

Industrial Unmanaged and Managed Switches



FEATURES:

- Industry 4.0 + IIoT
- Energy management + the industrial environment
- Sensors + switches
- Plant maintenance, test + measurement

ELECTRICITY + CONTROL



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Phoenix Contact's Industrial Ethernet Switches include managed and unmanaged switches and offer customers the flexibility to build powerful and secure networks in industrial environments.

(Read more on page 3.)

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Lighting the way ahead

Re-reading my 'futuristic comment' of last month I find myself mildly impressed with my ability to predict the future quite well.

Would that we could always do the same about our industry, our own companies or even the subcontinent in general. But hope can become a strategy at times – and we find ourselves in a country and continent brimming with opportunity.

Apart from some noise in certain areas, I sense a rolling up of sleeves and a commitment to getting things not only better, but right.

Often, we hear how the tone at the top defines how things can really begin to thrive. Although I have always thought of this in a positive sense, I do appreciate that the tone at the top may often be off key.

However, I am getting a sense about this as the weeks roll by – I sense a positive tone at the top.

I would be most interested to hear how you are sensing future developments. Certainly, there will be some arm wrestling as conflicting views are aired and consideration is given to the various support bases. But experience suggests that necessity is quite likely to make this work well – and that delivery, at the very least, will improve.

Then again, one even more frequently hears that 'the fish rots from the head'. There is no way at all one can consider this in a positive light.

We do need to be mindful of this and we need to keep a keen eye out for such a scenario. My sense, though, is that we are pretty good at spotting it based on the years of practice we have had.

So let us wait and see if it is a positive tone at the top or the fish rotting from the head that prevails.

Ian

Ian Jandrell

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

Turning to our industry, and along the lines of the above, it is appropriate to recognise that Eskom has been improving its performance over the past few months. Does this mean we are out of the woods? No. But clearly, some fundamental changes have been made in how the plant at South Africa's power stations is managed, maintained and run. Kudos to Eskom.

The problem, of course, relates to our distribution networks. This is likely to pose very significant challenges to the reliability of medium voltage supply for the next few years. The positive side of this is that if you have installed alternative energy sources, this is by no means a wasted investment.

The negative side is that it will take some time to resolve all the issues. We hear horrifying stories of the extent of debt owed to municipalities, and by municipalities to Eskom (R78 billion is the most recently reported sum) from all around the nation. We hear frightening stories too of illegal connections – and the consequences on the capacity of the installed system to deliver energy safely and reliably to paying customers.

Let us hope that one of the big changes that will be made as we move forward is in the capacity of the powers that be to stamp out illegal connections (for safety as well as practical reasons) and let us hope that they have the courage to fully understand the gravity of being in authority – and not being cowed by threats (real though they are).

Here's to watching the sun rise on a new future. And if the sun is obscured by clouds, to be sure we will have the energy to continue lighting the way ahead.



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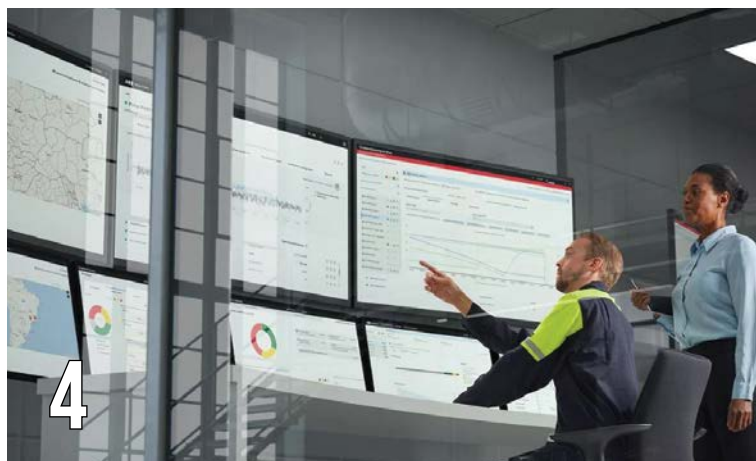
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The Industrial Ethernet Network portfolio from Phoenix Contact

Phoenix Contact offers you more real time, more wireless, more security, and more reliability. Industrial Ethernet from Phoenix Contact can be easily integrated into your automation infrastructure – because we make Ethernet easy. Thanks to our many years of experience in automation and industrial Ethernet networks, we are familiar with and understand your expectations and requirements. This is evident and embodied in our products and solutions.

Unmanaged switches vs Managed switches

For years, unmanaged switches have been used almost exclusively in machine networks and at field level. There are undoubtedly good reasons for this, with the chief arguments usually being the price (managed switches often cost several times as much) and the user-friendliness of these switches (no network technology know-how required). However, many customers turn a blind eye to the disadvantages of unmanaged switches, or rather, they ignore the advantages of managed switches, which justify the extra cost from an economic point of view. In networks with unmanaged switches, it is only possible to access the end devices (such as PLCs, bus couplers, and suchlike) directly. Furthermore, only information about the components can be obtained, not about the network as a whole. However, in this era when more and more Ethernet

components are also being used in machine and production networks, it is becoming increasingly important to be able to diagnose every device, every connection, and every instance of data communication in detail at all times.

Managed switches are the central source of information here. The initially higher investment required for managed switches often proves to be worthwhile as soon as the first network failure and associated production downtime can be prevented or fixed more quickly.

We at Phoenix Contact have an Industrial Ethernet Switch portfolio that comprises managed and unmanaged switches with Gigabit, PoE, IEC 61850 certification, and for DIN rail mounting. This gives you the flexibility to build powerful and secure networks, even in harsh environments: copper and FO ports, as well as redundancy functions, enable the flexible networking of your systems and the easy segmentation of your industrial network. □

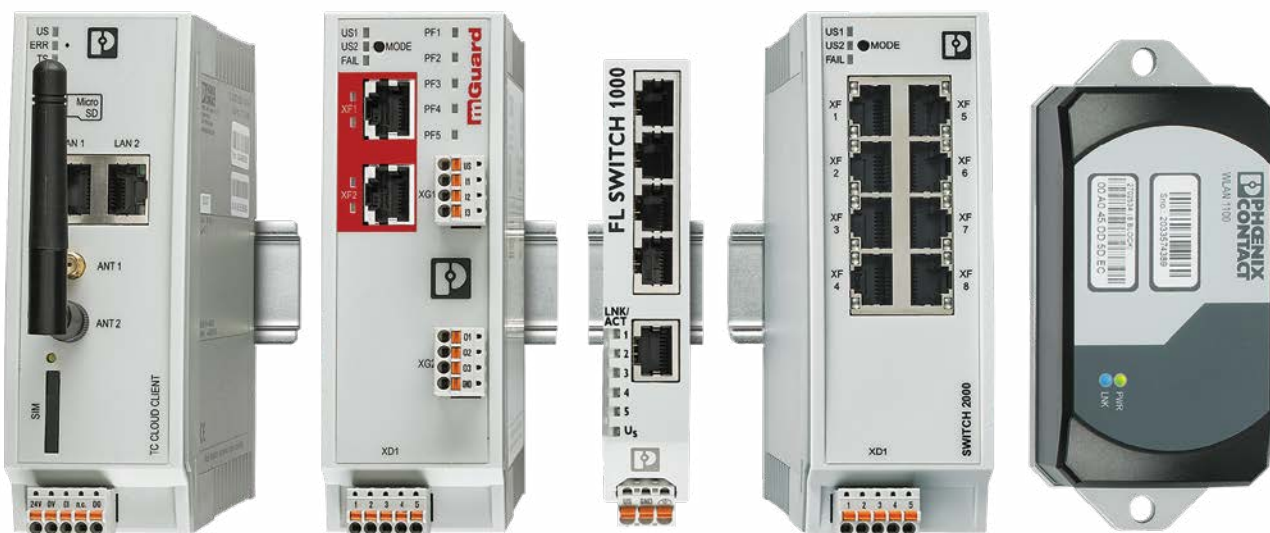


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Phoenix Contact's Industrial Ethernet Switch portfolio comprises managed and unmanaged switches.



Kabeer Sewpersad,
ABB South Africa.

Digital software solutions unlock business performance

Finding better ways to manage energy and manufacturing resources is a concern for businesses in Africa right now. However, achieving this can be a complex challenge. Kabeer Sewpersad, Sales Manager for Digital Solutions in process industries at ABB South Africa, reports here that the company is seeing first-hand how digital solutions are empowering businesses in several African countries to unlock improvements in energy management and enhance operational excellence and process performance.

Digital solutions in Africa: industry adoption

We are seeing some interesting trends relating to how and why companies in Africa are adopting digital solutions. Currently, we're providing a lot of support to cement, pulp and paper, and mining companies. Others taking a strong interest in our digital solutions are food and beverage businesses. All are looking to drive forward sustainability, process performance and operational excellence. Food and beverage companies have a strong focus on traceability from raw materials to finished goods, and the related supply chain tracking. In the mining industry, businesses are concentrating more on their underground fleet – and how to decarbonise, electrify and track fleet locations, aiming for near real-time optimisation of production plans.

Africa's mining sector is showing a lot of interest in our short interval control solutions. This software allows companies to convert and then track their long-term production schedules into shorter-scale weekly and daily plans. The system can auto-reschedule tasks as suggestions to meet the mine production targets, based on constraints experienced.

We're seeing a strong demand from the mining and pulp and paper sectors for advanced process control solutions, through which we provide process optimisation to help reduce raw material consumption, energy consumption, and process variability, and improve production throughput. Our work with businesses in Africa's cement industry is highlighting the value of digital solutions in optimising

processes and reducing materials used for manufacturing, while also improving on quality.

From silos to a single viewpoint

Organisational silos can stand in the way of critical operational and performance management improvements. Companies often rely on and interact with multiple systems, but do not have a single, unified view of what is happening across the organisation. Additionally, they lack a common way of working across their systems. These issues can lead to increased wastage, reduced efficiency and knock-on effects on performance and profitability. To counter this, ABB is implementing operational solutions which collect, contextualise, and convert data into actionable insights. This enables businesses to improve operations, optimise assets, streamline processes, and increase safety and sustainability. Beyond moving from fragmented silos to data unification that drives operational excellence, insights and productivity improvements, businesses then have the option of using the higher-level ABB Ability™ Genix platform to gain additional analytical insights and leverage AI and machine learning, to progress further towards achieving their goals.

Case study: Cement industry

A recent example of digital solutions helping a company to overcome system silos is the work we did with a leading Southern African cement company. After delivering a solution to facilitate operational excellence at three of its sites in Zimbabwe, ABB is now implementing this software solution at seven of the customer's sites in South Africa. We consolidate information from various manufacturing and business systems into one end-to-end system, ABB Ability™ Knowledge Manager, leveraging our extensive domain knowledge in the cement, minerals and mining industries. Knowledge Manager has a long track record, an installed base dating back over three decades, and is deployed at multiple global customer sites. For this customer in the cement industry, the solution helped break down organisational silos, supporting unified decision making and



ABB's digital software solutions are helping customers optimise process efficiencies and plant performance.

better collaboration across different business functions.

Maximising asset performance

Improving asset performance management is an important aspect of the journey towards optimum performance and maximum availability of plant assets, which directly impacts reliability and profitability, and minimises risk. We are working with many businesses in Africa, particularly in the pulp and paper industries, that are keen to understand how they can maximise performance of their assets and better manage their maintenance schedules with those assets. These companies are leveraging ABB's asset performance management solutions to address complex challenges.

Scheduled maintenance, on one end of the scale, can lead to 'over maintenance' resulting in excessive, unnecessary maintenance costs, or at the other end of the scale, 'under-maintenance' resulting in unanticipated breakdowns, downtime, and costly reactive maintenance. By gaining real-time insights into the status and performance of assets, businesses are better informed to prevent breakdowns, downtime, and the associated financial impact.

Accelerating business performance in Africa

These are exciting times for African countries and the



Companies in many industries are turning to digital solutions to drive sustainability and achieve operational excellence.

companies operating in them. Digital innovation is playing a central role in helping to shape a better future for businesses in Africa, enabling them to unlock improvements in energy and asset management, and empowering them to respond to new opportunities. By collaborating with trusted partners with proven experience in Africa, industries can reap the rewards and sustained benefits of digital innovation. □

For more information visit: www.abb.com

INDUSTRY 4.0 + IIOT : PRODUCTS + SERVICES

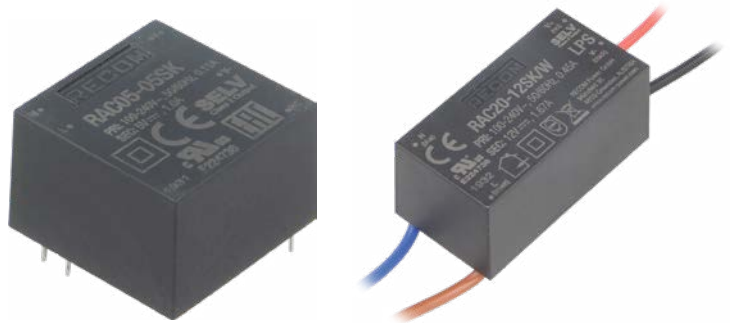
Miniature converters for electronic equipment

RECOM is a leader in power supply solutions for electronic and electromechanical equipment, offering integrated inverters for industrial, consumer, and other applications. The product line, which is available from TME (Transfer Multisort Elektronik), includes miniature circuits for direct installation in printed circuit boards (PCBs). The RAC series is especially popular due to its versatility and efficiency.

