge.

The objective of the research is to understand how lightning forms, so the knowledge can be used to better protect buildings and other facilities from damage, and to understand if climate change will result in more or fewer lightning storms.

Steven A Cummer, Professor of Electrical and Computer Engineering at Duke University explains: "A few years ago, there was nothing that could capture and process the huge volume of data involved. During an active thunderstorm, we often need to be able to record over one Terabyte of data per hour. We selected the Spectrum M4i.4451-x8 digitiser card with four channels, and we use two of them in the recording equipment. They are connected via Spectrum's Star-Hub to enable us to record simultaneously from eight antennas. Star-Hub ensures that everything is in sync, which is essential as we are using the antennas to form an interferometer. From small time differences between the signals at different antennas, we can work out the location of each lightning event, which can be up to 50 kilometres away. The cards have a sampling rate of 500 Mega samples per second on each channel to gather the amount of data we need, and the 14-bit resolution ensures we capture all the small signals."

The important seconds

The research is partly focussed on the moments just before and just after the lighting starts. The structure of lightning once formed is understood – it is a conducting channel of hot ionised gas that can be hundreds of metres long. "We are trying to capture data before the lightning begins. This pre-event data is virtually impossible to obtain if you rely on optical data capture of the flash, as there is no easy way to gather this from back in time," Cummer explains. "Now, with the Spectrum-based setup, we can get pre-lightning data. The cards constantly record data and overwrite it if it is not needed. The lightning event is the trigger not only to record data for the next second but also to keep the previous fraction of a second before the event, as that is always in the card's memory but is not stored unless triggered. With two Giga samples of memory per card, there is more than enough storage to capture all the several hundred Mega samples of signals per second we need, which is then stored. That done, the system quickly resets to record the next lightning event's data. This is important to capture data from a storm where lightning can occur every few seconds for several hours."

Regarding the software of the 8-channel system, Cummer commented that he uses Spectrum's measurement software SBench 6 to control and program the cards.

Spectrum Instrumentation measurement devices are available in South Africa from Vepac Electronics. □

Multifunction display for various measured values

The DX1063 multifunction display device from ifm handles almost all signal types to display various measured values.

A measured value high up in the cloud increases the global – but not always the local – visibility of information. For local visibility, the new DX1063 from ifm, a multifunction display device with a universal measurement input, suits almost all applications.

It can handle almost all signal types (voltage, current, frequency, pulse counter, PT100, PT1000, thermocouple), detecting and converting analogue standard signals, pulses, frequencies and temperature sensors' signals and displaying the measured value in the required unit directly on site.

Clear representation

The TFT display offers various possibilities and colours to visualise the measured value. The unit of measurement is also displayed, plus the signal name and the location tag, to clearly explain the displayed value.

The different font and background colours of the definable alarms help to evaluate the measured value. Via the two relay outputs, individual alarms can be transferred to higher-level systems, or simple controls can be realised.

This all-rounder in displays features:

- Universal measurement input for various types of signals (current, voltage, frequency, pulses, PT100/PT1000 and thermocouples)
- Colour TFT display with extensive digital labelling
- Intuitive menu structure with help texts for easy parameter setting
- 8 adjustable alarms and 2 relay outputs
- Low installation depth with standard panel cut-out.

It has a protection rating of IP65, making it suitable for most industrial installations.

For more information visit: www.ifm.com

Handheld ED-XRF spectrometers for metals analysis

The new SPECTRO xSORT handheld ED-XRF spectrometers from SPECTRO Analytical Instruments.

SPECTRO Analytical Instruments has introduced its newest generation of SPECTRO xSORT handheld ED-XRF spectrometers with improved features that maximise speed, ease of use, convenience, and advanced performance in the analysis of metals and alloys.

The newest xSORT handheld spectrometers enable high-throughput, highly reliable elemental testing and spectrochemical analysis of common metals and alloys, including 46 elements in 16 metal matrices, from the scrapyard to the factory to the foundry floor.

Features

The new spectrometers offer several beneficial features, as outlined below.

Faster analysis: The entry-level SPECTRO xSORT Alloy model, featuring a Silicon PIN (Si-PIN) detector, delivers metal-grade identification in seconds. The more powerful standard SPECTRO xSORT, with its high-resolution, high-sensitivity silicon drift detector (SDD), analyses most alloys in only two seconds and identifies light element alloys in seven seconds. The result is hundreds of inspections per shift for improved productivity.

Easier to use: Reduced in size and well balanced, SPECTRO xSORT is optimised for day-long, no-fatigue one-handed operation. The ergonomic, field proven design includes a light-squeeze trigger, an easy-reading, 5-inch wide-angle, high-definition touch display, physical buttons for gloved hands, and a smaller head for use in tight spots.

More flexibility: Analytical flexibility is maximised and SPECTRO xSORT offers two standard spot sizes. Users benefit from wide coverage of elements and alloys without switching methods between samples.

Advanced software: The powerful XRF Analyser Mobile operating software and fast-reaction industrial Android modules deliver touch operation, hardened security, quick access, and Windows PC compatibility. Standard features include a spectra viewer and a customisable metal-grade library.

Built-in protection and standardisation: The analyser's automatic shutter protects internal components and serves as the sample material for SPECTRO's iCAL (Intelligent Calibration Logic) standardisation – for continuous system monitoring and correction so all installed methods are always ready for use.

Additional features and options include a long-lasting quick-change battery, an onboard GPS, two cameras, Wi-Fi and Bluetooth connectivity, microSD storage, a docking station and a smaller attachable sample chamber.

The advances in the newest SPECTRO xSORT handheld metal analysers draw from SPECTRO's leadership in spectrographic analysis serving laboratories globally. This lineage includes the benchtop flagship SPECTROLAB S, a market leader for precise analysis; SPECTROMAXx stationary metal analyser; and the powerful, portable SPECTROPORT and mobile SPECTROTEST metal analysers.

Additionally, AMECARE Performance Services support maximum uptime, optimum performance, and long equipment life for all SPECTRO elemental analysers with customised support delivered by experienced service engineers in 50 countries. □

Versatile flow assembly for water treatment sector

Endress+Hauser has introduced the new Flowfit CPA25 universal flow assembly. It is designed for analytical measuring points in water and wastewater treatment and industrial auxiliary processes, providing for reliable integration of flow sensors into the respective process and easy maintenance.

Flowfit CPA25 – flow assembly with compact transmitter and pH sensor.

With the Flowfit CPA25, Endress+Hauser provides a completely new universal assembly which ensures that measuring points in standard applications can be implemented easily and safely. It consists of high-grade polypropylene and can easily cope with high chloride concentrations, such as in seawater. Measuring points can be set up easily and efficiently, with up to three sensors with a Pg 13.5 screw connection. This means the assembly is ideally suited to incorporate Endress+Hauser's pH, ORP, conductivity and oxygen sensors. In addition, the Liquiline Compact CM72 and CM82 compact transmitters can be installed, making the assembly several centimetres higher than its predecessor version, the Flowfit CPA250.

