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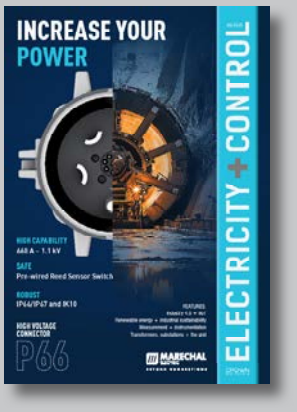


MARECHAL ELECTRIC, a longtime leader in innovative and reliable industrial electrification, now introduces P66, an advanced high-voltage connector engineered to perform in the most demanding environments. *(Read more on page 3.)*

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

Audited circulation Quarter 1 (Jan-Mar) 2025
Total print and e-editions 9 271

Published monthly by:
Crown Publications (Pty) Ltd
Cnr Theunis and Sovereign Sts,
Bedford Gardens, PO Box 140,
Bedfordview 2008
Printed by: *Tandym Print*
Telephone: *+27 (0) 11 622 4770*
E-mail: *ec@crown.co.za; admin@crown.co.za*
Website: *www.crown.co.za/electricity-control*

The wonders of maths and science

Over many years I have commented on school education, mathematics, science – and more. There are many concerns that can be raised around these subjects in the context of our own country, of course. But equally, there are moments where the light shines brightly.

In this regard I have mentioned the Eskom Expo for Young Scientists as an example of an intervention that makes a significant difference in the lives of so many young people. It is an organisation that I have been involved with personally for decades, and I am very proud of that.

Over the years the organisation has changed significantly and now has a much wider reach than before. This has placed a heavy load on the volunteers and staff who are involved in the initiative – and often, we do not recognise their efforts adequately.

The Eskom Expo for Young Scientist is affiliated with the Regeneron International Science and Engineering Fair (ISEF), which is run under the auspices of the Society for Science and the Public in the USA. Every year, learners from South Africa and some other African nations have the opportunity to compete on this remarkable stage.

While acknowledging that the learners who are afforded this opportunity are, naturally, exceptional, it is always heartening to see how capable they are of holding their own against the very best in the world. My take on this is that it is possible to produce exceptional outcomes in Basic Education if one sets one's mind to it. This must be an opportunity for South Africa to boldly strengthen maths and science at school level, recognising these as mandatory components of a modern education – and nothing less.

If we consider the topics that you will find covered in this month's issue of *Electricity + Control*, it is evident that these technological fields require expertise that is grounded in maths and science knowledge and competence. There is no other way of seeing it. If we want to produce a population of problem solvers and critical thinkers, it is to maths and science that we need to turn – rather than purely content-based subjects or rote learned outcomes.

Extending the theme of the ISEF, I have also had the pleasure of judging young learners both here at home at the Eskom Expo National Finals as well as at the ISEF in the USA. I never cease to be astounded by the depth of insight and capacity to break boundaries shown by youngsters – dare I say it – before they have learned enough additional physics to understand what is not possible!

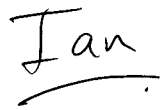
It reminds one that science is an area where it is fine to be wrong. After all, what we are attempting to do is to develop an understanding of the world we live in – from the smallest part to the biggest part – from sub-atomic particles to the universe we find ourselves in!

And as we proceed, we develop better and better models of what we observe. In some cases, we begin with purely theoretical models and then, over time, we can measure, test and improve our understanding. In others, observation also provides almost self-evident results that can be reported as our best understanding.

This allows us (at least to some extent) to be able to predict outcomes of specific circumstances. That is wonderful – and it forms the basis of what we do on industrial plant – where we can design a system to produce a specific outcome. And by measuring and correcting along the way, we can be assured of that outcome.

What a remarkably powerful thing to be able to do!

And that is thanks to maths and science.



Ian Jandrell

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

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Power up with P66
high-voltage connector

For over 70 years, MARECHAL ELECTRIC has led the way in industrial electrification with innovative, safe, and reliable solutions. Now, we introduce the P66, our most advanced high-voltage connector yet, engineered to deliver power and performance in the most demanding environments.

Designed for industries facing extreme conditions, high currents, and tight spaces, the P66 offers unmatched safety, flexibility, and durability, all in a compact and efficient format.

Driving the energy transition

As the world shifts towards decarbonisation, renewable energy, and grid modernisation, the P66 stands as a reliable solution to power this transition. It combines cutting-edge engineering with sustainability, helping industries meet performance goals while reducing environmental impact.

P66 is more than a connector, it's a key asset for industries aiming to electrify safely, stay competitive, and move towards a cleaner energy future.

Feature highlights

- High performance
- Handles up to 660 A and 1 100 V ac / 1 500 V dc – ideal for high-power operations
- Maximum safety
- Integrated Reed Sensor Switch, LOTO compliant, and designed to reduce risk during operations
- Extreme durability
- Rated IP66/IP67, IK10, corrosion and vibration resistant with a copper-free aluminium alloy casing
- User-friendly design
- Features a draw bar mechanism for easy handling, and multiple mounting/wiring configurations
- Space-saving
- Compact design, with straight or angled versions to suit different installations.

Technical overview

Electrical & mechanical

- Rated current: 660 A
- Rated voltage: 1 100 V ac / 1 500 V dc
- Frequency: ≤ 500 Hz
- Contacts: 4P+E
- Mechanical operations: 2 000 cycles
- Cable size: 150 to 400 mm^2 flexible/SWA

Auxiliaries

- 8 pre-wired auxiliary contacts
- 1 pre-wired pilot contact

Thermal & environmental

- Operating temperature: -40°C to +60°C
- Storage temperature: -40°C to +80°C
- Resistance to chemicals and vibration
- Stainless steel fasteners.