RAC series

The RAC series includes ac/dc converters with wide input voltage ranges (80 to 528 V ac and 100 to 750 V dc) and power ratings from 1 W to 40 W, achieving efficiencies up to 87%. The converters are suitable for various applications, from discrete electronics to larger loads like telecommunications equipment and industrial controllers. They also feature cost-efficient 3.3 V dc converters for microprocessor systems.

Some RAC models offer dual symmetrical outputs, simplifying designs for signal circuits like radio amplifiers and measurement devices. They provide stable voltage with minimal interference and low power consumption during no-load operation. Most models include built-in EMC (electromagnetic compatibility) filters and high-level protections like OPP – over-power protection, SCP – short circuit protection, and OVP – over-voltage protection, with insulation ratings up to 5 400 V.



Miniature 5 W ac/dc converter with a 25.4 x 25.4 footprint.

RAC converter with factory-mounted output and input leads.

Design and installation

RAC converters are designed for PCB installation with through-hole mounting, ensuring resistance to vibration and shock and making them suitable for mobile devices and industrial machinery. They are supplied in compact sizes, with the smallest measuring 25.4 x 25.4 x 16.5 mm and the largest 89 x 64.1 x 25 mm. This compact design aids in the miniaturisation of power supply circuits, simplifying manufacturing processes and reducing costs.

TME offers 44 different RAC converter series, each identified by their power rating and output voltage. Understanding the specific capabilities of each series helps in selecting the right product for different applications.

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

Advanced logistics engineering accelerates delivery

ACDC Dynamics (ACDC), a leading supplier of electrical components for automation, commercial, industrial, and mining sectors, has seen the first Gonvarri Tornado 9th generation Vertical Lifting Module (VLM) designed and installed in South Africa at its Edenvale warehouse. The VLM, from Logistics Systems Engineering (LSE), was designed to improve the efficiency of the warehouse operations.

It is an ultra-fast virtually noiseless, computer-controlled storage and transfer lift. Using minimal floor space, this innovative storage system automatically optimises loaded goods on trays, substantially increasing picking rates and providing security on high-risk items.

"Only once it was installed and operational did we realise the machine's speed and versatility, definite advantages compared to conventional VLMs, and it enables us to serve our customers better. The capacity of LSE's VLM allows us to increase productivity in storing and picking," says ACDC CEO, Mario Maio.

"This 9th generation Tornado VLM, which is 12 100 mm high, carries the same quantity of items as four competitor VLMs currently in our warehouse – and is close to three times faster. The technology and features incorporated in the Gonvarri VLM are beyond any other solution we have experienced or reviewed," he adds.

The installation was completed early in the second quarter of 2024 and the VLM has already demonstrated its effectiveness and accuracy, accelerating delivery times

and enabling simultaneous retrieval of multiple trays. This improvement has increased ACDC's picking rates and handling efficiency by up to 65%. The VLM continually optimises the heights of trays, finding the most appropriate space to accommodate storage units of various product sizes and heights. This HOT (height optimisation of trays) feature has proven to be a particular advantage. Each tray in the VLM measures four metres wide by 820 mm deep and has a standard capacity of 500 kg.

When deciding on this purchase, ACDC was swayed by the functionality of the VLM. "It's equivalent to having six additional personnel managing stock and it



Members of the LSE and ACDC teams at the official handover of the VLM at ACDC.

has the ability to use every millimetre of space," says Warehouse Manager, Floris Venter.

LSE's scope of work included the machine specification design, functional design, delivery, installation, commissioning, and personnel training. The VLM incorporates LSE's TCPlus System, a warehouse management system (WMS) that interfaces with the customer's enterprise resource planning (ERP) system.

"The project was engineered, manufactured, programmed and shipped from Finland," says Fred Albrecht, LSE CEO. "As the exclusive Gonvarri distributor and partner in South Africa, we conducted the installation and commissioning in just eight days. The installation was, however, made more complex due to the confined space in which the VLM had to be installed."

A simplified process

The module has a user-friendly interface. "It simplifies our processes," says Venter. "It allocates space based on product height and precisely indicates the location of each tray. When the ERP system calls a tray for picking, all orders are populated on the interface screen and then loaded sequentially. "However," Venter adds, "we can implement various rules during the picking process, such as prioritising the most crucial orders for execution."

The VLM is equipped with safety barriers and light curtains that stop it from operating when an alarm is triggered, which helps guarantee personnel safety.

Albrecht highlights: "The entire system is Industry 4.0 ready, taking storage and picking space to a new level. ACDC's order was one of the first orders globally and was South Africa's first order; there are now close to 1 000 units installed worldwide."

ACDC uses the VLM for small electrical components, focusing on medium- and fast-moving items. The high-density storage system measures each tray and immediately registers which cavity the tray must be sent to. This allows the trays to be filled with stock and the system optimises the volume by height, saving storage space. "There is a maximum of 25 millimetres between each loaded tray," says Venter. "This means we can

Continued on page 8



The new VLM delivers greater functionality and requires much less space than conventional racking and shelving.

Electrostatic discharge verification in IC design

USA-based Siemens Digital Industries Software has developed a fully automated solution to help integrated circuit (IC) design teams identify and address electrostatic discharge (ESD) issues driven by the growing complexity of today's next-generation IC designs, irrespective of the targeted process technology. Combining the power of Siemens' Calibre® PERC™ software with the proven SPICE accuracy of its AI-powered Solido™ Simulation Suite, it provides a fast and accurate method for checking compliance against foundry rules spanning all phases of IC design.

Supporting full-chip level verification, the solution helps engineering teams better manage design and manufacturing challenges in established or emerging process nodes. Its context-aware checks can help to improve the accuracy of results and reduce turnaround time for physical, circuit, electrical and reliability IC design verification.

The context-aware checking allows design teams to verify ESD paths quickly, in time to secure waivers from foundry rules that can lead to smaller die sizes and optimised designs – in turn helping design teams quickly make data-driven decisions, reportedly 8x faster than current methods.

Foundry ESD rules are designed to prevent ESD failures while accommodating the diverse design styles submitted by fabless companies globally. However, these rules may be overly conservative for specific design styles and mission profiles. By rapidly identifying and simulating ESD paths that might fail foundry rules with detailed transistor-level breakdown models, the new Siemens software identifies at-risk paths with SPICE-level precision, allowing for fast, targeted and automated fixes.

"Siemens' new context-aware ESD simulation solu-

tion can help deliver accurate reliability assessment for complex IC designs," said Silicon Labs' Michael Khazhinsky, Principal ESD Engineer of Central R&D.

"The push-button solution integrates dynamic simulation results from Solido into a full-chip Calibre PERC result that can be used to determine quickly if designs are electrically robust. In the event of circuit errors, the Siemens solution identifies nets and devices that need to be improved."

Automated context-aware IC design verification can now become a best practice, helping the timely delivery of reliable IC chips to market. Featuring functionalities such as automated voltage propagation, voltage-aware design rule checking, and the integration of physical and electrical information within a logic-driven layout framework, it helps design teams working to tight schedules.

"Siemens is empowering design teams to address the complexities of modern IC design reliability verification more quickly," said Michael Buehler-Garcia, Vice President of Calibre Product Management at Siemens Digital Industries Software. "This integration combines the strengths of our dynamic simulation from Solido and sign-off level ESD verification in Calibre PERC. The integrated solution speeds up the verification process and at the same time ensures the reliability of IC designs, helping our customers achieve their goals more efficiently. This is the first in a series of solutions planned, leveraging different elements of our software portfolio to speed up overall design cycle time."

For more information visit:

<https://eda.sw.siemens.com/en-US/>



Siemens Digital Industries has introduced a fast, accurate and context-aware ESD verification solution for use in IC design.

New AI Hub offers an AI design reference portfolio

Artificial intelligence (AI) use cases are growing fast, yet expert information is scarce for pioneering data centres. Vertiv, a global provider of critical digital infrastructure and continuity solutions, recognised this gap and the growing need for information in this field, which led to the launch of the AI Hub. This offers partners, customers, and other website visitors access to expert information, reference designs and resources to plan AI-ready infrastructure successfully.

The Vertiv AI Hub features white papers, industry research, tools, and power and cooling portfolios for retrofit and greenfield applications. The new reference design library demonstrates scalable liquid cooling and power infrastructure to support current and future chip sets from 10 to 140 kW per rack.

Reflecting the rapid and continual changes of the AI tech stack and the supporting infrastructure, the Vertiv AI Hub is a dynamic site and will be frequently updated with new content, including an AI Infrastructure certification

programme for Vertiv partners.

"Vertiv has a history of sharing new technology and insights for the data centre industry," said Vertiv CEO Giordano Albertazzi. "We are committed to providing deep knowledge, the broadest portfolio, and expert guidance to enable our customers to be among the first to deploy energy-efficient AI power and cooling infrastructure for current and future installations. Our close partnerships with leading chipmakers and innovative data centre operators mean we are well placed to help our customers and partners on their AI journey."

Sean Graham, Research Director, Data Centres at IDC, noted, "Virtually every industry is exploring opportunities to drive business value through AI, but there are more questions than answers around how to deploy the infrastructure. A recognised infrastructure provider like Vertiv is valuable to businesses building an AI strategy and looking for a single source for information." □



Vertiv has launched its AI Hub to offer a reference source for businesses looking to develop AI strategies.



Ryan Boyes, Galix Group.

Keeping AI in check: managing risk

Artificial Intelligence (AI) is fast becoming embedded in our everyday lives, from the apps we use, to search engines, facial recognition, smart devices in our homes, and more. However, Ryan Boyes, Governance, Risk and Compliance Officer at Galix makes the point that while AI has many applications

and benefits, and businesses are exploring its use in various ways, there is also a level of risk involved, particularly concerning the data that AI uses. He says risk management around AI is critical for any business, whether it has an AI strategy or not, because AI is simply everywhere.

Global standardisation

Having an international standard in place to manage the long-term risk of AI is essential, especially in light of companies like OpenAI recently reportedly disbanding its long-term risk team. The need for managing AI-related risk is highlighted by the introduction of the International Standards Organisation (ISO) 42001 standard in December 2023. ISO 42001 provides organisations with best practices to govern AI effectively, with formalised standards around AI management systems and a focus on understanding the risk of AI. It offers a comprehensive approach to managing AI systems throughout their lifecycle.

While ISO 42001 is a separate standard and certification, it is also intrinsically linked to ISO 27001, which is the standard for information security, because AI relies on data to perform its functions. It is therefore impossible to manage AI effectively without addressing information management systems as well. Every time anyone makes use of any AI system, whether this is part of corporate strategy or not, information is used and processed. Boyes emphasises that this needs to be better understood and better managed; otherwise organisations run the risk of information leaks, compliance breaches, and other issues around data security.

Intelligence requires information

AI and automation are widely applied to information in today's world, often without our noticing or being fully

aware of this. For example, if an AI platform like ChatGPT is used to build a document or help construct an email, which is something many people do without thinking, what information are they inputting to do this? If sensitive data like client names or company intellectual property are used, there is a risk of compliance breaches, as this information is now no longer under control and could be stored, processed, and used in a way that goes against local legislation.

Even storing information in SharePoint and using Microsoft Copilot could potentially be problematic, as the AI servers may be located outside the user's jurisdiction, and this may breach laws to which the company is required to adhere. If there is an information breach, the implications could be serious. Organisations need to be aware of how to manage the risks around AI and their information, and this should form an intrinsic part of compliance and cybersecurity strategies.

Not just an IT problem

Information and information security are no longer just an IT problem; everyone uses information, and it is critical that it is managed and protected effectively. From an organisational perspective, this means businesses need to be aware of what AI tools are out there and freely available, what is being used in the company, how to manage potential risk, and, importantly, where it fits in with their overall security strategy. The borders between roles and responsibilities are blurring, and both information and compliance officers need to understand how AI is being used and ensure appropriate security controls are in place.

While becoming certified in terms of ISO standards is not a legal requirement, they do provide excellent frameworks to guide the process of risk mitigation and to ensure effective, holistic information and cybersecurity strategies are in place. An experienced third-party security and risk provider can be a valuable partner on this journey, helping businesses to understand risks and their impact, how to manage, mitigate, or accept risk, and implement the systems and controls to manage information security effectively as part of a holistic, overarching cybersecurity and cyber resilience strategy. □

Continued from page 6

stock them effortlessly, and the system consistently optimises the volume, a capability not achievable with conventional racking."

The VLM, which has a floor footprint of 13.6 m², would take up 243 m² if laid out side-by-side as with conventional racking and shelving. This means it saves up to 87% of the space that would typically be required, providing ACDC with maximised storage capacity. Adjustments can also be made to the module; rules can change from FIFO (first in, first out) to first expiry. "Customers' de-

mands evolve, and the unit is adaptable to cater to WMS rules," says Albrecht.

LSE provides round-the-clock on-site support as well as technical remote monitoring, to resolve any issues efficiently and minimise downtime. "99% of all interventions can be done by remote assistance," says Albrecht. "However, with our user training programme, few interventions are required."

One of ACDC's goals is to advance technology in its warehouse and the company says the technology in the VLM meets its needs for future growth. □

Innovation gateway available on Google Cloud Marketplace

Altair, a global leader in computational intelligence, has announced that Altair One®, its cloud innovation gateway, is available on Google Cloud Marketplace, opening up new possibilities for users seeking access to powerful simulation, data analytics and high-performance computing (HPC) capabilities.