Furthermore, Flowfit CPA25 features a significantly improved siphon-like design that optimises flow to the sensors, enabling a fast response time and accurate readings. This special shape also prevents wet chemical sensors from drying out and enables reliable recommissioning after a measuring point shutdown. The assembly can be easily fitted onto panels, in measuring containers or simply on a wall using the integrated holder. An optional fixture also allows for mounting on pipes or railings.

For more information visit: www.endress.com

Simple flow switch for water, oils, gases and more

"Senseca recently introduced the FF type series flow switch which has applications specifically in the water, oils, gas, food and beverage sectors as well as in general industry where pump protection is required. Its 200-bar pressure and piston valve seat design make it a unique flow switch for various industry applications," says Jan Grobler, Managing Director of Senseca South Africa.

The simple mechanical operating principle of the piston valve seat design makes it space-saving and means the flow meter can be installed economically for high unit counts. The meter is practically maintenance free across all applications.

In operation, the flow volume raises a piston (fitted with a magnet) out from a valve seat against a spring force. The stroke causes a change in the magnetic field, where a hermetically isolated Reed switch is actuated and an electrical signal is generated. With spring-assisted stabilisation of the piston, the flow meter can be installed in all positions. The vertical positioning of the Reed switch adjusted at the factory enables recognition of flow rates from about 2% to 60% of the recommended maximum volume.

Grobler says the Senseca FF Flow Switch offers the largest switching value selection and the widest housing spectrum with a valve seat design. It is a cost effective and low maintenance flow switch which delivers effective system safety.

The FF series includes housing sizes for nominal pipe widths from DN8 to DN50 and freely selectable switching values from 0.41 l/m. The swift reaction times of less than 100 ms ensure rapid actuation time for applications. An additional feature is the high switching value repeat accuracy with a minimal pressure loss of less than 0.1 bar.

"The FF series of flow switches suit high-pressure cleaning technology applications as they are available in various housing sizes – and they can be used in any sector where water, oils and gas are processed," Grobler adds. "They offer high efficiency and provide a tamper-proof switching value, offering high system safety," he says.

When applied in process water in industrial systems, contamination situations often arise due to sediments and other ordinary content in the water. Here, the filtration is a recommended design feature. The FF flow switch enables horizontal flow through the housing where the vertical functional design is highly resistant to water contaminants. This supports the filtration efficiency of the overall system, delivering enhanced safety and functional reliability in such applications.

The flow switch FF can be ordered to meet customers' specific requirements. There is no switching value drift with the FF flow monitor, an advantage in flow monitoring for heat exchangers in cleaning technology applications with hot water systems.

"We adjust the flow switch to meet specified requirements," Grobler says. □

Dr Ulrich Greiner, TE Connectivity.

A smarter, more reliable power grid

Dr Ulrich Greiner, Manager Research & Development, Kries Energietechnik, TE Connectivity

As the world works to manage the energy transition, the ways we generate and consume power are poised for radical change. The electrical grid that delivers this power must also change, becoming smarter to adapt to new sources of generation and maintain reliability.

Renewable power sources such as wind and solar introduce variability to the supply side of the equation as the power sources are not constant but intermittent (the sun does not always shine and the wind does not always blow steadily). The rise of electric vehicles, larger data centres and the general electrification of everything are increasing the demand placed on the grid as well. At the same time, the increased frequency of severe weather events raises the potential for more widespread power outages.

Throughout these changes, grids must continue to deliver power reliably. When people flip a switch, they expect the lights to go on. When that doesn't happen, consumers and regulatory bodies notice. The grid must become more flexible and resilient to handle the changes. In short, it must become smarter – it must have access to the information needed to control and deliver power safely to all customers with minimal downtime.

A more transparent grid is a more resilient grid

In the power industry, reliability is measured via the System Average Interruption Duration Index (SAIDI), which provides the average number of minutes an average customer in a region is without power over the course of a year.

The ability to gather more information about the flow of electricity across a grid can help locate faulty wires and reduce the time it takes to get the power back on when something goes wrong – decreasing downtime and improving reliability.

Sensors provide critical information about the levels of voltage and current running through a circuit at a specific point along the line. That information can support a more resilient grid in several ways.

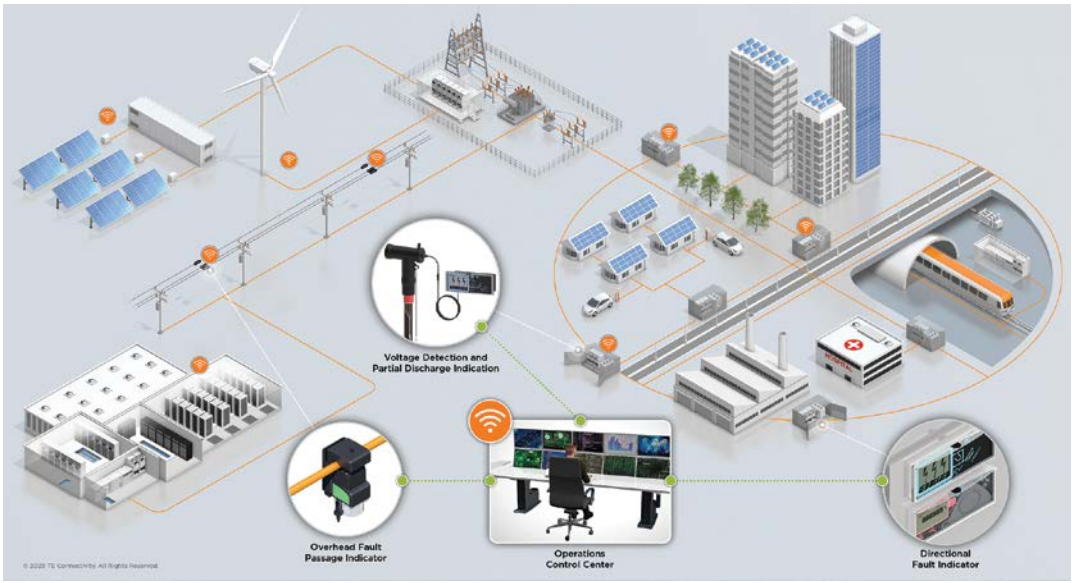
Improved maintenance

Some sensors can detect intermittent fluctuations in current that don't trip the circuit but do indicate the potential for an outage in future. By collecting data on the accumulation of these spikes in current, electricity providers can set thresholds for alerts and repair or replace failing equipment before it causes downtime.