Simplify, secure, sustain

With P66, installation is straightforward, maintenance is minimal, and downtime is reduced. Its modular, all-purpose design supports various cable diameters and connection styles, ensuring flexibility across applications.

Investing in the P66 means powering your business while protecting your people and the planet.

Partner with MARECHAL®

When you choose MARECHAL®, you're choosing more than a product. You're choosing a long-term partner committed to innovation, safety, and sustainability.

Let's electrify your industry – safely and efficiently.

For more information contact Marechal Electric Africa.
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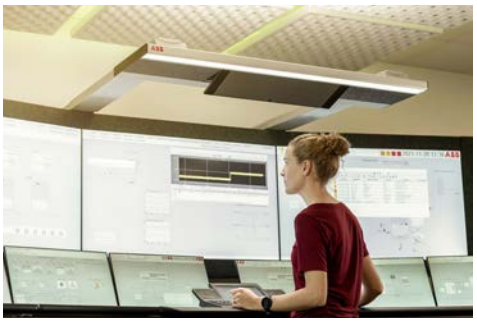
Safe, robust, and ready for the future, P66 is an advanced high-voltage connector engineered for demanding environments.

Automation and digitalisation in the pulp and paper industry

Arvin Ramjee, Account Manager, ABB Pulp and Paper, South Africa, says the pulp and paper manufacturing industry in South Africa is transitioning from traditional manual processes to embrace automation technologies, and so seeing significant transformation. He highlights too that industrial automation systems have evolved over the years, integrating software to measure key metrics that contribute to efficiencies. Here, Ramjee reports on advances in the industry.

As digital technologies are integrated into traditional automation systems, the pulp and paper industry is moving towards autonomous operations. Automation in pulp and paper mills aims to improve various production stages, from the preparation of raw material to producing the final product. The use of automation technologies enables precision and consistency throughout these processes.



ABB's digital solutions can be integrated into existing automation systems.

We have seen a shift in the paper industry – with reduced demand for newsprint and graphic paper. However, this has been replaced by demand for renewable packaging and tissue. There has also been a rise in demand for kraft paper, due to its downstream use as a solution to address sustainability concerns.

The level of automation in the pulp and paper industry is quite mature compared to other key industries. The next level is exploring digitalisation solutions to augment the existing automation products and solutions to extract more value by improving manufacturing efficiency.

Paper manufacturing is one of the most complex industrial processes today. Ensuring visibility of product properties is key to minimise rejects and improve repeatability and runnability. By continuously adjusting production to dynamic process movements and disturbances, quality control systems (QCS) can deliver reduced variability and enable swift responses to setpoint changes, avoiding production losses, improving product consistency, and contributing to lowering emissions.

More than simply reducing variability, modern QCS enable automatic controls to optimise production processes and energy consumption, reducing waste and costs – and ensuring that the final product meets internal and external standards.

Managing the use of resources

The pulp and paper industry in South Africa is also looking to transition to renewable energy sources to reduce reliance on fossil fuels and decrease greenhouse gas emissions. We have seen strategic investments being made towards integrating renewable energy sources for existing manufacturing processes with a key focus on use of energy and water, and chemicals, and managing carbon emissions.

Achieving these goals requires innovative technology that can increase efficiencies in the process and reduce wastage. Automation systems provide enhanced control over energy usage, for example, by optimising equipment performance and adjusting processes in response to real-time energy demand.

Automation solutions

As a global technology provider with decades of experience in quality control and automation, ABB continues to develop its pulp and paper products and solutions to catalyse change and address sustainability without compromising process quality and performance.

The company offers a comprehensive and integrated portfolio of automation products and solutions to support the pulp and paper industry throughout the manufacturing process. These include power distribution and electrification, paper machine drives, distributed control systems (DCS), paper machine QCS, manufacturing execution systems (MES) and ABB Ability™ Collaborative Operations to leverage the Industrial Internet of Things (IIoT) and deliver digital solutions to customers.

Paper mills that use ABB products and solutions can reduce rejects by keeping the product properties within a target range throughout the papermaking process. This is accomplished with the ABB Ability™ QMS, which provides measurement and control to reduce variability and therefore production waste. When paired with ABB Ability™ Expert Optimiser for Pulp, operators can further optimise process efficiency and raw material consumption to make on-spec products, economically and efficiently.

With time, adaptive Advanced Process Control together with Model Predictive Control adjust many variables simultaneously to achieve the desired output and meet the target range at the wet end of the machine. Staying within this range keeps costs in

Quality Control Systems enable reduced variability in product outputs and quick responses on setpoint changes, to improve product consistency and avoid production losses.

terms of energy, fibres and, in this process, water and chemicals too, as low as possible. Refining is a key area where APC achieves savings by reducing energy and fibre costs, also resulting in improved end paper sheet properties and with low raw material usage.

Some of the latest advances include ABB's tailored MES for pulp and paper, a system that connects and automates processes and provides visibility from shopfloor to enterprise. The intention here is to move plant operations from conventional connectivity towards fully autonomous operations – or smart manufacturing. ABB's process automation portfolio includes updated QCS products to achieve higher resolution for critical measurements that have a direct impact on product quality.

The ABB Ability™ EMS (Energy Management Solution) is an integrated solution incorporating forecasting and optimisation to address the various process demands. It maximises sustainability performance and energy cost savings via an iterative process of auditing, monitoring, forecasting and optimising energy consumption and supply for the entire manufacturing facility. EMS is helping process industries and manufacturing organisations make data-driven decisions about environmental, financial, and operational cost/benefit trade-offs as they work towards achieving carbon neutrality.

Remote support

Where the pulp and paper industry in South Africa was once facing the challenge of limited availability of expert resources, ABB leverages the digitally connected world to alleviate this challenge with its ABB Ability™ Collaborative Operations solution to provide customers access to a global resource pool of subject matter experts who can support operations remotely 24/7.