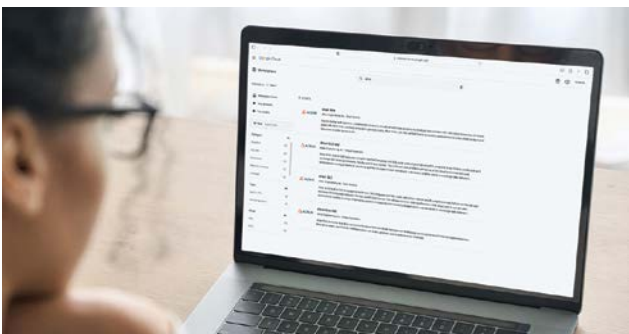
Altair One is designed for collaborative engineering, data engineering, and analytical application development. Built on a robust HPC backbone, it provides seamless, unified access to tools, data, and computing resources – with the power of artificial intelligence (AI) across every step of the product development life cycle.

Google Cloud Marketplace customers can make use of Bring Your Own Cloud (BYOC) functionality to run Altair simulation, AI, and data analytics applications.

“The integration of Altair One with the Google Cloud Marketplace empowers Google Cloud users to unlock a world of innovative solutions. This collaboration can fuel engineering breakthroughs with the power of Google Cloud’s adaptable, flexible, and scalable cloud infrastructure,” said Sam Mahalingam, Chief Technology Officer at Altair. “It aligns with our core mission of equipping businesses for digital success and making powerful software solutions readily accessible to users.”

“Bringing Altair One to Google Cloud Marketplace will help customers deploy, manage, and grow the platform on Google Cloud’s trusted, global infrastructure,” said Dai Vu, Managing Director, Marketplace and ISV GTM Programs at Google Cloud. “Altair can continue to scale and support customers securely on their digital transformation journeys.”

Altair One is a gateway that empowers organisations to mature into digital enterprises by breaking down data silos, connecting virtual models, optimising their compute infrastructure, and digitising key processes. It provides all the tools to create ‘one total twin’ of a product throughout its lifecycle, ‘one traceable thread’ connecting all data stages, and a ‘single source of truth’ for all models and data. This all-in-one platform automates data capture, empowers better decision making, enhances performance management, and accelerates digital engineering processes. □



Altair One is designed for collaborative engineering, data engineering, and analytical application development.

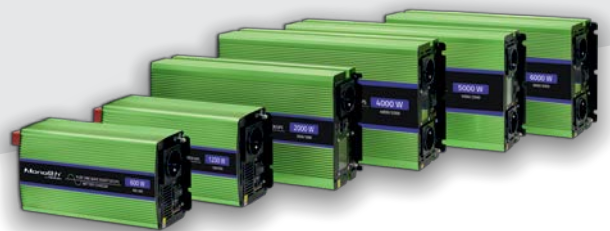


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Heskin Mzungu,
Client Director:
Energy at Zutari.

Balancing JET and ESG requirements

The world is facing an energy transition of unprecedented complexity that presents significant risks and opportunities. Deep technical skills, creativity, and collaboration are called for to navigate the transition successfully. Heskin Mzungu, Client Director: Energy at leading consulting engineering and infrastructure advisory firm Zutari, says the firm's

Generation, Transmission and Distribution, System Studies and Industrial Energy teams support clients across the lifecycle of energy projects, assisting them to achieve responsible growth.

“We combine our deep technical expertise with creative and digital skillsets to create value for our clients,” says Mzungu. “Meeting environmental, social and governance (ESG), Just Energy Transition (JET), and long-term climate resilience and decarbonisation targets is a fine balancing act, but Zutari is well positioned and resourced to tackle these challenges.”

Mzungu notes that for South Africa, the energy outlook is more positive now and he adds that the firm has received tenders for transmission projects, which bodes well for the strengthening of the national grid. Here, Zutari offers clients working in this space a single point of contact. As well as its technical engineering capabilities, Zutari can offer a single solution as ‘owner’s engineer’, an independent representative for the project owner. The firm provides a critical support role throughout all stages of the asset lifecycle, as well as in project management and quality assurance.

The energy transition in South Africa

Mzungu highlights a tension between the objectives of the JET and the need for coal-fired power in South Africa. “Looking at renewables in terms of costs, these obviously affect the bigger players differently than the smaller play-

ers. However, the social impact on local communities must also be considered,” he says.

The implementation plan for the JET aims to attract international and local investors to participate in South Africa’s energy transition. It spans 2023 to 2037 and sets out a roadmap to reach the goal of decarbonisation. The (draft) Integrated Resource Plan (IRP) 2023 presents government’s more detailed policy and outlines how South Africa aims to secure electricity supply into the future. The IRP 2023 reviews the previous IRP 2019 and sets targets for two horizons: 2030 and 2050. The draft policy document was issued by the Ministry of Minerals Resources and Energy earlier this year with a call for public comment (that was before the national elections and the subsequent changes in government).

Mzungu notes that the plan outlines the steps required to implement an energy transition, identifying the different technologies for the desired energy mix and determining when these would be introduced. The focus for Horizon 1 aims to stabilise supply and the national grid, and beyond that, Horizon 2 looks towards the country’s renewable energy targets and its decarbonisation commitments

“It is quite complicated for clients to get their heads

around the IRP 2023 and related documentation from other government entities, as there are significant legislative and other issues involved. Clients have to find a way through a minefield of policy changes,” Mzungu says. He also notes the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), for which Bid Window 7 (BW7) was announced on 15 December 2023, as another key consideration.

BW7 calls for procurement of 5 000 MW of renewable energy, including 1 800 MW of solar photovoltaic (PV) power and 3 200 MW of onshore wind power. Projects are required to be at an advanced stage of development and should



With its experience in the field and a spectrum of skills in-house, Zutari assists clients in getting to grips with the policies and demands of ESG and the JET.

be constructed and connected to the national grid within 24 months post-commercial close.

In addition, in terms of battery energy storage, BESIPPPP BW2 calls for 615 MW of BESS in eight storage facilities located near specifically selected transmission substations in the northwest supply area. The Gas IPP Procurement Programme (BW1) calls for 2 000 MW of gas-to-power land-based electricity generation facilities using natural gas within South Africa.

Mzungu highlights that these different programmes are running in parallel in terms of implementation. "Currently, we are assisting clients to navigate the various policies and programmes and their implementation timeframes. Many clients simply require advice. At Zutari, due to our history and experience in this sector, we offer expert guidance as we have played a significant role in REIPPPP since its inception."

The 'push-and-pull' tension in the energy transition and decarbonisation relates primarily to South Africa's history of coal-fired power generation. "The reality is we still need our coal-fired baseload for the foreseeable future," Mzungu says. "The IRP 2023 still includes coal up to 2030. So, it is important for clients to get a handle on the best solution for their businesses and for the country. It does not have to be the newest technologies; it can be an adaptation of existing technologies and alternative resources. For example, unlike the rest of the country, the Western Cape has abundant hydro and pumped energy storage resources, which are 'old school' but highly effective renewable energy technologies."

Wheeling energy

The advent of energy wheeling is another new development. This enables the transmission of privately generated renewable energy across the national grid to clients located in different parts of the country. For example, mines are procuring power directly from private developers, but the major bottleneck at present is the state of the transmission network.

Mzungu sees the unbundling of Eskom as a crucial step. He notes that the National Energy Regulator of South Africa (NERSA) allowed Eskom to transfer control over IPPs to the National Transmission Company of South Africa (NTCSA). The NTCSA, now formally constituted as a separate entity wholly owned by Eskom Holdings, will serve as Eskom's transmission subsidiary.

"The official establishment of the NTCSA marks progress towards achieving the functional separation of Eskom's business into distinct generation, transmission and distribution entities. The unbundling process is a critical step in ensuring more efficient and effective management of South Africa's power supply," Mzungu says.

It means that new build transmission projects can move



The firm offers clients advice and support through all stages of project development and asset management.

ahead. "We are just starting to see the rollout. Massive investment is needed in the transmission network over the next five to ten years, as Eskom has outlined in its Transmission Development Plan," Mzungu notes. "Here the funding will come largely from the private sector in terms of Engineering, Procurement and Construction (EPC). This will provide a comprehensive managed approach to streamline the construction process and deliver high-quality results on time and within budget," he says.

Project management and support

He emphasises too that a lot of work goes into getting a project to a point of financial viability. For example, in BW6, the emergency procurement round, many projects did not even reach financial close. "This entails financial, legal, and technical aspects and we help clients get there. Once a project reaches financial close, things tend to run more smoothly," says Mzungu. "We only supply the technical input; clients secure an external financial partner with a financial model based on the energy tariff required for that project to be viable."

Looking at the larger energy security picture for its clients, Mzungu says it has stabilised somewhat, with a more positive outlook going forward. "This is a result of investments from both the public and private sectors," Mzungu says.

And he adds that demand on the national grid is lower due to large-scale investment in renewable energy in residential, commercial and industrial sectors, giving Eskom much-needed breathing room. "The problem has been meeting demand, so if demand drops, it provides part of the solution. Eskom is also steadily improving the Energy Availability Factor (EAF) at its coal-fired power stations, though it is not yet where the utility wants it to be. Private sector players are making a major contribution to resolving Eskom's immediate issues."

Economies of scale are making the latest renewable technology more affordable for big and small players; systems can be implemented more cost-effectively. And,

apart from the affordability factor, Mzungu highlights that substantial institutional knowledge has developed in the industry through the years of REIPPPP.

"The sector has matured, with players and developers operating at every scale. Many players were frustrated initially at the slow pace of development, but Zutari has retained a lot of knowledge and experience in the sector," Mzungu says.

"Municipalities are not there yet, but the energy transition opens opportunities for them too. There is scope for us to offer our expertise at a local government and municipal level. The municipal level is open to tender, so it is very competitive." He cautions that the lowest price does not always translate into the best solution.

Looking ahead

Looking ahead, Mzungu anticipates a continuing increase in the uptake of solar energy by the private sector and, in tandem, a continued dependence on coal as a baseload energy source for decades to come. "It will happen together with the JET, although it may take longer than was originally anticipated.

"Australia presents a good example. It is as coal dependent as South Africa, but it embarked on its energy transition in 2001."

Government is also realising that renewables are coming online at such a pace that it must ensure the transmission network can support the new energy generation capacity and guarantee a stable grid. "The process may be slow, but we are heading in the right direction," Mzungu says. He emphasises that environmental factors are an important part of the JET as well and sustainability is a key concern for businesses where ESG reporting has become a priority and a major influence on corporate strategies.

In closing he highlights that Zutari's stakeholder engagement capability enables it to assist communities and public participation on projects, generating jobs on the ground, and ensuring that all the necessary permitting is in place. "Developing new energy projects is a complex process with many factors to consider, and clients look for the single point of contact we can provide," Mzungu says. □

For more information visit: <https://www.zutari.com>



Speaking at the IEA's Conference, Astrid Mozes, President, Regions, Danfoss.

A call to increase energy efficiency in the cold chain

With around 14% of food worldwide^[1] lost due to a lack of effective refrigeration, enough to feed one billion people, global engineering firm Danfoss is calling for more attention to be given to establishing sustainable and energy-efficient cold chain infrastructure.

The requirement for investments in sustainable cold chains is especially evident in sub-Saharan Africa where up to 40% of food is lost^[2] between farms and markets, with

two-thirds of this in the first mile.

The need to spur global action on energy efficiency was in focus at the International Energy Agency's (IEA's) recent 9th Annual Global Conference on Energy Efficiency, which took place in Nairobi, Kenya in May.

Increasing temperatures, population growth, urbanisation and rising incomes are driving the greater need for cooling. According to the first Global Cooling Watch Report^[3] launched by the United Nations Environment Programme (UNEP) at last year's COP28, cooling demand could triple by 2050. This would lead to a doubling of greenhouse gas emissions by 2050, which is equivalent to more than the total annual greenhouse gas emissions of the United States of America today.

The same report shows that driving efficiency in the cold chain and refrigeration through minimum energy performance standards and passive cooling can deliver 30% of the required energy savings by 2050, and significantly reduce food loss and waste. This large energy saving is based on the 24-hour year-round operation of refrigeration.

Speaking at the IEA's Conference, Astrid Mozes, President, Regions, Danfoss said: "The good news is that near zero emission cooling is possible. Emissions in 2050 could be cut by 97%, using readily available technology, including state-of-the-art energy efficiency. Kenya is one country where sustainable business models and financing solutions are key to delivering sustainable and reliable cold chains."

The Loss2Value Project^[4] in Kenya, launched by Danish Church Aid and Danfoss, is an example of important work being done in the country to establish a secure cold chain. The project's objective is to reduce post-harvest losses by emphasising the concrete value of energy-efficient cold storage to smallholder farmers and traders in Kenya and creating the ecosystem to make it a sustainable business case.

By implementing sustainable business models and financing solutions, the initiative is empowering small and medium sized enterprises and farmers to make positive change. The initiative addresses the immediate challenges and contributes to creating a lasting and resilient impact on the agricultural landscape in Kenya. □

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Power factor correction and voltage optimisation can enable savings on energy costs.

Cost savings with power factor correction

Ged Hebdige, Technical Director at UK company Powerdown220, a specialist in voltage optimisation, highlights two technologies for instant energy savings.

Hebdige explains that the 'apparent power' supplied through the mains by the electricity provider is made up of active power plus reactive power. Active power is usually referred to as 'real power' and is expressed as Watts (W) or kilowatts (kW). This is the electrical energy that is converted into work, turning the shaft of a motor, for example, and it's what the supplier bills the user for in kWh.

Reactive power, on the other hand, is used to generate and maintain the magnetic fields surrounding equipment such as motors and transformers. The equipment needs the reactive power to function, but it does not directly go to doing useful work.

Power factor is the ratio of active power to reactive power. The more reactive power a facility needs, the lower its power factor. The benchmark is a power factor of 95%, with most users above 80%. However, power factor can be as low as 50%, which means only half of the power supplied goes into active work.