TE Connectivity has also developed a device that can detect a partial discharge, a precursor to intermittent faults. When combined with remote signalling capabilities, these devices give electricity providers more information to help prevent faults in the first place. In addition to improving reliability, reducing the number of ground faults can reduce the chances of those faults sparking wildfires in dry climates.

Faster localisation of faults

Historically, detecting faults in the distribution system has required manual checking for notifications of faulty circuits in the ring main units (RMUs) or pad-mounted switchgear enclosures that sit between substations and the transformers outside houses and businesses. Placing sensors called faulted circuit indicators (FCIs) on power lines can help locate problems more precisely, providing an opportunity to isolate the fault and reroute power to parts of the circuit that can safely receive it. Reducing the amount of time it takes to locate the fault also means workers can get on site



Monitoring the energy grid: this graphic shows where the grid can become 'smarter'.

The IKI-OH is an overhead fault indicator which can be used on up to 36 kV overhead distribution lines. The indicators reduce the time needed to identify where in the overhead distribution network a fault has occurred – an activity that is typically time-consuming on traditional grid networks. By helping find and fix the fault faster, the amount of downtime is reduced – also reducing the impact of downtime on communities and businesses.

faster, reroute power as appropriate and begin fixing the problem.

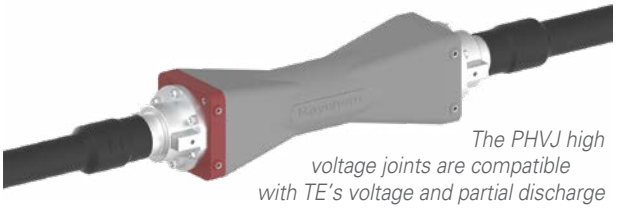
Enabling remote rerouting

Adding remote switching modules to RMUs can speed things up further. With the ability to control circuit switches from a remote location, power companies can reroute a circuit around a fault without having to dispatch personnel to do so. Computer systems capable of automating remote switching can accelerate response times, as the system can reroute power intelligently as soon as it detects a fault.

This type of automated rerouting is also useful for providing power to critical infrastructure, such as hospitals or tunnel ventilation systems. In these cases, circuits could be connected to a backup electricity supply. When the system detects a failure, it could automatically disconnect the defective feeder line and connect the healthy one, restoring power in seconds – essentially a large-scale equivalent of a whole-house generator.

Automatic rerouting is a prerequisite for balancing electrical loads across a smart grid supplied by an increasingly varied mix of power sources. To incorporate intermittent loads from renewable power sources, electricity providers need to be able to process real-time intelligence to balance supply and demand. That intelligence will also be necessary to incorporate more widely distributed sources of power into the grid. The centralised power plants that supply power today can adjust their output based on demand in their service area. To maintain a steady supply of electricity when both supply and demand fluctuate across a wider array of sources, providers must have clearer visibility into the entire power generation and distribution system.

The data that sensors collect can also inform plans for fundamental changes to the grid as electricity supply and demand dynamics continue to change. What's more, better data can support longer-term tasks, such as planning grid expansions or maintenance. Without knowing exactly what a local distribution network's needs are, it's virtually impossible to upgrade hardware efficiently. A better understanding of where demand is growing on the grid makes it easier for providers to determine whether they can route power more effectively across the current infrastructure or if they need to expand that infrastructure to continue to serve their customers effectively.



The PHVJ high voltage joints are compatible with TE's voltage and partial discharge detection systems and can be provided with integrated voltage tap where required.

The TE Raychem ELBA asymmetric compact elbow connector is compatible with TE's smart voltage detection systems and ideal for smaller switchgear boxes used by power facilities in data centres and solar and wind farms.

In an increasingly electrified world

In future, this combination of intelligence and automated switching could help incorporate alternative power supply models in an increasingly electrified world. The introduction of large-scale modular power generation to smart grids could help get areas back up and running after natural disasters. And the grid could intelligently route excess power to battery storage installations that supplement supply when demand rises. Smart technologies also pave the way for creative solutions, such as using electric vehicle batteries or home-based uninterruptible power supplies to act as a distributed battery when they are otherwise idle, providing additional flexibility to fill the gap when renewable production is reduced.

That future may not be as far off as it seems. In many cases, it is possible to retrofit existing equipment with upgraded devices and sensors today, integrating more intelligence into the grid sooner and at a lower cost. Such upgrades could provide immediate value by speeding up localisation of faults and increasing reliability, as well as laying the groundwork for a more resilient energy future. □

For more information visit: www.te.com

About the author

Dr Ulrich Greiner is Manager Research & Development and Product Development Engineering at Kries Energietechnik GmbH & Co KG, a part of TE Connectivity. In this role he is responsible for developing new products, sustaining engineering and industrialisation of products that help utilities to secure a transparent and resilient medium voltage grid. The products range from local current and voltage monitoring solutions to remote monitoring and protection devices. He has more than 12 years' experience in solutions for medium voltage distribution grids. He holds a PhD in physics from the University of Kaiserslautern and has previously studied at the University of Stuttgart and Michigan Technological University.

Modular substations suit growing data centres

As digitalisation gathers pace in industry, business and the economy broadly, data centres have become a fast-growing sector in South Africa and internationally. Data centres are typically scaled up over time and in this respect, and others, modular substations present an ideal solution for powering the facilities. David Claassen, Managing Director at Trafo Power Solutions, sets out the benefits of going the modular route.

As South Africa rides the digital wave, data centres need to be able to upscale at short notice – and similarly, the substations that power them.

Claassen says modular substations are proving to be ideally suited to supporting the expansion of data centres over time. Many data centres start out with a large building structure that is only 30 to 40% equipped with servers and ancillary equipment.

"The approach is often to set up a facility that is affordable in terms of the early customer base, and then expand the infrastructure as the customer base grows," says Claassen. "Using modular substations, the data centre can be equipped with as many as it needs for start-up, and more of the substations can be added as and when required."

He highlights that, as 24/7 operations, data centres require reliable and continuous power, so backup arrangements need to be in place. These might include diesel generators and, essentially, uninterruptible power supplies to ensure optimal uptime, and these too need to be able to be upscaled with additional units, installed as demand determines.

A dry-type transformer installed in a modular substation for a data centre.

Timelines

"There is considerable pressure on timeframes when a data centre is planned, built and expanded – because the sooner it can operate, the sooner it can generate revenue," he notes. "All supply partners involved in these projects have to find innovative ways of speeding up the process without compromising the result."

A modular substation for delivery to a data centre, equipped with dry-type transformer, switchgear and monitoring systems.

Modular substations present an optimal solution as they can be designed and built quickly. The repetitive nature of the manufacturing process lends itself to speed, and economies of scale achieved in steel and other material requirements can reduce costs.