To address the shortage of expertise, ABB has introduced Visual Remote Support using augmented reality. Having this solution in place opens a global pool of engineering resources to customers, to assist them on an emergency basis when necessary as well as to assist in commissioning critical projects remotely.

In terms of artificial intelligence (AI) and digitalisation, ABB Ability™ Genix combines industrial analytics and AI in an enterprise-grade digital platform and suite. Genix unlocks the value of contextualised data by means of IIoT to improve industrial productivity and operational performance.

Industrial AI and analytics, combined with IIoT, brings together AI algorithms, machine learning models and advanced analytics tools to extract insights from massive amounts of industrial data in order to optimise production and manufacturing processes.

ABB's end-to-end solutions for pulp and paper manufacturing support the full value chain – from woodyard to shipment and from mill to enterprise. With its comprehensive and integrated portfolio of products and solutions and deep industry knowledge it supports the entire pulp and paper process.

As a global technology leader in electrification and automation, ABB helps industries run at high performance and become more efficient, productive and sustainable.

For more information visit: www.abb.com

Study shows AI and analytics deliver value for manufacturers

The Manufacturing Enterprise Solutions Association International (MESA) worked with Tech-Clarity, Inc. to understand the maturity of artificial intelligence (AI) in manufacturing and best practices for manufacturers to achieve rapid business value. The latest iteration of its long-standing Analytics that Matter research programme resulted in the *Making Manufacturing Analytics and AI Matter* report. The data- and case study-laden report shares fresh insights straight from the shopfloor.

Based on feedback from over 420 manufacturing professionals, this year's study confirms that AI is no longer just a buzzword – it is a game-changer. Despite challenges, manufacturers are seeing real, measurable value from AI and analytics initiatives.

Below is a brief outline highlighting some of the insights the report offers to readers.

- Smart manufacturing – where companies are on the journey and the goals they have.
- Analytics benefits – why companies are investing, what challenges they face, the benefits and how quickly companies achieve them compared to results from other software projects.
- Descriptive analytics – how are companies moving forward on traditional analytics that describe a situation or summarise history.
- Predictive analytics – prediction is a #1 goal, so how are companies achieving it? What hurdles do they face, and how are they overcoming them to gain benefits?
- GenAI and supporting and guiding analytics – what are manufacturers doing with GenAI? What are the challenges and benefits?
- DataOps – since the #1 hurdle for predictive and GenAI is data to build the model, data management and governance are areas where most manufacturers need to improve.
- Technology use – the research asked how companies want to and are getting analytics and AI and which current systems include what types of analytics.
- Takeaways & recommendations – is a summary of the highlights and what the data shows works best for manufacturing analytics and AI to deliver business value.

Despite challenges, manufacturers are seeing real, measurable value from AI and analytics initiatives.

The research, conducted with Tech-Clarity through surveys and interviews from December 2024 to January 2025, offers a powerful snapshot of where the industry stands – and where it's headed.

Making Manufacturing Analytics and AI Matter is available for MESA members in the Resource Library accessible from the website.

For more information visit: https://mesa.org/

Digital technologies – transforming agriculture in arid regions

The Middle East, covering almost 7.3 million km² and with an estimated population of more than 500 million, is one of the world's key regions. Yet it faces considerable challenges. In such a broadly arid region, the impacts of climate change are acute. Rising global temperatures, changes in precipitation patterns, and extreme weather events threaten food security as they alter crop cycles, with a heightened risk of droughts and extreme rainfall and shifts in the distribution of pests and diseases.

Smart technologies and software and analytics platforms like Xylem Vue enable smart agriculture, providing significant benefits in arid regions.

Against this background, one of the main levers of beneficial change is the digital transformation of irrigated agriculture. Begoña Tarrazona, Irrigation specialist at Idrica (which is headquartered in Valencia, Spain and works in partnership with global water technology provider, Xylem), says that agriculture "plays an essential role in global food security and can also help to renew and improve the air by harnessing practices that promote soil health, carbon sequestration, and pollution reduction. The solution is to balance food production with respect for the environment, which is crucial for the wellbeing of the planet and future generations."

Key technologies

Despite the challenges, some countries in the Middle East have been able to turn the constraints into opportunities by adopting digital technologies and transforming agriculture in arid environments.

Examples include progress made by countries such as Israel, recognised for its highly developed agricultural industry which has enabled it to become a world leader in agricultural technologies. Saudi Arabia, over recent decades, has invested in sustainable agriculture projects tapping into technology to grow crops in the desert and reduce its reliance on imports, and the United Arab Emirates has embraced technologies such as hydroponics and vertical farming to increase local production and enhance food security.

Christian Pérez, Senior Business Development Manager - Digital, Middle East and Turkey at Xylem, says the digital transformation of the agricultural sector in the Middle East "is a pressing need, to ensure sustainability, food security, and self-sufficiency."

Xylem Vue is an integrated software and analytics platform that was developed to support water utilities in progressing digital transformation. It was born out of the partnership between Xylem and Idrica. Here, adapted to agricultural applications, it relies on four critical and innovative technologies, highlighted as key to upgrading the industry.

- IoT (Internet of Things) sensors: These sensors monitor variables including soil moisture and plant health in real time, enabling precise, highly efficient management. According to Tarrazona, "Digital transformation enables a huge stride towards increasing sustainability and reducing water stress. It is essential to deploy sensors that provide us with real-time data on irrigation infrastructures and enable us to harness new technologies to help make decisions and optimise resources and processes."
- Smart irrigation: The FAO (the United Nations Food and Agriculture Organisation) points to "enhanced irrigation management to support production intensification and diversification while reducing resource degradation" as a key

Other technologies such as drones provide additional information to support the analytics and optimisation of farming practices.

strategy. Smart irrigation is anchored in systems that automatically match water supply to the specific needs of each crop in each area, thus reducing over-irrigation and percolation as well as preventing the carry-over of essential nutrients and salts from the soil. This also avoids salt build-up on the surface and optimises the water footprint.