Facilities employing many inductive loads that rely on magnetic fields to operate are most likely to have a reduced power factor. Inductive loads tend to draw current that is out of sync with the voltage, resulting in a lagging power factor. This is most common with industrial and commercial consumers, where motors and transformers

draw heavy loads in a range of applications, such as fans and conveyors.

Suppliers bill consumers for active power, not reactive power. However, they must still supply enough reactive power to meet a user's demand. A power factor of 50% means the supplier must provide twice as much power as they charge for, and electricity suppliers may then charge users penalties if their power factor is poor.

Low power factor can also make it harder for a business to expand operations, because the existing supply might not be adequate to cope with current demand plus the extra to make up for the low power factor.

Hebdige adds that power factor is also an important part of power quality which can affect the lifespan of electrical equipment.

Power factor correction (PFC) minimises the amount of apparent power the transmission system must generate by supplying the required amount of reactive power locally, avoiding unnecessary power generation and distribution losses. PFC can cut electricity bills, improve equipment lifespan and in some cases, obviate the need to increase the supply availability or save the costs of upgrading or installing a new supply.

Voltage optimisation (VO) technology can, in some cases, provide further savings. VO reduces the incoming mains supply voltage to the level the equipment is designed to work with. This extends its lifespan, cuts electricity bills by around eight per cent and helps reduce the company's carbon footprint. □

Secure power for IT environments

Although Eskom has sustained a stable power supply nationally through more than 100 consecutive days without loadshedding, the implementation of load reduction by the national and municipal utilities still raises an operational barrier to many businesses. Consequently, demand for backup power continues to grow, to keep critical IT appliances running in the event of an outage.

Power management company Eaton has recently launched the Eaton 5P Gen 2 UPS, a compact and efficient power solution for edge and informational technology (IT) needs. Reportedly, delivering more output, security and control than any other devices in this class, the new product range also enables fleet management, remote UPS setting and remote firmware upgrades.

The 5P Gen 2 has enhanced power capability and provides up to 1 350 W, which is 22% more than its predecessor and 33% more than comparable models available on the market, making it suitable for protecting a wide range of applications. Intelligent design ensures its stable performance and energy savings, and advanced load segment control prioritises critical equipment and optimises battery runtime.

This UPS model features the Eaton ABM+ Advanced Battery Management technology, which extends battery life by up to 50% and allows for accurate battery life prediction and timely replacement alerts powered by machine learning. Additionally, it is supplied with hot-swappable batteries and an intuitive battery replacement wizard accessed via a built-in graphic LCD (liquid crystal display).

Eaton's Intelligent Power Manager (IPM2) and Distributed IT Performance Management (DITPM) software enable remote monitoring and management of IT infrastructure, even in hard-to-reach locations, including secure device configuration and firmware updates.

According to Jessica Masina, Field Product Marketing Manager at Eaton Africa, "The new Eaton 5P Gen 2 UPS offers superior output, security, and control compared to other devices in its category." The Eaton 5P Gen 2 UPS, together with the cybersecure Gigabit Network Card (included in the Netpack versions), meets strict cybersecurity standards. Moreover, Eaton's Brightlayer Software Suite is available for seamless integration with virtualisation environments, ensuring continuous service and data integrity.

Customers can opt for the compact 1U rack or the tower option, the Eaton 5P Gen 2 UPS fits all space requirements, so it is compatible with a variety of setups. □

Eaton has launched the new 5P Gen 2 UPS to protect critical IT appliances against power outages.



Addressing the high cost of solar waste

As the solar energy sector continues to grow, the challenge of managing the costs associated with recycling end-of-life solar panels becomes increasingly pressing. Desco Electronic Recyclers is paving the way for a more economically viable and environmentally sustainable approach to solar waste management.

Through innovative recycling services and solutions, the company is addressing these financial hurdles and tackling the significant expenses involved in the collection, transportation, and processing of solar panels.

Giulio Airaga, Desco Director, says the company provides a robust and thorough recycling process for solar panels, ensuring that valuable materials are recovered and repurposed and minimising the environmental impact.

"The process begins with dismantling the solar panels to extract the aluminium frame, junction box, and wires, which are valuable components that can be reused or recycled. The remaining photovoltaic material is then shredded to reduce it in size and milled to separate the glass, a crucial step in preparing the materials for further processing," he explains.

The separated glass and aluminium are sent to downstream customers that use these materials in the production of new, sustainable products, promoting recycling and supporting the creation of a circular economy.

Airaga says recycling solar panels poses significant challenges, particularly in terms of collection and processing costs. "Transporting solar panels to recycling facilities can be expensive, due to their bulk and weight."

For example, transporting 1 000 tonnes of solar panels requires 50 truckloads, each costing about R30 000, thus resulting in a total immediate cost of R1.5 million. This cost can increase further, depending on the distance from the collection site to the recycling facility.



Desco Electronic Recyclers is pioneering the recycling of end-of-life solar panels and sustainable solar waste management.

Moreover, the recycling process itself is costly and labour-intensive. Solar panels are large and bulky, and significant manual labour is required to feed them into the recycling machinery. The process involves multiple machines running continuously to handle the large volumes, further adding to the operational costs.

Airaga highlights that the energy-intensive nature of recycling solar panels is compounded by the lack of reliable power supply in South Africa, presenting an ironic challenge given that materials being recycled were used to generate energy from a renewable source.

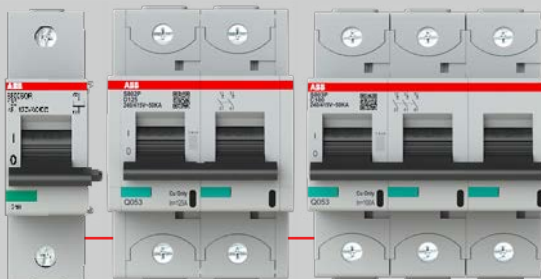
The cost to recycle each solar panel is roughly R200 to R250, and with an average solar farm containing from around 170 000 up to 611 000 panels, the financial implications are substantial. It is illegal to landfill solar panels, so finding cost-effective and efficient recycling methods is essential.

To further enhance the effectiveness of solar panel recycling, Desco advocates greater involvement from government entities and producer responsibility organisations (PROs). By subsidising costs and supporting recyclers, these bodies can help ensure that solar panel recycling becomes more accessible and economically viable. □

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Construction progresses on Koruson 1

Construction of EDF Renewables' Koruson 1 cluster of three wind farms (Phezukomoya, San Kraal and Coleskop) outside Middelburg and Noupoot, is well under way, with half of the of 237 turbine blades and other components required having been delivered from the Coega port. Each blade on the turbines is 81.35 m long and weighs 28 tonnes and they have travelled via the R75 and N10 to the three sites.

Project CEO, Cedric Faye said, "We would like to thank the public for their patience and safe driving with regard to the abnormal loads carrying the components from the harbour to site. There are several other projects under construction in the area, and we realise that traffic is being affected."

The scale of the Koruson 1 project is extensive, with the three sites spread across 50 square kilometres. A total of 78 wind turbines will be installed on concrete towers, which are now being assembled and erected across the three sites. The 124 m high concrete towers each comprise 50 keystones, all manufactured locally at a concrete tower factory outside Middelburg in the Eastern Cape.

Developed by EDF Renewables in partnership with H1 Holdings, GIBB-Crede and a local community trust, each wind farm will have a generation capacity of 140 MW, seeing a total installed capacity of 420 MW. This cluster constitutes the biggest wind farm yet built in Africa. The total investment in the project amounts to 11 billion ZAR.

In addition to the three windfarms, a main transmis-



The turbine blades for Koruson 1, each 81.35 m long and weighing 28 tonnes, in transit to the site.

sion station and three substations are under construction to transmit the power to Eskom. The construction works are progressing rapidly towards commissioning, and the Commercial Operations Date (COD) is planned for first quarter of 2025.

The project is part of Round 5 of South Africa's Renewable Energy Independent Power Producer Procurement Programme and will contribute to reducing the energy deficit in the country.

About 3 800 workers are currently on site. In this construction phase, Koruson 1 is creating significant employment and local resources and businesses are being used wherever possible. More than 40% of the project's value is made up of South African goods and services, and 1.25% of revenue generated by the three wind farms over their contractual period will be applied to socio-economic development initiatives for nearby local communities. □



*Andrew Taylor,
CEO of NOA
Trading.*

Renewable energy trading facilitates decarbonisation

NOA Group Holdings (NOA) has announced a 497 GWh energy supply agreement with Tronox Holdings plc, a leading manufacturer of titanium dioxide pigment. The agreement will extend Tronox's renewable energy usage significantly to above 70% of its electricity requirements and demonstrates NOA's capacity in aggregating power from a fleet of generation facilities across the country, to be supplied to Tronox's full portfolio of operating sites in South Africa.

"The model used represents an advance in renewable energy supply solutions for commercial and industrial off-takers in South Africa, and the largest private wheeling transaction between an aggregator like NOA and a private off-taker," said Andrew Taylor, CEO of NOA Trading, the group's trading subsidiary. "It separates energy generation from consumption using NOA's aggregation and trading platform, unlike traditional bilateral agreements tied to specific generation sites. This provides for more flexible, efficient, and reliable energy supply."

Under the 25-year supply agreement, NOA will deliver renewable energy to Tronox's five sites across the Western Cape and KwaZulu-Natal. This is facilitated

by Eskom's wheeling model, which allows NOA to source energy from diverse wind and solar facilities nationwide, thus enhancing supply reliability and tailoring generation profiles to specific geographic and resource characteristics.

"The initiative is bolstered by the issue of verified International Renewable Energy Certificates (IRECs), which authenticate the delivery of renewable energy. This is important in supporting Tronox's decarbonisation goals and reducing its reliance on fossil fuel-derived energy," Taylor added.

NOA is leveraging significant equity investment to consolidate its position in the renewable energy market and create strategic partnerships with established companies. With R3.2 billion of equity capital committed by NOA's majority shareholder, AIIM, NOA is positioned as a reliable supplier of renewable energy to the South African market. The transaction with a blue-chip off-taker like Tronox is viewed as a flywheel deal, enhancing NOA's strategic standing and capabilities in the sector.

The agreement between NOA and Tronox, building on an initial renewable energy procurement in March 2022 from a wheeled solar PV PPA, also supports Tronox's lead in decarbonisation. □

Breaking ground on SunCentral

Independent power producer, SolarAfrica Energy has officially broken ground on its first utility-scale solar farm, known as SunCentral, in De Aar in the Northern Cape. Phase 1 of this project will establish around 342 MW in generation capacity. Phases 2 and 3 will take total generation capacity to 1 GW – making this one of the largest projects of its kind in the country.

A project of partnerships

During the breaking ground ceremony, David McDonald, CEO of SolarAfrica Energy, outlined the significance and strength of the partnerships behind SunCentral – a key driver for its success.

“A project of this magnitude would not have been possible without the power of partnerships. Over the past decade, Eskom has found new ways of making wheeling a reality in South Africa. Its dedication to partnering with the private sector demonstrates its commitment to addressing South Africa’s power generation struggles,” McDonald said.

The event was also attended by representatives of Emthanjeni Municipality and Business Chamber, and McDonald acknowledged the importance of fostering positive relationships within the community. Mayor Lulamile Nkumbi expressed the municipality’s support for the project and emphasised the importance of maintaining open and transparent communication between all stakeholders.

Special mention was made of Soventix South Africa, the company that originally developed the project for submission in the Renewable Energy Independent Power Producer Procurement Programme. Soventix sold the rights to Phase 1 of the cluster development to SolarAfrica and will continue to develop Phases 2 and 3 for the project as time progresses.

Engineering, Procurement and Construction (EPC) firms Proconics and Sinohydro will be key to the project’s success. Proconics will install SunCentral’s Main Transmission Substation (MTS) and Sinohydro will be responsible for the installation of more than 500 000 solar panels.

Infrastructure investments

Phase 1 of the project represents an investment of just under R5 billion. The MTS, with a total cost of around R1 billion, is funded by SolarAfrica and will play a pivotal role in ensuring the power produced on site can be evacuated into the national transmission grid. The solar installation carries a cost of around R4 billion. This is an indication of the significant contribution SunCentral will make to the country’s power infrastructure. “Investments of this nature go a long way in bolstering the grid’s ability to manage and distribute power across the country,” McDonald said.

As part of the greater Starsight Energy Group, SolarAfrica’s SunCentral project will also serve as a blueprint



Construction has officially begun on Phase 1 of SunCentral, the start of build out in this R5 billion investment.

for the adoption of wheeling projects in East and West Africa, with a specific focus on Kenya and Nigeria.

Power for good

A project of this scale has an impact at local and national levels. Located between Hanover and De Aar, SunCentral brings with it several corporate social responsibility projects that will be implemented in collaboration with local members and leaders to support an improved quality of life among the surrounding communities. □

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Kusile Unit 5 adds 800 MW to the grid

Following six months of rigorous testing and optimisation, Eskom announced, at the end of June 2024, the successful transfer of Unit 5 of the Kusile Power Station from the new build programme to operations in the Generation Division. Reaching commercial operation after it was first synchronised to the national grid on December 31, 2023, this unit will now begin contributing power, increasing Kusile Power Station's total output to 4 000 MW.

"Kusile Unit 5 makes an extremely valuable contribution to the national grid. It is one of the largest baseload units contributing megawatts, and it enhances the stability of the network," said Isabel Fick, General Manager System Operator.

The handover of Unit 5 to operations marks a significant milestone in Eskom's ongoing efforts to stabilise South Africa's power system, adding a stable and much needed 800 MW to the grid.