In its modular substation solutions for data centres, Trafo Power Solutions typically provides a dry-type transformer and medium voltage switchgear. These units step down the incoming medium voltage power for the low voltage servers and ancillary equipment on the racks.

"With our experience, we have a good understanding of where we fit into the customer's overall electrical network," Claassen says. "We design the substations to ensure a seamless interface with other aspects of the data centre, such as the low voltage distribution, the medium voltage switchgear, UPSs and the overall control and monitoring system for the facility."

The control system could be one of various products and brands and Trafo Power Systems designs its substa-

Modular substations present an ideal solution for powering data centres.

tions to integrate effectively with the customer's critical monitoring, access control and security systems.

Efficiencies

"Another key driver of data centre success is efficiency, as the scale of the operations means they consume a great deal of electrical power," he says. "The overall electrical backbone of the facility must run at the minimum cost for the business to maintain profitability. At Trafo, we contribute to this by designing and manufacturing energy-efficient dry-type transformers."

These transformers boast among the lowest losses on the market, globally. They also offer the advantage of being air-cooled, which means they require very little maintenance when compared to conventional oil-filled transformers. This differentiator is particularly important in a facility where there are multiple units in operation. The oil in conventional transformers must be checked and changed regularly, whereas dry-type transformers need minimal attention.

"The less maintenance that has to be conducted, the lower the cost of running the facility," says Claassen. "Maintenance often also implies downtime, and data centres have very little tolerance for any intervention that breaks the continuity of their operation."

As they don't use oil as a coolant, dry-type transformers offer the further advantage of a higher safety rating, so they can be installed inside a building. They do not need to be contained in a separate brick and mortar structure with concrete bunds to catch any potential oil spill. This simplicity and safety complement the streamlined nature of data centres and remove a number of serious risks of disruption.

Training and maintenance

To support the reliability of its substations, Trafo Power Solutions provides detailed training on its modules for data centre operators – equipping them to deal with simple first-line issues. The company also provides customers with 24/7 service for any aspect that the operators cannot deal with themselves.

"We give the customer a complete operation and service schedule detailing the maintenance cycle as well as the process and procedure," he says. "The way we design the substation means there is minimal need for anyone to enter the module. This improves uptime, as items like filters can be changed without the need for doors to be opened, which would require powering down the unit."

A modular substation in production, being fitted with switchgear for a data centre application.

Projects

Trafo Power Solutions has been engaged in local and regional data centre projects, ranging in size from 1 MW to 60 MW – supplying up to 20 modules to each project. It has also recently been involved in a data centre project in the Netherlands.

"In this case, we are supplying three dry-type transformers for the centre's intake substation, and these are rated at 22.5 MVA with a primary voltage of 50 kV and a secondary voltage of 13.8 kV," Claassen says. "This is quite a unique project, as oil-cooled transformers are usually used for these larger substations. With significant space constraints, the substation needed to be located indoors, with the switchgear installed above the transformers."

He points out that cooling is also an important aspect of substation design for data centres, as the design must accommodate the proximity of the modules within confined spaces. The approach is to consider the cooling for the centre as a whole, providing a thermodynamic design that integrates the needs of all the plant within the facility.

"Using specialised software, we simulate the heat generated within the centre – setting the context of ambient temperatures – and design the sizing and location of the necessary openings and fans of the substations accordingly," he says. "This design also contributes to reducing energy consumption by minimising the need for air conditioning." □

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

How do we manage an overburdened grid?

Taru Madangombe, Schneider Electric.

Taru Madangombe, Vice President: Power and Grid for Middle East and Africa at Schneider Electric says Electricity 4.0 provides some answers.

The energy transition and innovation are inherently interdependent. If we look at the history of the energy ecosystem, initial developments around electricity focused on the supply side of the value chain. Over time, this changed, evolving from the work of pioneers such as Alessandro Volta and Michael Faraday in the 1800s (Electricity 1.0) to mass electricity by the end of the 19th century (Electricity 2.0) when electricity production was driven by demand. The development of the first practical solar cells came in the 1950s, and with it, the first digital technologies (Electricity 3.0). Today, in the context of the energy transition, we need to focus equally on supply and demand to reach our sustainability targets.

Electricity 4.0, which can be seen as representing the convergence of electrical and digital technologies at scale, empowers electricity systems to become greener and smarter. Furthermore, it allows for distributed energy resources (DERs) that support reliable power provision, and grid infrastructure measures to avoid energy wastage.

Our current energy landscape needs to be driven by the fundamentals of Electricity 4.0. In South Africa, DERs are being added to businesses and households almost daily. According to Eskom, calculations show that rooftop solar's contribution increased from 2 265 MW in July 2022 to 5 204 MW in December 2023. A significant shift.

Readying the grid

Renewable energy generation technologies place additional strain on the distribution network as it was originally designed for one-way electricity flow. As more consumers become prosumers, generating and potentially selling electricity back to the grid, the challenges of managing low voltage networks (LV) become more complex.

South Africa's grid, like those of most utilities globally, was conventionally designed to transport electricity from core generating regions like Mpumalanga, to the rest of the country, including the more highly industrialised areas such as Gauteng, to drive economic activities. Hence the long high voltage (HV) power lines and infrastructure that traverse the country to reach cities and towns and the medium voltage (MV) and LV networks which support the distribution of electricity to points of consumption.

The grid was not designed to transport electricity in the opposite direction. LV infrastructure can be constrained by this excess electricity capacity generated on site.

Although MV and HV infrastructures have seen some evolution with the introduction of advanced distribution management systems (ADMS) managing large inflows of utility-scale renewable energy systems at distribution level, we now require similar technologies to manage the complexities at low voltage levels. Without adequate infrastructure and management systems in place, the stability and reliability of the grid could be compromised.

Electricity 4.0 can alleviate some strain

Electricity 4.0 leverages technology to enable sustainability and improved grid operations. Key components include:

Renewable energy integration – facilitating the seamless integration of DERs such as solar and wind

Smart grid technologies – implementing advanced grid technologies that enable smoother system operation, higher energy efficiency, and improved management of generation and storage systems

Decarbonisation strategies – embracing a lifecycle approach to digitise and decarbonise the energy sector, support sustainability goals and reduce greenhouse gas emissions.

Electricity 4.0 represents an overarching approach to modernising the energy sector, balancing supply and demand, and offers some solutions to an overextended grid by enabling smarter management of various voltage iterations. □

Cable locator for failsafe cable fault diagnostics

The Amprobe UAT-600 series cable locating kit is available locally from Comtest.

Accidentally hitting a power cable during a project can lead to costly repairs and create seriously hazardous safety situations. Digging in the wrong place can also lead to significant and unnecessary delays, as well as run-on costs for a project.