- Satellite imagery and drones: These furnish detailed information on crop conditions, enabling early detection of problems and efficient resource planning.
- Artificial intelligence (AI): Building data from sensors deployed in irrigation infrastructures and in the field into big data platforms enables AI-powered big data analysis. This facilitates the identification of behavioural patterns and trends, providing for the optimisation of agricultural processes and resources, improving resource use, boosting productivity, and helping decision-making in real time.

The benefits of digital transformation

The implementation of these technologies and use of the Xylem Vue platform have generated significant benefits in the region.

- Water use optimisation: Uptake of smart irrigation systems and hydroponics has enabled more efficient management of water, a scarce resource in the region. In Morocco, for example, hydroponics has been introduced to deal with drought and ramp up agricultural production.
- Increased productivity: Using cutting-edge technologies has raised agricultural yields, enabling countries such as Israel to be self-sufficient in most of their food needs and to become exporters of agricultural products.
- Environmental sustainability: Digital farming practices minimise the use of chemical inputs and optimise the use of resources, helping to look after the environment.
- Food security: The uptake of agricultural technologies has increased the capacity of countries in the region to produce food locally, thus lessening reliance on imports and improving food security.

Digital transformation of irrigated agriculture in the Middle East demonstrates how innovation can meet environmental challenges and ensure a sustainable future for such arid regions around the world. As technology continues to move forward, digital agriculture could play an increasing role in enabling countries to adapt to climate change and drive food security in water-scarce environments.

For more information visit: https://www.xylem.com/en-za/

Single cable solution simplifies connectivity

Cabling can be one of the most challenging aspects of installing automation and drive systems, often leading to delays, faults and inefficiencies. As a global leader in drive and automation technology, SEW-EURODRIVE understands that reliable cabling is critical to the success of any project.

Recognising the complexity and risks that traditional cabling can present, SEW-EURODRIVE developed its DDI (Digital Data Interface) technology, combined with a single cable system that simplifies connectivity. This is designed to meet the demands of modern industry and eliminate the potential for cable connection faults that so often delay commissioning and compromise long term performance.

Where conventional cabling requires different cables for power, feedback and control, SEW-EURODRIVE's single cable solution integrates energy transmission and data communication. This reduces installation time and costs and helps streamline project planning, as well as improving machine design flexibility and increasing system reliability. With fewer connection points and reduced wiring complexity, the risk of installation errors is substantially reduced, enabling faster, smoother start-ups and greater operational confidence.

Willem Strydom, Business Development Electronics Manager at SEW-EURODRIVE South Africa, says, "From our experience across industries worldwide, we know that even minor cabling issues can escalate into major project setbacks. With our DDI technology and single cable design, customers can eliminate these risks, enabling more efficient installations and maximising system uptime from day one."

The DDI system transmits both digital encoder signals and motor temperature information through the same cable that is used to supply power. The integrated power and data communication provides real-time feedback from the motor without the need for additional wiring, delivering high levels of accuracy and process control and with the further benefit of simplifying maintenance requirements.

"Through its commitment to simplifying industrial automation and improving reliability SEW-EURODRIVE continues to set new standards," Strydom says. "Offering a complete drive solution that reduces cabling, improves diagnostics and enhances overall system efficiency, we help businesses across sectors achieve operational excellence."

The single cable solution, with proven DDI technology, empowers businesses to achieve faster, more secure and more cost-effective drive installations – supporting operational continuity and future-ready automation solutions.

For more information visit: www.sew-eurodrive.co.za

The MOVILINK® DDI hybrid cable enables simultaneous transmission of power and digital data between the inverter and motor, simplifying wiring and providing continuous condition monitoring and diagnostics.

A step-change in technology for welded assemblies

Welding is integral to the automotive manufacturing process and, in this regard, Malben Engineering, an award-winning supplier of welded assemblies to original equipment manufacturers (OEMs) and tier 1 automotive sector suppliers, has invested in a technological step-change over the past three years.

Operational Director, Luca Smargiasso says the introduction of a new vehicle model by a key customer necessitated the introduction of new, completely automated welding technologies. These include adaptive pulse welding, dc projection welders, and controlled voltage spot welders; as well as advanced variable pulse MIG welding technology.

Data-driven welding processes

Malben Engineering's welding processes, backed by extensive quality controls, deliver 750 000 projection welds and 1.7 million spot welds monthly. The company complies with the automotive sector's CQI 15 quality standard – and was one of the first tier 1 suppliers to achieve an A-rating and green status – maintaining a zero margin for defects and a rejection rate of zero parts per million (PPM), significantly exceeding customer expectations.

Although Malben has welded coated and uncoated mild steel automotive parts for decades, Smargiasso says the automotive industry is using thinner gauge, higher tensile steels, which makes welding more challenging. "There is a drive to go thinner with stronger materials, to reduce weight and improve fuel efficiency," he says.

Malben's automation and attention to detail deliver predictability and consistency. "In this sector, we are doing production welding for mass production runs. So, our welds must be exactly the same, every time," says Quinten Ballot, Head of Maintenance, who has extensive welding experience.

Over the past eight months, Malben reports zero rejections. Smargiasso comments: "It is like climbing a mountain. Everybody can do day one, most people can do day two – but from day three, they cannot continue and are in danger of falling! It is being able to do the same thing day in, day out, over an extended period and without letting your guard slip, which really counts."