"The delivery of the unit, as part of our Generation Operational Recovery Plan, demonstrates the remarkable achievements possible when our 40 000 employees work together as a collective," said Bheki Nxumalo, Eskom Group Executive for Generation.

"I extend my gratitude to all Eskom employees and contractors for their diligent work in bringing this unit to commercial operation. This achievement aligns with our commitment to maximising grid capacity," added Nxumalo.

Dan Marokane, Eskom Group Chief Executive, said, "We stated in our winter outlook, published on April 26, 2024, that we would add new generation capacity to the grid with Kusile Power Station Unit 5, as part of our intense focus on delivering the Generation Operational Recovery Plan, which was approved by the Board and initiated in March 2023. This addition is part of a total of 2 500 MW that will be added before the end of this calendar year.



On completion Kusile Power Station will comprise six units with a capacity up to 4 800 MW.

"Eskom will continue to focus on implementing operational recovery, strengthening governance and future proofing the organisation to enable energy security, growth and long-term sustainability to the benefit of South Africa and sub-Saharan Africa," Marokane said.

Over the past six months, Kusile Power Station Unit 5 has undergone a series of tests while intermittently supplying electricity. Since its synchronisation in December 2023, the unit has met performance expectations, supported the grid and helped to reduce loadshedding. On completion, Kusile Power Station will consist of six units, producing a maximum of 4 800 MW.

Additionally, Kusile is equipped with wet flue gas desulphurisation (WFGD) technology, making it the first power station in South Africa and Africa to use this emissions abatement technology. WFGD removes sulphur dioxide from flue gas before it is released into the atmosphere, ensuring compliance with international air quality standards.

Construction of the remaining Kusile Unit 6 is progressing as planned, with it expected to be synchronised to the grid in November 2024.

Located near eMalahleni in Mpumalanga, Kusile is South Africa's largest construction project and, on completion, it will be the world's fourth-largest coal plant.

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

Koeberg operating licence extended for further 20 years

The National Nuclear Regulator (NNR) has granted Eskom a licence to continue operating Koeberg Nuclear Power Station Unit 1, which provides 930 MW to the grid, for



Eskom has been granted a licence by the NNR to continue operating Koeberg Unit 1 for another 20 years.

another 20 years until 21 July 2044. Koeberg Unit 1 will join about 120 reactors worldwide that have safely continued operations beyond their initial 40-year life.

Eskom has operated the Koeberg Nuclear Power Station safely for 40 years and has invested in safety improvements and extensive maintenance to ensure it continues to operate safely into the future.

"Together with our business partners, we are proud of this achievement, which ensures that Africa's first and only nuclear power plant can now continue to operate safely into the future," said Bheki Nxumalo, Eskom Group Executive for Generation.

"The granting of the licence is a testament to the hard work and continued commitment of our teams to nuclear safety and Eskom's generation recovery plan," said Keith Featherstone, Eskom Chief Nuclear Officer.

Continued on page 19

Financial close on 280 MW wind energy projects

African Infrastructure Investment Managers (AIIM), a division of Old Mutual Alternative Investments, has reached financial close on the 140 MW Khangela and 140 MW Umsinde Emoyeni wind farms to supply renewable energy to the operations of Rio Tinto's Richards Bay Minerals (RBM) and Sibanye Stillwater via wheeling agreements.

The projects have been led and developed by AIIM's renewable energy project development platform, ACED. Reatile Renewables has co-invested in the projects alongside the AIIM-managed IDEAS Fund, one of South Africa's largest domestic infrastructure equity funds. Rand Merchant Bank (RMB), a division of FirstRand Bank Limited, is the sole mandated lead arranger for both projects, and operations and maintenance services for the projects once built will be provided by AIIM's in-house operator, EIMS.

"We are proud to have achieved financial close and to begin construction on another two private renewables projects in partnership with some of South Africa's major mining houses. The projects will provide Rio's Richards Bay Minerals and Sibanye Stillwater with clean energy for their operations, and will create jobs and development funding streams to support and grow local communities living adjacent to the projects," said James Cumming, General Manager of ACED.

The deal entails the sale of power to the mining houses through 20-year Power Purchase Agreements. Khangela and Umsinde Emoyeni Wind Farms are situated near Murraysburg in the Western Cape, with a small portion of the proposed development site crossing into the Northern Cape. Windlab South Africa (now Seriti Green) was the early-stage developer of the sites, which were then acquired and developed to financial close by ACED.

"The addition of power generation capacity to the national grid will contribute to offsetting the power deficit in

the country," said Cumming.

These deals mark the ACED team and their allied teams having brought about 470 MW of private wind and solar projects to financial close in the past 24 months, confirming the consortium's collective drive to be a leader in renewable energy development and operation in South Africa. They add to the gigawatt of projects the teams have already developed and operate via the South African Renewable Energy Independent Power Producer Procurement Programme.

"AIIM is committed to executing its mandate of investing successfully in renewable energy projects that can deliver sustainable investment returns over the long-term to our predominantly South African pension fund investor base," said Sechaba Selemela, Investment Principal at AIIM. He also highlighted the benefit of having companies such as ACED and EIMS in the AIIM fold, noting that, "our in-house development platforms provide us with a differentiated and steady flow of large-scale investment opportunities, which are unmatched in this market."

Selemela added that the Khangela and Umsinde Wind Farms are two of the three wind farms that make up the largest cluster of wind energy projects on the continent with the last project expected to close in the next few months. This portfolio follows from similar wind farm developments, Msenge Emoyeni and Castle Wind Farm, on which AIIM reached financial close in 2023.

Simphiwe Mehlomakulu, Executive Chairman of Reatile Group, noted this as another win for South Africa. "We are delighted to have reached financial close on both projects and to be able to support big businesses so they can continue to create employment and new opportunities in the South African communities in which we operate. We aim to bring real solutions to alleviating loadshedding and building sustainable generation capacity to the grid in South Africa."

Managing Director at RBM and Rio Tinto Iron and Titanium (RTIT) African Operations, Werner Duvenhage, emphasised the significance of the project, stating: "This project is expected to reduce our annual emissions by about 470 kt CO₂e, equivalent to about 20% of our baseline emissions, and to meet about 26% of RBM's existing energy requirements."

Sibanye-Stillwater CEO, Neal Froneman said: "Financial close of the Umsinde Emoyeni wind farm marks another critical step in our journey to achieving carbon neutrality by 2040. The renewable energy secured through our four PPAs will enable a stepped reduction in our carbon footprint, contributing to mitigating the effects of climate change, and enhancing the sustainability and shared value creation of our SA operations through favourable pricing relative to current supply. We continue to develop and execute energy solutions that contribute to the delivery of our strategy." □



*Sechaba Selemela,
Investment
Principal at AIIM.*

Continued from page 18

"Over the years, Koeberg has identified and implemented safety improvements, from both French and US nuclear experiences, which have reduced the risk to levels that would normally only be achieved by new, modern nuclear power plants," Featherstone added.

As the Koeberg licence will be changed to reflect an end date of 21 July 2044 for Unit 1, Eskom will continue to operate the unit until January 2025, when the unit will be shut down for its next scheduled refuelling and maintenance outage.

The current licence for Koeberg Unit 2 only expires on 9 November 2025, and the Koeberg Power Station is implementing some of the prerequisites for Long Term Operation in the current outage. Once the current outage is complete, Unit 2 will be returned to service, and the NNR has stated that the decision regarding the Long Term Operation for Unit 2 will be made at a later date, but prior to 9 November 2025. □

Customised solutions in pressure sensors

Instrotech, local representative of KELLER, a Swiss-based market leader in the production of isolated pressure transducers and transmitters, supplies the wide range of KELLER pressure sensors as well as customised solutions.

Wherever pressure sensors are needed, a solution can normally be found in KELLER's standard product catalogue, but there are often great benefits to optimising a product specifically for integration and use in existing complete systems. In addition to outwardly identifiable components such as housing parts or plugs, the inner workings of the sensor can be optimised. Instrotech offers many individual parts in-house and works closely with the supplier, so it can make various modifications with ease.

Shared expertise

Instrotech's customers are specialists in their field: they know their requirements and operating conditions best and KELLER understands this. Since 1974, KELLER has been harnessing the potential of piezoresistive sensor technology to see numerous challenging projects to completion. In these projects, a mutual exchange of expertise has been essential to their success. Sharing KELLER's knowledge is what enables Instrotech to find the best sensor solution for its customers.

Even applications that may appear simple at first glance can prove highly complex on closer analysis. By taking on-site usage conditions of the required sensor into consideration from the outset, KELLER can implement improvements in the effectiveness and durability of the solution. This holds true whatever the application – from fill-level sensors in rain-water tanks to ultra-precise laboratory instruments.

No matter the task at hand, expert advice from the company's sales engineers and developers is an important part of the puzzle. Deciding if an existing product can be used – possibly with suitable modifications – or a new development is needed, depends entirely on the application project. Together, Instrotech and KELLER look at the requirements to determine the properties needed for flawless measurement. With their many years of experience, the teams look closely at all the factors involved and their various interdependencies.



Various specifications must be considered in determining the right solution for each application.

Measuring ranges and performance

First, they define the basic sensor specifications such as overall measuring range, accuracy, calibration to specific measuring points and units of pressure, or scaling of the output signal. Products with a digital signal output have additional factors that need to be determined, such as sampling rate or signal resolution. The values defined at this stage form the starting point for selecting components.

Bernhard Vetterli, Technical Director at KELLER, says, "With our technological expertise, long experience and mastery of the many processes involved in manufacturing pressure sensors, as well as a high level of vertical integration, we can make what sometimes seems impossible, possible."

Tuned to ambient conditions

Another crucial requirement is considering the ambient conditions. These can inform design to provide for a longer service life for the sensor and are essential for delivering correct measurements. If the pressurised system operates with a large overpressure or with dynamic loads, the sensor design must be optimised for these particular demands.

With some applications or neighbouring system parts, there is a risk of signal distortion or component failure due to vibration or shock. Temperature also has a major impact on all materials and their resistance. Complications can be caused by extreme temperatures and by rapid changes in temperature. Another important factor is chemical resistance. The materials used for housings and seals must be carefully selected, so they are not at risk of being damaged by aggressive measuring media. External factors such as petrol fumes, ultraviolet radiation, salt water or, in some environments, microorganisms, can also cause problems. It is therefore essential that all relevant factors be considered. Of course, even finely tuned designs still have limits, and additional protective measures may be needed.



As the local representative of market leader KELLER, Instrotech supplies a wide range of KELLER pressure sensors.

Stefan Fehr, Head of Quality Assurance at KELLER adds, "Our experience has taught us that materials and physics hardly know any limits when it comes to creating new challenges for us to solve."

Mechanical design

Taking all the above points into consideration, the performance of the sensor will be influenced by its design, from the choice of the sensor chip and coupling medium through to the materials and production techniques used. In addition, customers may have particular requests concerning shape and size, pressure connections and so on. And of course, specific requirements relating to the area of application must be complied with, as well as applicable legal regulations and standards.

David Bollinger, Head of Mechanical Engineering at KELLER says, "Customer-specific constructions are an important driver of innovation and inspire us to develop new ideas and approaches to finding solutions. New findings are always incorporated into the further development and improvement of our existing product range."

Electronics and configuration

The main function of the electronics is to prepare the measurement signal, and in some cases to save it and output it via a suitable interface. Customers can also request that application-specific calculations be integrated in the firmware, or ask for special device and software configurations. Other requirements will depend on the working environment, taking account of factors such as extended lightning protection, EMC (electromagnetic compatibility) or explosion protection. Intrinsically safe products can also be specially configured to match the parameters of the customer's overall system.

Silvan Achtnich, Electronics and Software Development at KELLER says, "We develop electronic modules that get the best accuracy from our sensor elements and leave scope for customer-specific algorithms."

Electrical interfaces and connections

Digital interfaces can be configured for specific communication protocols or modified to suit the customer's needs. Analogue interfaces also continue to play an important role in sensor technology. KELLER is well experienced in developing application-specific solutions based on both these principles, including devices with light wave and frequency outputs. For electrical connections, the necessary plugs can be integrated into the design, and cable outlets can be specified by the customer.

Daniel Hofer, Head of Product Management at KELLER says, "The success of a project hinges on the exchange of information at the interfaces. We offer a wide range of protocols and electrical interfaces to enable seamless system integration and loss-free transmission of pressure values."

Labelling

In addition to customer logos, functional markings can be applied to devices, either employing laser inscription or by printing information on labels. Labelling may include part codes, serial numbers, data matrix codes or guide marks. Customers can also specify a colour-coding scheme for the connecting wires. For consumer products such as manometers, a personalised design that includes the customer's logo can be applied to the front panel.

Patricia Pedrosa of Laserservice, says, "Our annealing marking technology guarantees high-resolution laser inscriptions that are resistant to acids as well as chemical and corrosive components, all without damaging the metal surface." □



Labelling of devices can be customised to meet the customer's requirements.

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

SENSORS + SWITCHES : PRODUCTS + SERVICES

A single terminal to power load cells

With its four EL336x EtherCAT analogue input terminals, Beckhoff provides a particularly compact and cost-effective solution to integrate weighing functions into control systems. The integration of the supply voltage for the load cells is especially advantageous.

The EL3361-0100 and EL3362-0100 EtherCAT analogue input terminals feature analogue inputs for the direct connection of one or two resistance bridges (strain gauges) or load cells in a 4-wire or 6-wire connection system. The 10 V sensor supply is already integrated. The analogue value resolution is 24 bits and 10 ksps. For more demanding applications, the EL3361 and EL3362 also offer a switchable sensor supply (5/10 V) and digital inputs (for example, for tare) and outputs (for example,

for ready messages) that can be controlled either locally or via the controller.