The Amprobe UAT-600 series cable locating kit – available locally from Comtest – is supplied complete and ready for use with a transmitter, receiver, test lead kit, batteries and additional fuses, all in a mobile, protective duffle bag. The UAT-620 kit also includes a signal clamp for transmitting a signal when it is not possible to make electrical contact with the cable to be traced. For applications where ground fault locating is required, the UAT-600 transmitter can be used in combination with the optional A-frame accessory.

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

City of Cape Town modernises its electrical infrastructure

The City of Cape Town, which is responsible for delivering energy to some 4.8 million residents in the Western Cape, has awarded ABB a three-year contract for a phased retrofit of legacy medium voltage (MV) switchgear in its electrical infrastructure.

The new contract follows the success of an initial 2020 project, which saw more than 400, 11 kV oil-filled circuit breakers and over 100 SF_6 insulated circuit breakers replaced with next generation ABB VD4 vacuum circuit breakers, and the safe disposal of 160 kg of potent SF_6 gas.

The City has teamed up again with ABB to install additional 12 kV VD4 circuit breakers and ancillary equipment to replace its ageing LMX installations. The new devices will clear potentially harmful short-circuit faults in tens of milliseconds, preventing severe damage to electrical infrastructure and minimising the risk of downtime, a critical concern for the Western Cape during planned loadshedding. Enhanced safety for operators is also a key consideration, with the installation of a type tested arc-vent door behind which the racking of the circuit breakers is completed.

Frans Bouwer, ABB Regional Manager for the Western Cape, said, "We are proud to be a long-term service provider for the City of Cape Town and to be selected to support the City on this modernisation project.

"Improving the reliability of the power supply is important for the Western Cape but this project goes much further. The City is investing in an upgrade which will increase the quality and availability of power supply, and it has sought a sustainable solution which supports the circular economy," he said.

Over the past four years, ABB has delivered a range of savings and efficiency gains for the City. By only replacing older legacy circuit breakers, and not the entire feeder board and substation, the upgrades were executed with minimal downtime, and the costs and emissions associated with replacing the entire switchgear were avoided.

The carefully executed retrofit preserved most of the City's existing installed base and prevented the use of an estimated 358 400 litres of oil – had like-for-like circuit breakers been used. Furthermore, the project ensured

ABB's compact VD4-LMT vacuum circuit breakers are easy and fast to install.

the safe and sustainable disposal of the old SF_6 breakers and gases. One kg of SF_6 has the equivalent greenhouse effect (or climate change effect) as 23 500 kg of CO_2, and ABB's full-circle end-of-life service was implemented to eliminate any risk from the SF_6 disposal.

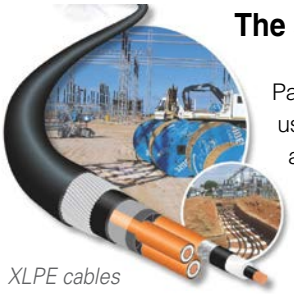
Bouwer added: "Upgrading outdated components is where the largest environmental gains and cost savings can be made – reducing the total cost of ownership by a third, substantially extending the lifecycle of installed assets and minimising the need for on-site maintenance and associated transport emissions."

Patrick O'Halloran, Principal Professional Officer: Equipment Standards for the City of Cape Town, said, "ABB's collaborative approach, combined with their innovative retrofit solution, has been key in successfully continuing the ongoing modernisation of our electrical infrastructure, ensuring reliable and sustainable energy supply to the region and supporting our strong environmental commitments."

More than half of electrical equipment, such as metal switchgear cabinets, steel plates and busbars, can be used for long periods without being replaced if outdated components such as circuit breakers, relays and internal components are upgraded, regularly monitored and maintained.

ABB's compact VD4-LMT vacuum circuit breakers are easy and quick to install. The 12 kV range includes 630 A, 1 250 A and 2 000 A circuit breakers type tested at 25 kA for 3 seconds. VD4 mechanisms are tested to perform more than 10 000 mechanical operations, delivering increased durability and reducing downtime.

For more information visit: go.abb/electrification



XLPE cables offer a number of advantages for MV applications.

The advantages of using MV XLPE cables

Paper insulated lead cables (PILC) have been in use for more than 100 years in medium voltage applications from 6.6 kV up to 36 kV, as well as in high voltage systems. PILC has been preferred over the years due its high dielectric strength, low dissipation factor, relatively low dielectric loss, low sensitivity to dc testing and proven reliability. However, it has become less popular as it is being replaced by cross-linked polyethylene (XLPE) cables due to factors impacting its cost-effective use. Many cable manufacturers around the world have discontinued production of PILC in response to the reduction in demand.

XLPE as an insulating medium has a lower dielectric constant, lower dielectric loss and high dielectric strength and operates at higher temperatures, enabling the cable to be more efficient, carrying more current than the same size cable of paper insulation impregnated cable. XLPE is generally preferred by customers for factors relating to ease of use, efficiency, fewer accessories and less complexity, among others.

Some of the factors that favour XLPE rather than PILC for MV cables are set out below.

- XLPE has a higher current rating compared to the same size PILC cable due to the fact that XLPE has a higher operating temperature.
- For PILC cables, the installation, maintenance and repair processes are more complex, intensive, time consuming and high on cost compared to XLPE cables.
- As many factories worldwide have discontinued production of paper insulated lead cables, the accessories such as jointing and termination kits are not easy to find.
- The shortage of skills for splicing, jointing and termination of paper insulated cable is also driving customers to move to XLPE cable. Many PILC cable failures reportedly result from suspected poor workmanship related to the skills gap.
- Although PILC cable performs better in providing radial water blocking properties with the lead sheath which is completely impermeable, XLPE is also available in cost-effective water blocking formats for both longitudinal and radial water blocking. It can be supplied on request, by leading cable manufacturers such as Aberdare Cables in South Africa.
- XLPE cables are more flexible than PILC cables which are more rigid especially for larger sizes. This means XPLE can be used where a shorter bending radius is required.
- Environmental considerations also play a role. Paper insulated lead cable is oil impregnated with mineral oil or PIB and, with its lead sheath (heavy metal), it presents a higher risk of environmental contamination than XLPE. Consequently, XLPE is favoured in many situations where an environmental analysis is a key aspect in design decisions.

Aberdare Cables Pty Ltd in South Africa offers XLPE cables up to 132 kV for customers across Africa and around the world. For voltages higher than 132 kV, XLPE cables can be provided by Aberdare cables through its parent company, Hengtong Group in China.

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

Investing in production for the energy transition

MR is increasing its production capacity of transformers, tap-changers and related energy technologies to meet high demand globally.