Robust design of experiment processes and analysis of live data in real-time are factors that set Malben Engineering apart.

Plant Manager, Jithin Kottikkal explains that the quality of the data provided enables the Malben welding team – which collectively has some 70 years of welding experience – to take action when necessary to ensure that quality controls remain within limits.

Quality Control Manager, Cheslyn Reid adds: "We analyse the data, ensuring that it leads us in the right direction. We do not go into anything blindly, but we carefully analyse what our process tells us – tracking it over a certain period, then implementing production line changes to ensure we are always ahead."

Ballot points out that strict process controls and team-based decision-making are also priorities.

Real-time adaptive welding

The real-time control of weld parameters is achieved by using pulse welding. The welding parameters are adjusted in real-time during the weld process. If the gap between the welded parts varies due to dimensional tolerance allowances, the weld voltage and arc length are adapted accordingly.

Malben Engineering makes use of automated robotic welding in its production of welded assemblies for the automotive sector.

Technical Director, Marco Smargiasso says an important part of the Malben step-change was a move from ac to dc, with the move to dc projection welders. He notes that where robotic spot welders are still controlled by alternating current, this is carefully checked: "We monitor and measure the voltage. If there is something wrong, the process is immediately stopped. Monitoring current ensures we do not get a cold weld."

Ballot makes the point that the quality of welding that Malben achieves, also relies on highly skilled team members. "Malben employs experienced welders and builds skills within the company to keep pace with technology and with the requirements of our customers," he says.

Real-time digital twins support simulation-driven design

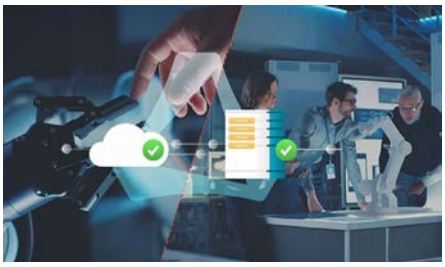
Earlier this year Altair announced a technical integration between the NVIDIA Omniverse Blueprint for Real Time Digital Twins and the Altair One® cloud innovation gateway. The integration takes advantage of GPU acceleration, NVIDIA NIM microservices, and NVIDIA Omniverse technologies to give customers an unparalleled ability to visualise, build, edit, and interact with complex simulations and digital twins in a shared turnkey environment. More broadly, it helps organisations leverage the full potential of Altair's simulation, artificial intelligence (AI), data analytics, and high-performance computing (HPC) solutions to drive groundbreaking innovation.

"Integrating NVIDIA Blackwell acceleration, AI and Omniverse technologies into Altair One will allow Altair users to take another leap forward in their digital engineering and digital transformation efforts," said Sam Mahalingam, Chief Technology Officer at Altair. "Integrating the Omniverse Blueprint for Real-Time Digital Twins with Altair One gives users a powerful new way to operationalise and innovate with digital twins, data, and AI in real time. It is another example of how Altair is continuing to lead in all things digital engineering and digital twin."

By leveraging NVIDIA Omniverse Blueprint for Real-Time Digital Twins in Altair One, users can collaborate and simulate in a shared virtual environment in real time. The technology combines 3D design, AI, and ray tracing to create immersive digital environments that function as a next-level digital workspace for professionals in all industries. Users benefit from high-end rendering and streaming capabilities on the cloud that simplify how software components work together in large systems, especially those used for AI, data processing, and graphics computing. The integration will open new avenues for innovation and collaboration in areas like crash and drop test simulations.

"Digital twin technology is reshaping industries and giving engineers and designers the tools to enable real-time design, optimise faster, and more," said Timothy Costa, Senior Director of CAE and CUDA-X at NVIDIA. "Now, Altair users can leverage NVIDIA's best-in-class technology to operationalise digital engineering and streamline their digital engineering workflows."

Overall, the integration empowers users by giving them seamless, turnkey access to the Omniverse Blueprint with minimal effort. That means, if users have built digital twins with the Omniverse Blueprint in Altair One, they can easily deploy them in any cloud or on-premises environment. By systematically cataloguing all data with essential metadata, Altair One enables datasets to expand through multiple design iterations. This supports the development of models in tools like Altair® PhysicsAI™, which can slash analysis time from hours or days to just seconds or minutes.



Supported by NVIDIA technology, Altair aims to drive further innovation in simulation-driven design, and AI-powered engineering.

In addition to the advantages outlined above, Altair is leveraging NVIDIA technology in other systems to supercharge performance. For example, Altair® OptiStruct® now features the cuDSS GPU-accelerated Direct Sparse Solver library to improve performance on CPU and GPU-accelerated architectures and Altair® EDEM™ will soon support the NVIDIA Grace architecture.

Altair is also pleased to announce performance on NVIDIA Blackwell for Altair® ultraFluidX®, Altair® nanoFluidX®, and EDEM, demonstrating up to 1.6x improvement on NVIDIA DGX B200. For EDEM, this represents a 40x speed increase when compared to 32 CPUs.

Hat-trick for Routed in fastest-growing companies rankings

In the announcement of the fourth annual *Financial Times*' Africa's Fastest-Growing Companies rankings, South Africa-based integrated cloud platform provider Routed has made the list for the third time.

Andrew Cruise, Managing Director of Routed.

The FT/Statista 2025 annual ranking of Africa's fastest-growing companies looks at a range of different industries and ranks companies based on the common denominator of their compound annual growth rate (CAGR) in revenue.

Commenting on the company's 109th place in the 2025 rankings, Managing Director Andrew Cruise notes that the cloud market is continuing to grow exponentially, and Routed has built its business on addressing all enterprise cloud, recovery and modern application development requirements.