The EL336x analogue terminals add to Beckhoff's existing range of weighing technology, slotting into the portfolio above the EL3351 and alongside the EL3356 with additional functionalities. The ELM350x EtherCAT measurement terminals, which support freely adjustable filters, quarter/half bridge capability, and even higher sampling rates (also in connection with the TwinCAT 3 Weighing Library), offer an ideal solution for demanding dynamic applications that require advanced measurement technology.

For more information visit: www.beckhoff.com



The EL336x EtherCAT analogue input terminals offer compact and cost-effective implementation of high-performance weighing functions.

Conductivity sensor for water treatment processes

ifm has introduced the LDL400 conductivity sensor, the polypropylene version of its proven LDL200 inductive conductivity sensor. The material properties of the LDL400 conductivity sensor make it especially suitable for applications in which metallic sensors tend to corrode – where aggressive, acidic or alkaline media, such as cleaning agents, are used, or when in direct contact with salty ambient air. The measuring channel with an internal diameter of eight millimetres ensures optimum flow of the medium and minimises the risk of blockages.

The LDL400 conductivity sensor can be used in almost any stage of the water treatment process.

The conductivity of a medium is measured from 100 to 2 000 000 $\mu\text{S}/\text{cm}$ and output as a temperature-compensated value, in digital or analogue form. The wide measuring range means the sensor can be used in most water treatment applications. Furthermore, the percentage concentration of NaCl (sodium chloride) in ultrapure water can be accessed acyclically.

Due to its material properties, the sensor can be used in the marine industry and is certified according to DNV EU RO Mutual Recognition Type Approval. This makes it an ideal choice for water treatment applications on ships.

The compact design combines evaluation unit and sensor element in one housing. This saves space in the control cabinet and significantly reduces wiring complexity. It also eliminates the need for expensive data cabling between the measuring element and the evaluation unit.

A standardised M12 connector is used, instead of the usual error-prone cable gland. With ingress protection ratings of IP68 and IP69K, the M12 connector withstands severe operating conditions. Moulded plugs allow for quick connection and eliminate wiring errors as there is no terminal chamber.

Water treatment – filtration and desalinisation

The sensor measures the conductivity of the medium continuously in the range from 100 to 2 000 000 $\mu\text{S}/\text{cm}$. This means the LDL400 can be used universally in diverse water treatment applications and as an indicator of water quality.

Fish farming – keeping the ecosystem in balance

In fish farming, the sensitive ecosystems must be precisely controlled to enable successful and sustainable

breeding. If the system were to become unbalanced, this would result in the loss of the breeding stock and breeding coming to a standstill. The salt concentration of the water, a relevant measured variable, can be determined reliably at any time with the LDL400 via the measured conductivity.

Vertical farming – checking the concentration of minerals

To optimise plant growth in vertical farming, it is important to determine and adhere to the plants' water requirements, and to check the concentration of minerals in the water. The LDL400 can be used to measure this concentration and check whether it corresponds to the requirements. Thus it contributes to ensuring an optimum water supply for the plants.

Digital communication via IO-Link

IO-Link provides digital communication to the sensor, enabling:

- Precise transmission of process values
- Reduced wiring with decentralised IO-Link masters
- Seamless digital information and values
- Sensor data to be used via IIoT for MES and ERP
- Best possible resolution across the entire measuring range.

With IO-Link, the resolution of the conductance is always scaled to suit the used measuring range, to ensure the highest possible accuracy.

The EIO104 converter converts IO-Link process values quickly and easily into two 4...20 mA signals. This means IO-Link sensors can be connected easily to existing controllers with only analogue input cards. With analogue integration, the process value is output as a 4...20 mA signal. The LDL400 is supplied with 1 x analogue output.

Transparent processes

Constant monitoring of conductivity and temperature allows the user to keep an eye on the process at all times. The salt concentration of NaCl in ultrapure water can also be output acyclically.

Easy set-up

The conductivity sensor can be configured quickly and easily via IO-Link – either remotely or during the process. No additional transducer is required.

In addition to displaying and logging the process values, various events can be recorded and simulated via IO-Link.

If the device is to be replaced, the 'backup & restore' function automatically backs up and restores parameter sets via IO-Link, making it easier to replace the device.

For more information visit: www.ifm.com



Monitoring water filtration and desalination systems.



Optimising mineral content in water in vertical farming applications.

On the wavelength of innovation

The VEGAPULS 6X radar sensor, using an 80 GHz signal frequency, changes contactless level measurement in previously challenging applications. Its advanced technology merges multiple frequency bands – W-Band (80 GHz), C-Band (6 GHz), and K-Band (26 GHz) – enabling precise radar beam focusing. This enhanced focus improves measurement accuracy significantly, even in tanks with internal structures or media with low reflectivity.



The VEGAPULS 6X radar sensor enables precise level measurement in previously challenging applications.

The narrow measuring beam of the VEGAPULS 6X proves advantageous in various applications. It ensures reliable measurement results. This is a particular requirement in fields like mining and mineral processing where, historically, plants have relied on costly point-level detectors paired with continuous measurement sensors, often leading to high installation expenses or excluding their use. The VEGAPULS 6X offers a cost-effective, easy-to-install continuous measurement solution.

In the pharmaceutical industry, precise instrumentation calibration is critical for batch traceability and process validation. Traditional systems are specialised, expensive, and time-consuming to set up. The VEGAPULS 6X streamlines this process, providing reliable level and inventory measurements in storage tanks. Its use in chemical storage tank measurement, where calibration is complex and involves thermal compensation and pressure monitoring, highlights its precision and ease of use.

Distilleries also benefit from the accurate, compact radar-based measurements of the VEGAPULS 6X. The sensors, calibrated with specialist tank charts, ensure precise measurement of taxable alcohol in spirit vats under customs and excise control, for example. Before long-term maturation in barrels, liquor stored in stainless steel vats can be measured accurately using the radar sensors, demonstrating their effectiveness in controlled environments.

Even in small containers, the VEGAPULS 6X's high accuracy is advantageous. Designed to reduce near-range interference, it excels in non-contact measurement. Its versatile antenna systems suit various applications, and advanced software algorithms suppress interference from antenna build-up and tank structures.

The VEGAPULS 6X can measure to the bottom of vessels, even with low dielectric media. Traditional sensors typically struggle with signals reflecting off the bottom of vessels, causing inaccuracies. The VEGAPULS 6X's shorter 80 GHz wavelength minimises this issue, ensuring stronger signal attenuation by the liquid medium and weaker reflections from the bottom of the vessel. This allows for accurate tracking of liquid levels, even near the bottom of the vessel.

The VEGAPULS 6X represents an advance in radar-level measurement technology, offering unmatched precision and reliability across various industries. Its innovative design and advanced capabilities make it an essential tool for modern-level measurement needs.

For more information visit: www.vega.com



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Neels van der Walt,
Iritron.

The power of wireless vibration monitoring in mining

In the dynamic landscape of modern mining, wireless vibration monitoring is ushering in a new era of asset management and fault prevention. Over the past two years, advances in sensor technology have enhanced the capabilities of remote monitoring significantly, driving a rise in autonomous mining and drilling operations. Neels van der Walt, Senior Business Development Manager at Iritron, outlines how this evolution improves efficiency and contributes to a safer and more reliable working environment.

Wireless vibration sensors represent a valuable progression from traditional wired sensors. They serve to monitor the health of mining equipment by detecting and analysing vibrations that indicate potential faults. Unlike wired sensors, wireless sensors enable easy installation and offer scalability and reduced maintenance requirements, all attributes that make them suitable in modern mining operations.

Recent advances have made wireless vibration sensors more reliable and efficient. Improved battery technology, enhanced connectivity, and rugged designs tailored for harsh environments allow mining operations to use them to monitor critical assets. The sensors can be deployed rapidly and integrate seamlessly with existing monitoring systems, providing real-time data which is key to maintaining equipment health.

Key advantages

One of the most significant advantages of wireless sensors is the simplicity of installation. Traditional wired systems require extensive infrastructure, including trenching, cabling, and setting up installation points, which can be costly and labour-intensive. In contrast, wireless sensors can be installed quickly by the existing workforce, minimising disruption to mining operations. This ease of installation translates into lower setup costs and lower maintenance costs going forward, compared to wired solutions.

Wireless sensor systems also offer scalability. As mining operations expand or monitoring needs evolve, additional

wireless sensors can be integrated smoothly into the existing system. This adaptability is particularly valuable in large-scale mining environments, where the ability to adjust to changing conditions quickly can enhance operational efficiency and machine uptime.

Wireless sensors feature user-replaceable batteries with long lifespans, reducing the frequency of required replacements. The absence of cables and connectors also means there are fewer components that can fail or need maintenance, making the system more robust and reliable over time.

Key benefits

Wireless vibration sensors enhance safety by enabling early detection of potential equipment failures. By monitoring critical components such as bearings and gearboxes, these sensors provide instant feedback on anomalies, allowing for pre-emptive maintenance actions. This reduces the risk of catastrophic failures, particularly in hazardous locations like underground mines.

Unexpected shutdowns are costly in terms of lost production and emergency repairs. Wireless sensors offer continuous monitoring and precise data on machine health, facilitating a shift from reactive to prognostic maintenance. This approach means maintenance can be scheduled based on equipment conditions, rather than a preset programme, reducing downtime and lowering overall maintenance costs.

In addition to detecting faults, wireless sensors contribute to optimising equipment performance. They measure critical parameters such as acoustic emissions and temperature, enabling maintenance professionals to make informed decisions to improve machine lifespans and efficiency.

Wireless vibration sensors support the digital transformation of mining operations by providing real-time analytics. Combined with AI and prescriptive analytics, the data offers deep insights into equipment performance and operational effectiveness. This can be used to inform decisions, leading to improved productivity and performance.

Key features

Rugged design and durability: Mining environments are typically harsh, demanding equipment that can withstand extreme conditions. Wireless vibration sensors are de-

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Wireless vibration sensors can contribute to improvements in operational efficiency and safety in mining.



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Raghav Gurumani,
CTO, Zuper.

Adopting new technologies in field service management

Raghav Gurumani, Chief Technology Officer, Zuper

As is the case with many areas of business, field service management is evolving rapidly. With technological advances, things that would have been difficult even a few years ago are commonplace today. A lot of paperwork, for example, is now digitised and, with the proliferation of smartphones, photographic proof of work can be sent instantly.

Further advances anticipated in the next few years will likely be even more significant. Artificial intelligence (AI) and machine learning, augmented reality (AR) and virtual reality (VR) will play increasingly significant roles in field service management. We are also likely to see more applications that leverage mobile technology, customer self-service, and automation.

As important as these technological advances are, it's equally important that organisations do not just chase every new trend. Instead, they should focus on those that are most relevant to solving their business challenges within the local context in which they operate.

Upskilling for tech advances

If we consider AI and machine learning, for example, there is no doubt that these nascent technologies have significant potential in field service management, particularly when coupled with Internet of Things (IoT) sensors.

AI-powered software, for instance, can handle many routine tasks, freeing up people's time so they can focus on high-priority issues. Intelligent scheduling algorithms, as another example, can help ensure that, based on their skills and availability, the right field technicians take optimal routes to jobs. Over time, those platforms will keep learning and advancing too, making things increasingly efficient.

IoT-connected devices can provide real-time data to

enhance monitoring and proactive servicing. Combine that with the ability of smart sensors to track system performance and notify technicians of any irregularities and companies have the potential for a system that is much more efficient, to the point where faults can be repaired before customers even notice there is an issue.

But organisations should not simply adopt these technologies and assume they will see immediate benefits. They also need to ensure that employees have the necessary skills to take advantage of the technologies, a factor that is particularly important in a country which has as big a shortage of digital skills as South Africa.

Understanding local contexts

The same is true for other transformative technologies. AR and VR, for example, have proven value in fields such as training. That is especially so when it is helpful to provide a low-risk environment for new technicians to gain experience. However, companies need at least some people with the right skills to set up and maintain those environments.

AR can also be used to give technicians overlays that highlight components, display stats, or offer step-by-step guides. That is not always feasible in South Africa as some of those applications require a lot of bandwidth. Although that is not a problem in urban areas where connections are plentiful, it can be difficult if a technician is working in a rural area where connectivity is patchy.

Contrastingly, mobile technologies which allow field technicians access to schedules, job details, customer information, and knowledge databases while on the go will come more naturally to a country that's as mobile-first as South Africa. These technologies carry numerous benefits, including allowing technicians to do, and move between, jobs

Continued from page 24

signed for durability, featuring high G-range robustness and IP68-rated dust and water resistance. This means they can operate reliably in challenging mining conditions.

Seamless connectivity: The sensors provide seamless, wireless connectivity, transmitting real-time data to digital platforms or other IIoT systems. The live vibration tracking allows for immediate responses to potential issues, optimising performance and increasing efficiencies.

Flexibility: Wireless systems are inherently flexible and scalable, making them ideal for the dynamic needs of mining operations. Additional sensors can be added or replaced easily, enhancing the system's capabilities and providing more detailed analytics where needed.

Real-time data transmission: Wireless vibration technol-

ogy offers real-time feedback, transmitting data on vibrations and surface temperatures. This capability is essential for remote monitoring and precise fault identification and enables proactive maintenance.

Interoperability with existing systems: Wireless sensors integrate with existing data historians through compatible protocols like REST-API or MQTT. This allows for centralised data aggregation and analysis, providing actionable insights that can be used to drive innovation in mining operations.