Responding to the rapidly increasing global demand for transformers and energy technology, Maschinenfabrik Reinhausen (MR) is investing in an unprecedented expansion of its production capacities. Managing Director Wilfried Breuer states: "We are investing proactively and substantially in all areas that help us to meet the needs of our customers in the best possible way. We have initiated a number of measures to increase our workforce, invest in tools and production areas, and optimise our infrastructure."

Managing Director Holger Michalka, who is responsible for production and infrastructure worldwide, emphasises: "Our investment priorities are at the Regensburg site in Germany, in the USA, China, Italy and Oberursel near Frankfurt, Germany. At the lead factory in Regensburg, we are starting to expand production lines, test benches and building infrastructure, to increase capacity by 25% by 2025 – particularly for high-demand products. Further steps are being planned to double the production space in Regensburg. As a first step, three additional production bays with an investment value of around 20 million euros will go into operation by mid-2025."

Expanding and increasing production volume at the Suzhou site near Shanghai, China, will see additional capacities for VACUTAP® tap-changer variants available from July 2024, to shorten delivery times primarily for Chinese customers and transformer manufacturers.

At the end of July 2024, a new production building will go into operation at the Humboldt/ Tennessee, USA plant for bolt-on tap-changers. With investments amounting to USD3 million, capacities in Humboldt have been expanded by 45% and will be increased by a further 25% by 2025. Provision has already been made for future expansion and sufficient reserve space has been secured.

Capacities will also be expanded in 2024 at the production sites for transformer accessories and instrumentation of MESSKO in Oberursel, as well as in Italy at CEDASPE in Milan and Reinhausen Italy in Trissino, to meet the sharp rise in demand. □

Green hydrogen must be produced and used wisely

A new impact paper released by Danfoss states that with hydrogen production set to consume more than half of today's electricity demand by 2050, energy efficiency in its production is paramount. It calls for decisive steps to be taken to scale its production for use in the hard-to-abate sectors, without putting an unmanageable strain on renewable energy production or financial resources.

Danfoss calls for a nuanced approach to green hydrogen, because it will play a critical role in the transition away from fossil fuels. However, it suggests that more focus needs to be put on how we use and produce green hydrogen in the most efficient way, to lower costs and the demand for renewables. It says green hydrogen should be recognised as a limited resource that must be strategically allocated to sectors that are otherwise challenging to decarbonise, such as heavy industry and long-distance transport.

Mika Kulju, President, Danfoss Power Electronics and Drives says, "The potential of hydrogen as a clean energy carrier is immense. But it must be produced efficiently to minimise costs, and we need to deploy it judiciously. To maximise its impact, green hydrogen should be channelled into sectors where alternatives to fossil fuels are limited, to ensure the greatest reduction in greenhouse gas emissions."

Because green hydrogen production consumes a lot of electricity, energy efficiency in this process is essential to its sustainability. While current green hydrogen conversion processes incur an energy loss of about 30%, existing technology can minimise this loss. For instance, efficient converters, converting alternating current (ac) to direct current (dc) for electrolysers can increase overall production efficiency by about 1%. Though seemingly small, a saving of 1% of the electricity demand for hydrogen production in 2050 would be enough to power London for almost four years.

Hydrogen holds significant promise for many countries in terms of their climate strategies, and substantial funding programmes are under way globally. But Danfoss makes the point in its paper that we need to act fast. To realise the goals of the Paris Agreement, it indicates that global electrolysis capacity must reach more than 550 GW by 2030. Green hydrogen production can grow substantially by 2030, but cost challenges are hampering deployment.

According to the International Energy Agency (IEA) in its latest Renewables report, hydrogen-dedicated renewable energy capacity is expected to grow by 45 GW between 2022 and 2028, which is some 35% lower than forecast a year ago due to slow progress in real-world implementation.

Kulju says, "Hydrogen is no silver bullet, but we need to speed up cost-efficient green hydrogen production because there is no doubt that hydrogen will play a crucial part in the green transition."

Recovering excess heat from electrolysis is another important energy efficiency measure. Hydrogen production creates a great deal of excess heat. In the EU alone, about

First, electrify and reduce demand; second, produce hydrogen efficiently; third, use hydrogen wisely – these are the key points of the recently released Danfoss Impact Paper.

114 TWh could be recovered by 2030, enough to cover Germany's current domestic heating more than two times.

Kulju adds: "The potential of recovering excess heat from electrolysis is so enormous that it would be a severe policy mistake not to consider it when planning future energy infrastructure. That's also why it's so critical to set the right regulatory and economic framework for an efficient large-scale rollout of hydrogen."

The new Danfoss Impact paper – *Green hydrogen: A critical balancing act* – presents a balanced approach to hydrogen where efficiency and affordability are key considerations.

In summary:

- By 2050, hydrogen production will require more than half of today's total electricity demand.
- Green hydrogen should be considered a limited resource and prioritised for sectors that are otherwise hard to decarbonise.
- Hydrogen currently remains concentrated in traditional applications, but a rapid upscaling in hard-to-abate sectors like heavy industry and long-distance transport is necessary.
- Green hydrogen must be produced efficiently by minimising the cost, energy loss, and energy demand of its production.
- Conversion of electricity to hydrogen currently creates an energy loss of roughly 30%, but there are technologies available today to reduce this loss.

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

From SA to LA – South Africa's young scientists at Regeneron ISEF

In mid-May, a group of six outstanding young scientists from South Africa travelled to Los Angeles, California in the USA, to participate in the Regeneron International Science and Engineering Fair (ISEF), the world's largest pre-college science, technology, engineering and mathematics (STEM) competition.

These young scientists won the opportunity to represent the country and showcase their exceptional scientific endeavours at the Regeneron ISEF following their successful entries in the Eskom Expo International Science Fair (ISF), held in October last year. Three of them emerged as winners among the more than 1 600 young scientists from around the world that competed at this year's ISEF at the Los Angeles Convention Centre.

The participating learners

These are the South African learners who were selected to participate.

Alutha Botha, 18, Grade 12, Nombulelo Secondary School, Makhanda (Grahamstown), Eastern Cape showcased his project entitled 'Exploring seasonal habitat use by juvenile fish species in Algoa Bay, South Africa, using remote underwater video surveillance'. Botha studied the behaviour of juvenile fish in different habitats in the shallow areas of Algoa Bay. In earlier studies of these shallow coastal areas, the methods used did not allow for targeted data collection without damaging the habitats. Botha used remote underwater videos to access these areas. His research is an important benchmark for future studies on diversity and population counts in these specific habitats, using the technology of underwater surveillance systems.