"The company was founded in 2016, to address a clear gap in the South African cloud market – the need for reliable, locally hosted infrastructure designed specifically for VMware. Since then, the business has stayed true to this technical specialisation of designing, building and operating VMware-based private clouds with depth and discipline," Cruise says.

"We are not a generalist cloud provider. Routed is a purpose-built VMware cloud operator that has grown by focusing on what it does best. This singular focus has allowed it to lead in platform quality, consistency and trust – a major reason why the market sees Routed as a go-to infrastructure partner for VMware cloud environments."

Cruise says the company's growth has been driven by a partner-first approach, designed to enable other providers to succeed. As a service provider for service providers, Routed supports managed service providers (MSPs), internet service providers (ISPs), systems integrators, and cloud resellers to launch, run and scale their own VMware-based cloud platforms. These partners rely on Routed's infrastructure, expertise, and support, while retaining control of their customer relationships and services.

"The business also prides itself on its engineering excellence. It was the first VMware Cloud Verified provider on the continent and continues to invest in platform-level capability. Routed's platforms are built by engineers, for engineers, and are designed to run real-world workloads with stability, scale and sovereignty," says Cruise.

"Routed builds client trust through effective delivery, an approach that has made us one of the most dependable infrastructure partners in South Africa, and a standout on both the *Financial Times* and *News24* fastest-growing companies lists."

Record growth in renewable power capacity

In its report* Renewable Capacity Statistics 2025 *released earlier this year, the International Renewable Energy Agency (IRENA) shows another significant increase in renewable power capacity during 2024, reaching 4 448 gigawatts (GW). The addition of 585 GW capacity last year amounts to a 92.5% share of the total capacity expansion, and a record 15.1% rate of annual growth.

Although 2024 marks yet another benchmark in the development of new renewable energy capacity, IRENA notes that progress still falls short of the 11.2 terawatts needed to align with the global goal to triple installed renewable energy capacity by 2030. To reach this goal, renewable capacity now needs to expand by 16.6 % annually until 2030.

In addition, the progress achieved again reflects significant geographic disparities. As in previous years, most of the increase occurred in Asia, with the greatest share being contributed by China – almost 64% of the global added capacity – while Central America and the Caribbean contributed the least at only 3.2%. The G7 and G20 countries respectively accounted for 14.3% and 90.3% of new capacity in 2024.

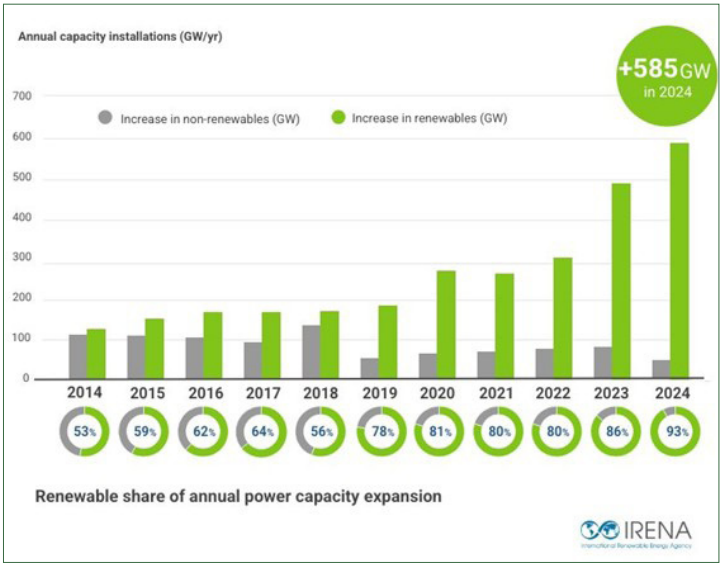
IRENA Director-General, Francesco La Camera commented: "The continuous growth of renewables we witness each year is evidence that renewables are economically viable and readily deployable. Each year they keep breaking their own expansion records, but we also face the recurring challenges of great regional disparities and the ticking clock as the 2030 deadline is imminent.

"With economic competitiveness and energy security becoming increasingly a major global concern today, expanding renewable power capacity at speed equals tapping into business opportunities and addressing energy security quickly and sustainably. I call on governments to leverage the next round of Nationally Determined Contributions (NDCs 3.0) as an opportunity to outline a clear blueprint of their renewable energy ambitions, and on the international community to enhance collaborations in support of the ambitions of the countries of the Global South," he added.

Noting the remarkable progress, the United Nations Secretary-General, António Guterres, said: "Renewable energy is powering down the fossil fuel age. Record-breaking growth is creating jobs, lowering energy bills and cleaning our air. Renewables renew economies. But the shift to clean energy must be faster and fairer – with all countries given the chance to benefit fully from cheap, clean renewable power."

The report released by IRENA shows that solar and wind energy continued to expand the most, jointly accounting for 96.6% of all net renewable additions in 2024. Over three-quarters of the capacity expansion was in solar energy which increased by 32.2%, reaching 1 865 GW, followed by wind energy which grew by 11.1%.

The large net decommissioning of non-renewable power in some regions has contributed to the upward trend of renewables capacity. However, more needs to be done to reach the goal of tripling renewables capacity by 2030 and the Paris Agreement. Over the past few years, IRENA has been pressing for clear, quantifiable renewable capacity targets in NDCs 3.0. To this end, the agency has been assisting in the enhancement and implementation of its members' NDCs with a focus on the energy sector through its country engagement.



With 585 GW of new renewable power capacity additions, renewables accounted for over 90% of total power expansion globally in 2024.