The use of wireless vibration sensors in mining enables a significant advance in operational efficiency and safety. □

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

more easily, enhance their interactions with customers, and to use their days more productively. That translates into a better customer experience and a more efficient organisation.

Using the right field management software

To bring these transformative technologies together in ways that are productive and take local contexts into account, organisations should make use of tools like field management software. Again, though, this is not just a matter of finding the software that looks the nicest or costs the least.

Organisations need software that can integrate with the new technologies as well as with other existing enterprise software that they depend on. With that kind

Zuper works with fast-growing service businesses to scale and modernise their field operations with comprehensive, flexible, and configurable field service management solutions. Zuper's platform integrates readily with industry-leading apps and CRMs and is provided with personalised support, as well as robust reporting and analytics. Thousands of users globally rely on Zuper's automated workflows to enable field workforce collaboration and deliver top quality customer service.

of integration, rooted in the present but with an eye to the future, organisations can expect to streamline operations, improve the customer experience, and enable a highly skilled workforce. Choosing compatible systems that can work together is critical.

A considered approach

Big technological advances will impact the field service management space in big ways. As organisations understand the trends emerging with those advances, it is just as important that they do not immediately latch on to each new one. They should rather look carefully at whether a particular trend or technology works within the local context or, if it could in future. If the technology is working locally and can be integrated into important systems, it's worth pursuing.

In the South African context, that may not always mean using the same technologies in the same ways as in other markets. The best providers, particularly of the software that helps enable those technologies, recognise that and will fit into the ways of working that best suit the customer's organisation. □

For more information visit: <https://www.zuper.co/>



Unmatched precision and reliability with radar

ifm's new sensor detects objects by means of a focused radar beam. With its long range, shock and vibration resistance properties and different operating modes, the radar sensor is designed to accurately detect objects even in the most adverse conditions.

*The data obtained can be clearly visualised using the "Vision Assistant" software and the benefits of IO-Link technology. The new radar will be exhibited at the upcoming Electra Mining Africa in September. **Make sure to visit us at stand A6***



ifm – close to you!

New communication module for i.Sense sensors

Optimising operating processes and minimising downtime: this is where the new iComm Box from igus helps customers. With the new communication module, the i.Sense sensors for condition monitoring of igus motion plastics can be integrated into the superwise service. Intelligent algorithms provide a detailed status analysis of the machines and systems monitored. The superwise dashboard provides information in real time and allows for optimum monitoring and control. A decisive advantage is that the costs for data transmission are included in the product price.

When a plant operator needs to stop a system right away before a mechanical defect leads to expensive consequential damage, technology can support the human eye. Intelligent sensors in the i.Sense series from igus monitor the condition of moving machine components, such as energy chains, cables, linear guides, plain and spherical bearings and slewing ring bearings. If an anomaly arises, the sensors immediately trigger a message or an automatic system stop to prevent expensive damage.

"The new communication module opens up a cost-effective and simple option of expanding the functionality of the sensors," says Richard Habering, Head of the smart plastics Business Unit at igus. It connects the sensors with the superwise service from igus and thus enables fast and reliable data transmission. All reports are saved with measured values in the igus i.Cee portal and can be evaluated at a later time for diagnostic purposes. In addition, intelligent algorithms use the sensor data to calculate the movement profile of energy chains, for example. Based on the detailed analysis, precise predictions can be made about their condition. The superwise dashboard clearly displays real-time information on service life, maintenance recommendations and information on anomalies. "This approach ensures that no potential service life remains unused and, in parallel, minimises the risk of failure," says Habering.

Quick return on investment

The communication module could be used by companies from the process industry such as sewage treatment plants and concrete works, for container cranes in ports, and in the manufacturing industry, including car manufacturers. The new solution enables a fast return on investment as it can optimise maintenance management and prevent expensive downtime. "One minute of system downtime can cost up to €10 000 in the automotive industry. If we can save just a few seconds with the iComm Box, which is quickly achieved, the investment has already paid off," Habering highlights.

The i.Sense EC.P sensor, which measures tensile and shear forces in the energy chain, shows how the iComm Box works: the measured values are transmitted via a cable to an evaluation module in the control cabinet, which can be connected to the PLC to trigger



The igus iComm Box connects i.Sense sensors and the superwise service for reliable real-time condition monitoring.

an automatic system stop in an emergency – if a guide trough becomes loose, for instance. The evaluation module can also be connected to the iComm Box via an additional cable. The communication module then sends the data to the superwise dashboard via the mobile network – encrypted, separated from the customer's TCP-IP network and therefore with maximum security. There are no costs for this transfer. By purchasing the module, the user acquires a flat rate for data for ten years.

Iigus can handle the monitoring

In the personalised dashboard, the customer can always see the remaining service life of the networked components as a percentage value and the ideal time for the next maintenance. "The dashboard is intuitive and easy to use, making monitoring easy," says Habering. If companies do not have time to monitor the systems, igus takes on responsibility for the applications as part of the superwise service.

The i.Cee portal is directly connected to the igus CRM system. This means the sales employees are always informed of all reports and automatically receive a corresponding task. For example, in the event of a plant shutdown, they can organise fast deliveries. They can respond proactively when something needs to be done. This means the customer doesn't even have to look at the dashboard. "With this service, we alleviate the demands on human resources for our customers and support their productivity in times of a shortage of skilled labour," Habering adds. "With the iComm Box, we offer an all-in-one system to assist customers in mastering the challenges of Industry 4.0." □

Conducting thermal inspections – choose the best method

There's no universal solution for all infrared inspections using a thermal camera or thermal imager. Fluke, as a leading provider of electrical testing tools, and locally represented by Comtest, advises that it's best to match the method used to the type of equipment being inspected and the level of detail needed. However, it outlines three basic methods which can be used to cover most situations: Baseline thermography, Thermal trending thermography, and Comparative thermography.

Baseline thermography

Baseline thermography is a good place to start for most applications. The maintenance team should scan the equipment when it is first commissioned, or later in the lifecycle when it is working the way it should be, and use that 'baseline' as a reference point for future inspections. With Fluke's portable thermal cameras, technicians can use the thermal images on the camera in the field or on a PC at the office, using software tools provided. This baseline approach paves the way to help maintenance technicians spot anomalies down the road.

Trending thermography

Once the baseline is set, teams can conduct thermal trend-

ing inspections to compare how temperature is distributed in the same components over time. This can help to detect declining performance so that maintenance downtime can be scheduled before the equipment schedules it.

Comparative thermography

As would be expected, in this comparative approach, similar components are scanned using the thermal camera under similar conditions, and the results can then be compared. This method relies on the idea that similar or identical components under similar loads will be expected to have similar temperature profiles. Once three or more components are compared, picking up an anomaly is relatively easy. This is usually straightforward, but it is important to keep in mind that in some installations, depending on the components being compared, the actual temperature difference that can be viewed as an anomaly will vary.

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



Thermal imaging cameras can be used to monitor plant and equipment and detect anomalies.

New technologies in MRO boost supply chain efficiency

RS South Africa is part of the RS Group plc, which provides product and service solutions for industrial customers around the world and has spent over 80 years aggregating suppliers of technology and services to offer these to its customers.

"When customers approach us with specific issues they need to address, we look at what solutions we can offer in terms of an overall plan or strategy," says Craig Henry, MRO Business Development and Value-Added Solutions Manager at RS South Africa.

Maintenance, Repair and Operations (MRO) is key to the efficient functioning of supply chains across a range of industries, from equipment and machinery to the many processes essential for a company's daily operations. The efficiency of MRO impacts maintenance planning, operational costs, and overall supply chain efficiency significantly.

Technologies such as the Industrial Internet of Things (IIoT), predictive maintenance algorithms, automation and digitisation, AI, blockchain technology and 3D printing are transforming MRO operations. They also assist with traceability, asset tracking and more. Smart contracts, providing for three- to five-year optimisation of new procedures, present another new trend.

Henry advises customers to ensure they have defined their goals and objectives clearly. "Prioritise what is going in first and what is most compatible. Consider key stakeholders. If you do not have their buy-in, any strategy is unlikely to take off effectively," he says. □



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The top 10 emerging technologies of 2024

The World Economic Forum (WEF) recently published its annual *Top 10 Emerging Technologies Report* presenting technologies identified to have the greatest potential to make a positive impact in the world in the next three to five years.

"Organisations make better choices when they understand the factors shaping the future," said Jeremy Jurgens, Managing Director, World Economic Forum and Head of the Centre for the Fourth Industrial Revolution. "The report identifies technologies poised to influence societies and economies significantly. It spotlights technologies with significant potential for revolutionising connectivity, addressing the urgent challenges of climate change and driving innovation across various fields."

"Drawing on the expertise of Frontiers' chief field editors worldwide brings our shared commitment to transformative science into clear focus, presenting insights and clarity on breakthrough technology that has the potential to change societies, economies, and lives for the better," said Frederick Fenter, Chief Executive Editor, Frontiers. "This is open science in action, and we are delighted to partner with the World Economic Forum in bringing these technologies to the attention of business, science and political leaders around the globe."

The top 10 emerging technologies identified in the 2024 report focus on applications in health, communications, infrastructure and sustainability, as outlined below.

AI for scientific discovery: While artificial intelligence (AI) has been used in research for many years, advances in deep learning, generative AI and foundation models are revolutionising the scientific discovery process. AI will enable researchers to make unprecedented connections and advances in understanding diseases, proposing new materials, and enhancing knowledge of the human body and mind.

Privacy-enhancing technologies: Protecting personal privacy while providing new opportunities for global data sharing and collaboration, 'synthetic data' is set to transform how information is handled with powerful applications in health-related research.

Reconfigurable intelligent surfaces: These innovative surfaces turn ordinary walls and surfaces into intelligent components for wireless communication and, at the same time, enhance energy efficiency in wireless networks. They hold promise for numerous applications, from smart factories to vehicular networks.

High-altitude platform stations: Using aircraft, blimps and balloons, these systems can extend mobile network access to remote

regions, helping bridge the digital divide for over 2.6 billion people worldwide.

Integrated sensing and communication: The advent of 6G networks facilitates simultaneous data collection (sensing) and transmission (communication). This enables environmental monitoring systems that help in smart agriculture, environmental conservation and urban planning. Integrated sensing and communication devices also promise to reduce energy and silicon consumption.

Immersive technology for the built world: Combining computing power with virtual and augmented reality, these technologies promise rapid improvements in infrastructure and daily systems. They allow for designers and construction professionals to check for correspondence between physical and digital models, ensuring accuracy and safety and advancing sustainability.

Elastocalorics: As global temperatures rise, the need for cooling solutions is set to soar. Offering higher efficiency and lower energy use, elastocalorics release and absorb heat under mechanical stress, presenting a sustainable alternative to current technologies.

Carbon-capturing microbes: Engineered organisms convert emissions into valuable products like biofuels, providing a promising approach to mitigating climate change.

Alternative livestock feeds: Protein feeds for livestock sourced from single-cell proteins, algae and food waste could offer a sustainable solution for the agricultural industry.

Genomics for transplants: The successful implantation of genetically engineered organs into a human marks a significant advance in healthcare, offering hope to millions awaiting transplants.

The *Top 10 Emerging Technologies Report*, now in its 12th edition, serves as a source of strategic intelligence for professionals. Drawing on insights from scientists, researchers and futurists, the report identifies 10 technologies that have the potential to influence societies and economies significantly.

In addition to promising major benefits to societies and economies, these emerging technologies are noted as disruptive, attractive to investors and researchers, and expected to achieve considerable scale within five years.

This year's edition introduced an innovative trend analysis methodology, incorporating academic literature, funding trends and patent filings, to ensure the accuracy and relevance of the selected technologies. The technologies featured in the report, produced in collaboration with Frontiers, were identified through a rigorous selection process involving over 300 world-leading academics and experts from the Forum's Global Future Councils, the University and Research Network, the Frontiers network comprising over 2 000 chief editors worldwide from top institutions, and Mariette di Christina and Bernard Meyerson, Co-Chairs of the Emerging Technologies Steering Group.

For more information visit: www.weforum.org



The top 10 emerging technologies identified for 2024 have applications in health, communications, infrastructure and sustainability.

Celebrating South Africa's excellence in science, engineering and technology

Recognising, celebrating and rewarding excellence in science, engineering, technology (SET) and innovation in South Africa, the National Science and Technology Forum (NSTF) recently announced the 17 winners of the 2023/2024 NSTF-South32 Awards. The hybrid event of the awards presentation took place on 11 July 2024, marking the 26th anniversary of this flagship project of the NSTF.

Outstanding contributions to SET and innovation were recognised and celebrated in the following broad areas: Scientific research, Innovation and development, Management and related activities, Capacity development in engineering research, Environmental sustainability and biodiversity conservation, Science diplomacy, Medical research, Water research and innovation, Data for research, and Science communication.

Additionally, a Special Annual Theme Award is presented; the NSTF theme for 2024 is the Fourth Industrial Revolution (4IR) in South Africa and the award was made recognising a significant contribution in this regard.

The 2023/2024 NSTF-South32 Award winners

The Lifetime Award was presented to Professor Ben-Erik van Wyk, Chair: Department of Science and Innovation (DSI)/ National Research Foundation (NRF) South African Research Chairs Initiative (SARChI) in Indigenous Plant Use, University of Johannesburg (UJ). This Lifetime Award recognises his contribution as a botanist and an authority on traditional and commercial uses of plants, with numerous books and publications to his name covering all or most of the socially relevant and commercialised plant species of the world.