Likitha Chundru, 18, Grade 12, Bryanston High School, Johannesburg, Gauteng shared her project entitled: 'Analysis of the effect of rhizobium bacterial spp. on seed germination and plant growth of non-legume monocotyledon and dicotyledon plants'. Chundru used the nitrogen-fixing bacterium Rhizobium spp. to enhance the growth of non-legume staple crops such as maize. Her project has the potential to save farmers time and resources and offers a sustainable alternative to chemical fertilisers to increase crop yield. The solution is inexpensive, simple, and environmentally friendly, making it safe for farmers to use.

Matthew Collier-Reed, 19, Grade 12, Pinelands High School, Cape Town, Western Cape shared his project entitled: 'Community support: connecting in-need individuals with essential services in South Africa through an accessible instant messaging service'. Collier-Reed developed a Node.js program that could be integrated into the backend of a popular messaging app. The program provides important support services to people and facilitates interactive chats with users. It also provides reports on local events, such as fires and floods, and allows users to report such events. The program guides users to suitable services from a list that encompasses homeless shelters, hospitals, police stations, rehabilitation facilities, and centres for child and youth support.

Keamogetse Precious Monna, 17, Grade 12, Ramotshere High School, Ngaka Modiri Molema, North West presented her project on: 'Improving retail security using a metallic barcoding system'. Monna used recycled materials to develop her own reliable security system to address the issue of retail store theft and has made significant progress in developing the system. Her innovation is a foundational step towards creating advanced security measures to protect retail businesses from losses due to theft.

Nicholas Zhang, 17, and Zaahid Sader, 17, Grade 11, UJ Metropolitan Academy, Gauteng presented their project entitled: 'Enhancing bobsleigh performance through biomimetic design inspired by the peregrine falcon *(Falco peregrinus)* and kingfisher *(Alcedo atthis)*'. The duo share a passion for bobsledding and designed two sleds that are inspired by nature, showcasing their growing interest in this field. It is refreshing to see South African learners take a keen interest in winter sports to the extent that they set out to design sleds to outperform existing ones. Their analytical approach and extensive knowledge of biomimicry have led to new insights into bobsleigh aerodynamics. Their designs

Alutha Botha from Nombulelo Secondary School in Makhanda (Grahamstown).

Likitha Chundru from Bryanston High School in Johannesburg.

Keamogetse Precious Monna from Ramotshere High School in Ngaka Modiri Molema, North West.

demonstrate improved performance compared to that of standard bobsleighs.

Among the winners

The young scientists made an impact at the Regeneron ISEF, winning a Special Award and a Community Award. Achievements worth celebrating as they were competing among young scientists from 49 US states and close to 70 countries, regions, and territories around the world.

For their innovative project focused on advancing bobsleigh design and performance based on biomimetics, Nicholas Zhang and Zaahid Sader from the UJ Metropolitan Academy (Maths, Science & ICT School of Specialisation) received a full scholarship award sponsored by the King Fahd University of Petroleum and Minerals.

"We are thrilled about the recognition and the awards we have received at this most competitive ISEF. This means a great deal to us and being here is one of the most enriching experiences we could ever have. It was not easy to reach this level and we are excited that our perseverance has won us this recognition. Connecting with like-minded individuals and engaging in conversations with them was truly inspiring and enabled us to discover a wealth of knowledge.

"We want to urge our fellow students never to undermine or lose sight of the power of their dreams. Through Eskom Expo, you uncover limitless opportunities and possibilities, and the youth must seize every opportunity presented to them to pursue their passion for science and engineering," they said.

The other award winner was Matthew Collier-Reed, a Grade 12 learner at Pinelands High School in Cape Town, for his project in which he developed a community support app, enabling in-need individuals to connect with essential services through an instant messaging service.

Collier-Reed was one of the recipients of the Regeneron Community Award, valued at US$500 (just more than R9 000), and his project was among the 30 to receive recognition out of nearly 1 700 participants who had presented their projects to demonstrate their commitment in addressing local challenges and problems to positively impact their communities.

Collier-Reed said, "It's an honour to receive the Community Innovation award. However, it's less about me and more about the recognition being given to community support projects, a testimony that it's possible for young people to make a difference in their communities and bring growth and sustainability in our society.

"The entire experience was a lot of fun meeting new, like-minded people, and an opportunity to learn about all the different cultures. It was an amazing experience," he added.

Chief Executive Officer of the Eskom Development Foundation (Acting), Ms Mologadi Motshele, said, "We congratulate all the learners who reached this level and Eskom leadership and all its employees take immense pride in the accomplishments of these learners, our future scientists and engineers. After reaching the finals in the 2023 Eskom Expo for Young Scientists, they successfully represented South Africa at the Regeneron ISEF."

She said, "Development and sustainability are at the heart of Eskom's business, and the investment made in the Expo is a demonstration of our commitment to create shared value in addressing the country's socio-economic challenges. Since 1999 Eskom has provided opportunities for the youth to expand their intellectual and social horizons through the Eskom Expo, and every year we appreciate the impact, value, and the return on investment being realised, which is being recognised worldwide."

Motshele concluded saying: "Eskom remains committed to continue its efforts and contribution to combat current and future socio-economic challenges facing our country and supports the national agenda of developing and investing in STEMI programmes. Eskom's focus on youth education programmes, in partnership with other institutions, is aimed at the development of current and future critical skills required in South Africa. This is why Eskom Expo for Young Scientists ventures beyond local, regional and national platforms to the international arena, to open new avenues that foster innovation among the youth and networks around the globe.

"We are grateful that the Eskom Expo stands as one of Eskom's strategic, national initiatives which serves as an important driver of sustainability, contributing to youth development, enabling and preparing young South African to participate actively in strategic fields and industries to build and grow our economy."

Eskom Expo Executive Director, Parthy Chetty, said: "We are extremely proud of all the leaners, as they competed with the best in the world. The new experiences they have had and the networks developed will add to their lifetime memories. The learners' participation up to this highest level and the awards won are a reflection of the continuous support from Eskom leadership and management to make Eskom Expo a national and international success, as well as the teachers' hard work, the learners' perseverance, and commitment by the Eskom Expo staff, mentors and all the volunteers in the Expo programme."

Registration to participate in the 2024 Eskom Expo is open, with District Expos currently under way. Learners in grades 4 to 12, and learners from TVET colleges (NC2 to NC4) can register their projects on the Eskom Expo website: *www.exposcience.co.za*.

Matthew Collier-Reed from Pinelands High School in Cape Town won a Regeneron Community Award.

Nicholas Zhang and Zaahid Sader from the UJ Metropolitan Academy in Johannesburg won a full scholarship award sponsored by the King Fahd University of Petroleum and Minerals.

Ener-G-Africa opens new clean cookware factory

On 9 May 2024, Ener-G-Africa officially launched its cookware manufacturing facility in Paarl, in the Western Cape, where it produces a range of clean-burning fuel-efficient stoves and cookware and employs 100 people from the local community. The event was attended by the Drakenstein Municipality's Executive Mayor, Stephen Korabie, as well as retailers, NGOs and community organisations. A panel discussion on clean and green cooking was led by the World Bioenergy Association President, Christian Rakos.