Technology highlights

- Solar photovoltaics increased by 451.9 GW last year. China added 278 GW to the total expansion, followed by India, 24.5 GW.
- Hydropower (excluding pumped storage hydropower) capacity reached 1 283 GW, demonstrating a notable rebound from 2023, driven by China. Ethiopia, Indonesia, Nepal, Pakistan, Tanzania, and Vietnam added more than 0.5 GW each.
- Wind energy expansion declined slightly, to a total of 1 133 GW capacity by the end of 2024. Expansion was again dominated by China and the United States.
- Bioenergy expansion rebounded in 2024, with an increase of 4.6 GW of capacity compared to an increase of 3.0 GW in 2023. The growth was driven by China and France each adding 1.3 GW.
- Geothermal energy increased by 0.4 GW overall, led by New Zealand, followed by Indonesia, Türkiye, and the US.
- Off-grid electricity (excluding Eurasia, Europe and North America) capacity expansion nearly tripled, growing by 1.7 GW to reach 14.3 GW. Growth was dominated by off-grid solar energy which reached 6.3 GW in 2024.

For more information visit: www.irena.org

South Africa's carbon tax overhaul: Unlocking renewable energy investment

The reviewed and revised second phase of South Africa's Carbon Tax Act 2019 comes into effect from 1 January 2026 through to 31 December 2030, increasing the rates of carbon tax liabilities and thus motivating sharper reductions in carbon emissions. It signals a decisive shift in the country's climate and energy landscape. With stricter emissions thresholds and an expanded scope for carbon offsets, the revised framework is expected to drive significant investment in renewable energy and reshape how businesses source their electricity. Alberto Gambacorta, Executive Vice-President for Sub-Saharan Africa at renewable energy firm Scatec, outlines how this policy evolution opens new doors – despite notable hurdles.

Alberto Gambacorta, Scatec, Sub-Saharan Africa.

A financial incentive for cleaner energy

By making fossil-fuel-based electricity more costly, the updated carbon tax regime incentivises companies to move towards cleaner alternatives. "For businesses tied to coal-intensive energy supply chains, investing in renewables is becoming a financial necessity," Gambacorta says. This economic pressure is increasing the competitiveness of solar, wind, and battery storage technologies, particularly for industrial users.

Making use of carbon offsets

The revised policy allows for greater use of carbon offsets, particularly for projects under South Africa's REIPPPP (Renewable Energy Independent Power Producer Procurement Programme). However, projects must meet the principle of 'additionality' – demonstrating they would not be viable without the offset mechanism. "That's becoming harder to prove in South Africa, and it gets technical very quickly," Gambacorta cautions.

Confronting grid constraints

Despite growing demand for clean energy, grid infrastructure remains a major bottleneck. Several REIPPPP rounds have faltered due to limited transmission capacity. Yet, there are signs of progress. The government's Independent Transmission Programme invites private-sector involvement in building 14 000 kilometres of high-voltage lines and hundreds of transformers nationwide.

Storage solutions, particularly battery systems, also present an opportunity. These technologies help balance the grid by storing excess energy generated during peak sunlight hours and releasing it when needed to ensure demand and capacity align.

Corporate procurement under pressure

The evolving carbon tax policy is expected to fuel corporate demand for power purchase agreements (PPAs), as companies look to cut emissions and reduce energy costs. This pressure is amplified by international regulations, notably the EU's Carbon Border Adjustment Mechanism (CBAM). "Manufacturers exporting to Europe face punitive tariffs if they rely on coal-based electricity," Gambacorta notes. "This makes moving to renewable energy about more than sustainability – it is about survival in global markets."

Positioning for a green hydrogen future

He highlights that the policy shift also presents a long-term opportunity: green hydrogen. With abundant renewable energy resources and rising global demand, South Africa could become a key player in this emerging sector. However, Gambacorta warns that the country's competitiveness will depend on overcoming infrastructure and export limitations. "We must be able to produce at the right cost – and have the means to move the product to market."

Turning policy into progress

Rather than introducing further regulation, the focus needs to be on fully implementing existing frameworks – such as the Electricity Regulations Amendment Act and new wheeling mechanisms. A national curtailment framework could also allow renewables to be traded more flexibly.

"Moreover," says Gambacorta, "municipalities must be better equipped to procure and distribute clean energy. Only a few are currently capable of acting as effective off-takers."

A call for collaboration

To unlock the full potential of South Africa's energy transition, cooperation between government and the private sector is essential. Forums for public-private dialogue are already active, but real progress hinges on translating discussions into delivery – expanding grid capacity, accelerating project execution, and supporting municipal readiness.

"With the right collaboration," Gambacorta says, "South Africa can meet its energy goals and build a more sustainable, inclusive economy."

For more information visit: www.scatec.com

Shaniel Lakhoo, WSP in Africa.

The cost impact of tracking options in PV power plants

Solar photovoltaic (PV) systems have a significant role to play in increasing the power generation capacity in South Africa. However, the PV power generation profile used in South Africa's recent long-term planning simulations does not accurately represent the current and expected future PV power generation in the country. This is the view of Shaniel Lakhoo, Senior Electronic Engineer for WSP in Africa.

As South Africa progresses its energy transition, Eskom is predicting that solar PV's contribution to generation capacity will grow to 19% by 2030. it is clear that solar energy will play an important role in the country's future power generation. Understanding the power production profile for PV plants is critical in ensuring the right decisions are made on the generation technology mix to best meet the country's electricity demand. Deploying the right mix is key to providing a stable, lowest cost electricity solution.

One of the critical factors to consider in utility-scale PV plant centres on how the modules are set up on the site and whether the modules are fixed in place and angled to compensate for the latitude (fixed-tilt) or track the sun during the day on a single horizonal axis (single-axis tracking). The choice has significant implications for cost-effectiveness, energy output and, in turn, influences when and how much power may be injected into the grid.