The TW Kambule-NSTF Award for a leading researcher is sponsored by proSET (Professionals in SET), a sector of the NSTF representing more than 45 professional societies. The award was presented this year to Professor Patience Mthunzi-Kufa, Research Group Head: Biophotonics; Manager: Photonics Centre, Council for Scientific and Industrial Research (CSIR); Professor Extraordinarius: University of South Africa (UNISA), for her research on the construction and application of photonics-based diagnostic devices for point-of-care detection of HIV-1, TB, Covid-19, as well as non-communicable diseases, to achieve early detection and facilitate timely treatment.

The TW Kambule-NSTF Award for an emerging researcher recognised two winners this year. The award is sponsored by the South African Young Academy of Science (SAYAS).

Dr Tiisetso E Lephoto, Lecturer and Principal Researcher: School of Molecular and Cell Biology, Faculty of Health Sciences, University of the Witwatersrand (Wits), was recognised for her investigation of biological control agents (natural enemies for pests) which can help solve identified challenges, and the identification of new insect-killing microscopic worms called entomopathogenic nematodes, which have the potential to infect and kill problematic soil-dwelling insects in farms within 24 to 48 hours of an invasion.

Professor Tebogo Mashifana, Associate Professor and Head



Professor Ben-Erik van Wyk, winner of the Lifetime Award.



Professor Patience Mthunzi-Kufa received the TW Kambule-NSTF Award for a leading researcher.

of Department: Chemical Engineering Technology, University of Johannesburg, was also recognised for her research focusing on innovative circular economy principles to remediate the environmental impact caused by wastewater and solid wastes, and the conversion of such wastes generated by different industries, which pollute the environment, contaminate water, soil and the air, into new products that can be used for various applications.

The Management Award was presented to Professor Bernard Slippers, Professor: Department of Biochemistry, Genetics and Microbiology; Director: Tree Protection Co-operative Programme; Director: Forestry and Agricultural Biotechnology Institute (FABI), University of Pretoria (UP); Director: Innovation Africa @UP. The award was presented in recognition of his leadership and participation in several substantive research programmes and his role in the foundation of the Future Africa Institute, the Africa Science Leadership Programme and Innovation Africa @UP, as well as in the global young academy movement and the Global Young Academy and SAYAS.

The Engineering Research Capacity Development Award, sponsored by Eskom since 2003, also recognised two winners this year.

Professor Claudia Polese, Associate Professor: Aerospace Manufacturing and Design; Head: Aeronautical Engineering Stream; Deputy Director: African Research Universities Alliance Centre of Excellence in Materials, Energy and Nanotechnology; Advisory Aerospace Research Director: National Aerospace Centre, Wits, received the award for her leadership of several strategic South African initiatives to strengthen research in advanced manufacturing technologies and primarily the cutting-edge Laser Shock Peening (LSP) process, furthering substantial infrastructural and human capital development.

Professor Emmanuel Iwuoha, Professor: Chemistry, University of the Western Cape (UWC); DSI/NRF SARChI Chair for Nano Electrochemistry and Sensor Technology; Director: Sensor Lab, UWC, also received an award, for his exploitation of the capacity of the Sensor Lab at UWC for research on disease diagnostic sensor devices, lithium-ion batteries/supercapacitors and solar cell technology for applications in solar cells and gas sensing, to



Both Dr Tiisetso E Lephoto (left) and Professor Tebogo Mashifana (right), were recognised as emerging researchers.

achieve a significant throughput of researchers under his guidance.

The NSTF-Water Research Commission Award, sponsored by the WRC since 2017, was presented to Professor Timothy Dube, Director: Institute for Water Studies, UWC; Adjunct Professor: United Nations University, Flores, Germany. Professor Dube was recognised for his pioneering and innovative methods using satellite technology merged with machine learning (AI) to monitor water resources in semi-arid regions, enhancing ecological sustainability and community resilience.

The NSTF-SAMRC Clinician-Scientist Award, sponsored by the South African Medical Research Council (SAMRC), was awarded to Dr June Fabian, Director: Wits Donald Gordon Medical Research Institute; Post-doctoral Researcher; Co-Lead: Clinical Research Platform: SAMRC/ Wits Rural Public Health and Health Transitions Research Unit; Lecturer: Department of Internal Medicine, School of Clinical Medicine, Faculty of Health Sciences, Wits. The award was made in recognition of her leadership and co-ordination of the multi-country and multi-dimensional ARK project, which challenged outdated, biased, and unscientific diagnostic tools and developed new, evidence-grounded methodologies to achieve greater impact in the early detection and management of chronic kidney disease.

The Green Economy Award, sponsored by the Technology Innovation Agency (TIA) was presented to Professor Linda Godfrey, Manager: Circular Innovation SA, Principal Scientist: Circular Economy, CSIR; Extraordinary Professor: Faculty of Natural and Agricultural Sciences, North-West University (NWU). She was recognised for her leading role in shaping and driving SA's waste and circular economy science, technology and innovation agendas, encompassing the development and implementation of the Waste Research, Development and Innovation Roadmap for the DSI and having been instrumental in shaping strategic local and international waste and circular economy initiatives.

The Science Diplomacy for Africa Award, sponsored by the Science Diplomacy Capital for Africa (SDCfA), was awarded to Professor Irvy (Igle) Gledhil, Visiting Adjunct Professor: School of Mechanical, Industrial and Aeronautical Engineering, Wits. She is recognised for her work to build vibrant, supportive environments in which women and men, as scientists, can make real contributions, leading the international working group on Women in

Physics, her leadership in the Global Gender Gap Project, and the convening of African and South African scientists to engage with difficult problems.

The Data for Research Award was presented to Mr Leo Chiloane, Manager of the uLwazi Node, South African Environmental Observation Network (SAEON) Open Data Platform, of the NRF, for the management of a metadata repository that facilitates the publication, discovery, dissemination, and preservation of earth observation and environmental data in SA, certified as a trusted repository by the CoreTrustSeal in 2023.

The Innovation Award for a corporate organisation was received by Professor Mike Sathekge, Chief Executive Officer and President of Nuclear Medicine Research Infrastructure (NuMeRi) NPC. It was awarded to the organisation as a facility which represents a paradigm shift in its field, offering a one-stop-shop for medical imaging and theragnostics dedicated to drug development and clinical research, providing consolidated expertise in nuclear technologies, in medicine and the biosciences, and creating significant research, development and innovation capacity in SA.

The Innovation Award for a small, medium or micro enterprise, sponsored by the National Intellectual Property Management Office (NIPMO) since 2019, was awarded to Jonker Sailplanes (Pty) Ltd Co-Founder, Shareholder and Director: Professor Attie Jonker, School of Mechanical Engineering, NWU. The award was made in recognition of the company's design, manufacture, and further development of sailplanes, and for building on its success with exports of its internationally competitive sailplanes.

Professor Jennifer Fitchett, Professor: Physical Geography, Wits, received the **Communication Award** for her involvement in communicating her own science to the public and in training early career researchers in science communication, notably through a science blog, articles in *The Conversation* and podcasts.

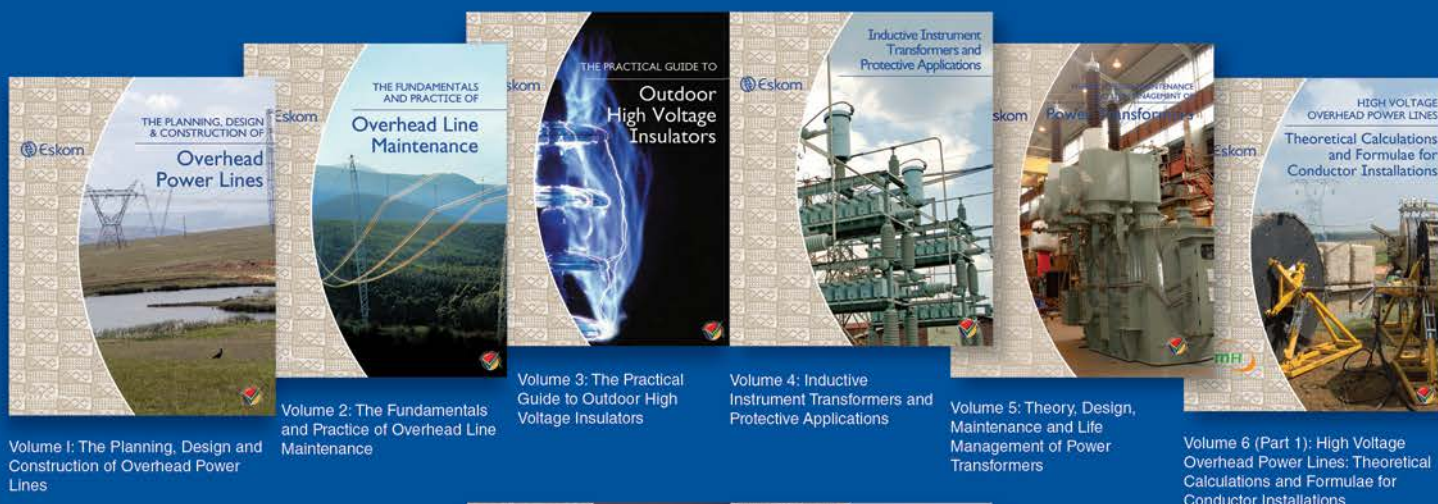
The Non-Governmental Organisation (NGO) Award went to OLICO Maths Education Director: Maths Education: Dr Lynn Bowie, for the project the organisation has developed to make sense of mathematics through high quality programmes and resources for thousands of South African school children from disadvantaged backgrounds.

The Special Annual Theme Award: 4IR in SA was received by Professor Patrick Woudt, Interim Director: Department of Astronomy, UCT, on behalf of the Inter-University Institute for Data Intensive Astronomy (IDIA), a partnership of the Universities of Cape Town (UCT), UWC, and UP. The award recognises the institute's cutting-edge infrastructure and its management which facilitate global collaboration in astronomy, empowering researchers to analyse complex SET data with unprecedented efficiency.

The NSTF is an independent non-profit stakeholder organisation and network, a civil society forum of over 130 organisations involved in science, engineering, technology and innovation in South Africa.

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

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 accrued by Eskom over the years, as a guide and legacy and to serve as a source of reliable, reputable and highly technical information.



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.

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.



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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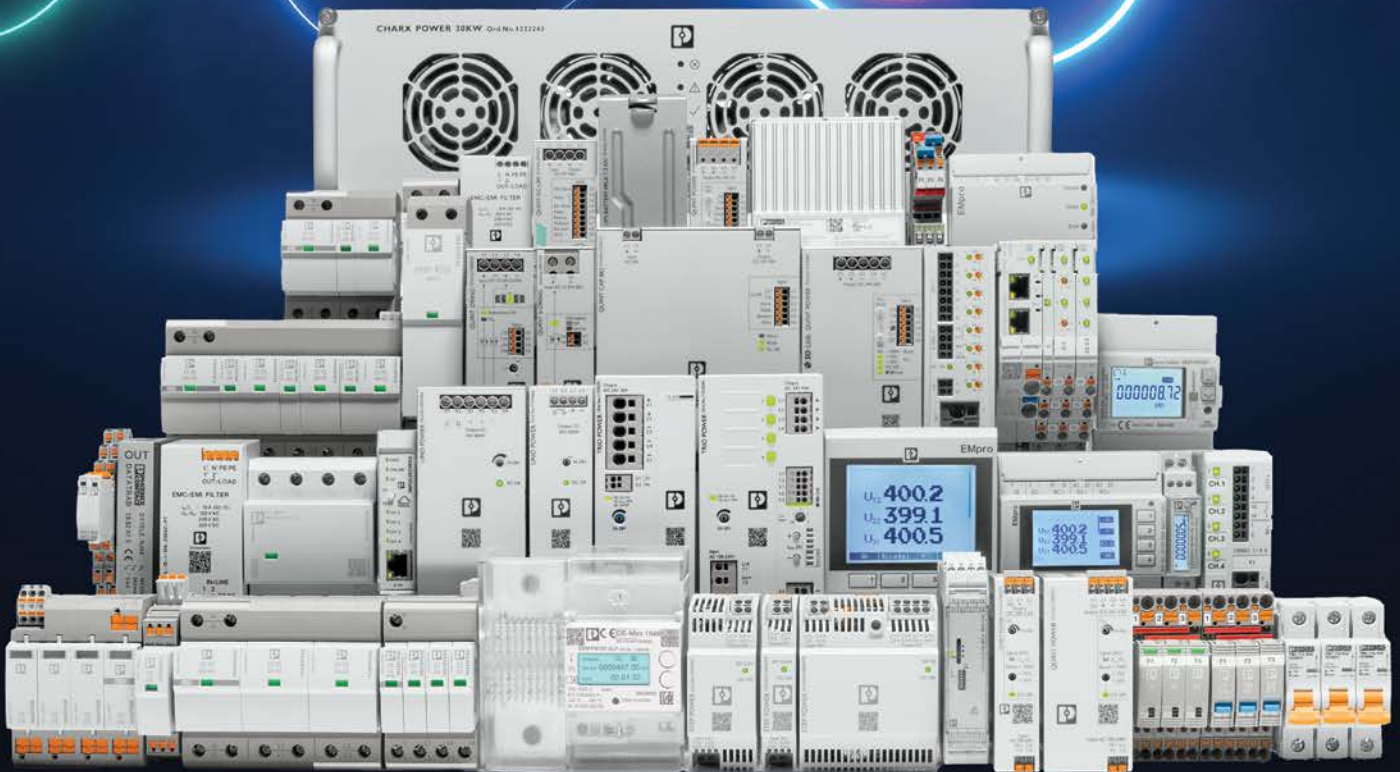
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