"This launch reflects our vision to revolutionise cooking in Africa, making it cleaner, healthier, more affordable and better for the environment," said André Moolman, CEO at Ener-G-Africa. "Cooking remains largely the unrecognised responsibility of women in Africa. Every day, millions of women across the continent have no option but to cook in unsafe conditions, using inefficient equipment. They spend hours collecting firewood for fuel, and cooking on unhealthy and often dangerous wood-burning stoves. We are looking to change that by providing accessible, innovative and cost-effective cookware that saves women time, money and fuel. We hope to help women reclaim their time, negate safety issues related to firewood collection and improve health outcomes by minimising exposure to harmful smoke. This can help to restore women's dignity and boost their productivity."

Ener-G-Africa aims to revolutionise cooking on the continent with clean-burning, fuel-efficient and affordable stoves and cookware.

A pelletised biomass fuel is used in the EcoFAB cookware.

Christian Rakos referred to the opening of the new factory as a landmark event for clean cooking in Africa. "Ener-G-Africa's engagement will include building supply chains for a fuel that can revolutionise cooking in Africa – pelletised biomass coming from various types of agricultural residues and fast-growing grasses. This modern fuel offers a clean burning and affordable alternative to firewood and charcoal. The dedicated pellet cookstove built here has the potential to become a unique success story."

Ener-G-Africa's clean cooking solutions extend to innovations in the form of sustainable fuels, all aimed at combatting climate change and making universal access to clean cooking by 2030 achievable (SDG 7).

Dave Lello, Chief Business Development Executive at Ener-G-Africa, added: "Our products are designed for clean cooking, which is healthier, and green cooking, which is better for the environment and more sustainable. Our stoves are safer to use and they are more fuel-efficient, which makes them more cost-effective."

Local manufacturing commitment

The manufacturing plant is located in Berg River in the Drakenstein Municipality, contributing to job creation and stimulating the local economy. Built at a cost of US$1 million, the 3 200 m^2 factory consolidates the company's commitment to local manufacturing. Products are distributed across South Africa and into other countries across the continent. All the products are currently available on the website.

The plant uses 100% locally made stainless steel and is located near Ener-G-Africa's other facility – a women-run solar manufacturing plant that is the second largest on the continent.

Ener-G-Africa is a Proudly South African member, committed to an uplifting ethos that promotes social and economic change and progress and to making a meaningful contribution to building South Africa's economy and alleviating unemployment.

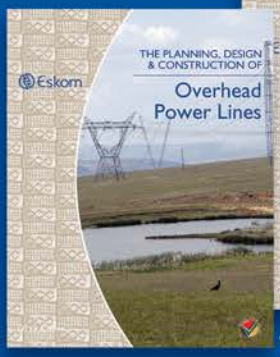
The company has invested in cutting-edge manufacturing technology, including a 6 kW laser cutter and a 25 m long dishwasher for cleaning the finished cookware. The laser cutter provides high precision and accuracy, with an 'auto coil' feature that enables the machine to auto-feed and cut material, increasing efficiency in batch production and minimising material waste. Laser cutting also allows for flexibility in terms of cutting the different shapes and patterns required to produce the full range of cookware.

"As well as serving the needs of African women, our range is well suited to anyone who enjoys cooking outdoors, from camping enthusiasts to South Africans who love to sit around a fire together," says Moolman. "Our stoves and cookware are fuel-efficient, easy-to-use, clean-burning and designed to bring the joy back into cooking."

For more information visit: www.ener-g-africa.com.

Eskom

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



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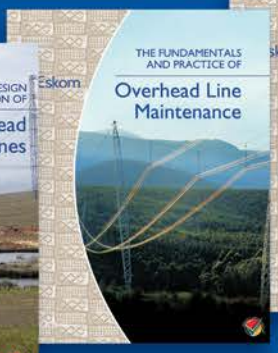

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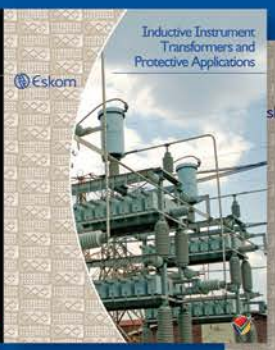

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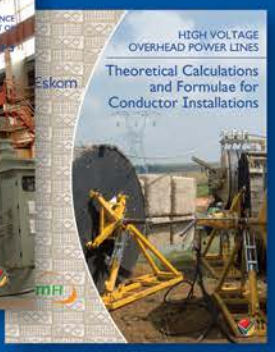

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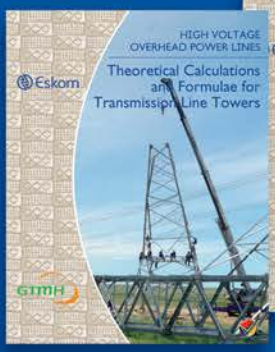

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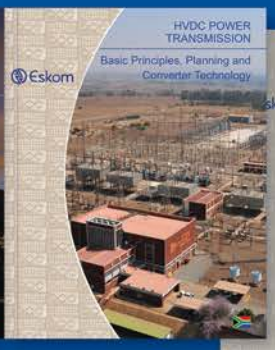

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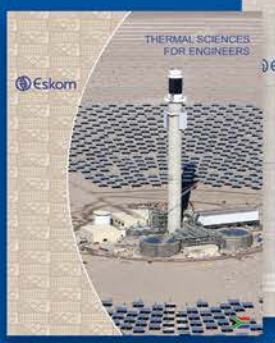

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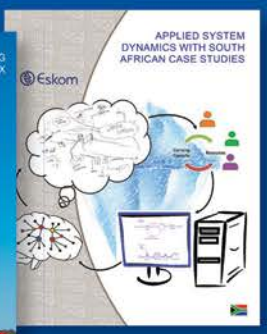
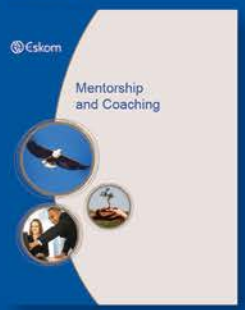


Volume 13: Applied System Dynamics with South African Case Studies

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



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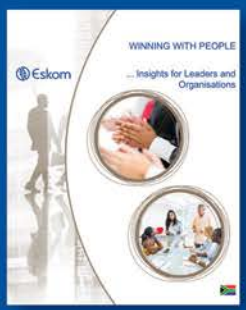

Volume 2: Winning with People ... Insights for Leaders and Organisations

Volume 1: Procurement Management Key Concepts and Practices

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

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

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