Accurate PV power generation profiles

The accuracy of PV power generation profiles is crucial for long-term power generation capacity expansion planning. These profiles inform the broader energy mix and capacity planning for the future. The country's studies, included in the Integrated Resource Plan (IRP) 2019, show the predominant use of fixed-tilt systems with the IRP 2023 not providing sufficient information to conclude the profile used. This is despite the growing use of single-axis trackers in real-world projects.

Single-axis trackers, which follow the sun's path through the day, generally outperform fixed-tilt systems in terms of energy production. In my research, I found energy gains of 12.9% to 20.1% could be achieved annually, by using single-axis tracking systems as opposed to fixed-tilt systems. By analysing the Levelised Cost of Energy (LCOE) – a measure of the average net present cost of electricity generation for a plant over its lifetime – I sought in my research to determine which configuration would offer the lowest LCOE.

Across all scenarios and locations, single-axis trackers consistently emerged as the most cost-effective solution. Despite the higher upfront costs, the energy gains from using trackers more than offsets these expenses. This results in a lower LCOE compared to fixed-tilt systems.

Further sensitivity analysis, to understand the most significant factors impacting LCOE, showed that the balance of system (BOS) costs and the ground coverage ratio (GCR) are the most critical variables. Interestingly, the cost of land had only a minor influence on LCOE. This was true even with the upper band equivalent to more than four times the profits that could be expected from using the land for agricultural purposes.

I also explored bifacial modules in the analysis as these are becoming more prevalent in the market and are being deployed in new projects. However, through my simulations I found that the additional energy produced by bifacial modules does not justify the 6% premium over single axis trackers. Compared to fixed tilt systems, the added energy was sufficient to make this the lower LCOE solution.

These insights are of value for decision makers. The analysis showed that even in scenarios with lower GHI (Global Horizontal Irradiance), single-axis trackers with mono-facial modules remained the most cost-effective choice. Additionally, the plant design can be optimised based on GCR, knowing the cost of land is not a significant factor, and so improving the overall feasibility of solar projects.

Among the critical factors that influence power generation capacity and cost effectiveness in utility-scale PV plant centres on how the modules are set up on the site and the use of fixed tilt or single-axis tracking modules.

A representative power profile

One of the other valuable outcomes of my research was the development of a representative PV power generation profile for South Africa. This was achieved by weighting the contributions from the eleven Renewable Energy Development Zones (REDZ) across the country, against the expected deployment of PV according to the Integrated Resource Plan (IRP) 2019. The resultant profile blends these contributions to create a profile reflecting the anticipated future solar generation.

This new profile is based on the most cost-effective solution identified in the simulations (single-axis trackers with mono-facial modules) and provides a revised profile that forms a more reliable basis for future energy planning. It is a step towards ensuring that our long-term energy forecasts are grounded in the realities of the technologies we are using.

The journey of exploring PV tracking choices has underscored the importance of aligning our energy planning with the latest technological and market advances As South Africa moves towards decarbonisation, our long-term planning should reflect realistic predictions, rather than solely historical data or outdated assumptions.

The transition to renewable energy is about adopting innovative technologies and – importantly – making informed decisions that will shape the sustainability of the country's energy systems for decades to come. In the case of utility-scale PV power plants, that means ensuring representative profiles are used when completing long-term planning simulations.

Note

The insights shared here are based on Shaniel Lakhoo's master's degree project and follow the conference proceedings around the work he presented at the 2024 EEEIC International Conference on Environment and Electrical Engineering [https://www.eeeic.net/] that took place in Rome.

For more information visit: www.wsp.com

Renewable energy + industrial sustainability: Products + services

GWEC's Global Wind Report 2025

This year's guide to the wind industry is out now. The Global Wind Energy Council's Market Intelligence team brings together data that is not available elsewhere, and the Policy Team presents analysis of the main challenges facing the wind industry and explores solutions to them. The report also includes a Markets to Watch section with details on the key markets, and insights from leading industry figures.

Ben Backwell, CEO of GWEC, says: "We hope you will enjoy reading this year's Global Wind Report as much as the GWEC team has enjoyed writing it. This year's report finds the industry delivered another record year of new capacity in 2024 but also sees an industry ready to deliver much more. We look forward to working with all stakeholders, alongside our partners in governments and key institutions around the world, to navigate the challenges investigated in this report, and maximise the benefits of wind technology for people in every region of the world."

A record-breaking 117 GW installed in 2024

The *2025 Global Wind Report* captures a pivotal moment for the wind energy sector. With 117 GW installed in 2024, wind power is advancing into new geographies and consolidating its position as a core pillar of the global energy transition. Yet, this momentum is not enough. To deliver the full benefits of wind energy and align with the COP28 agreement to triple global renewable capacity by 2030, wind deployment must scale up rapidly.

Overview

The report assesses where the industry stands today, highlighting new legislative wins and market expansion, confronting critical challenges like macroeconomic pressures, fragmented trade, supply chain misalignment, and disinformation. The report sets out a roadmap to overcome these barriers, backed by a clear call to action. With supportive policies, collaborative planning, and targeted investment, wind energy can scale up rapidly to unlock economic growth, energy security, and a clean energy future.

Key recommendations

The 2025 report presents a call to action: governments, industry and civil society need to work together to accelerate wind energy deployment at scale. To achieve this, GWEC urges specific steps, as outlined below.

- Create demand certainty: Reform auctions, align procurement with national targets, and provide long-term revenue visibility.
- De-risk investment: Use incentives like tax credits, reduce permitting delays, and implement investor-friendly policies in emerging markets.
- Industrialise for scale: Standardise turbine components, embrace modular manufacturing, and automate production to boost efficiency and resilience.
- Enable fair trade: Replace protectionist measures with coordinated, trade-friendly green industrial policies.
- Modernise infrastructure: Expand and digitise grid systems, accelerate interconnection, and integrate flexibility solutions.
- Build social licence: Counter disinformation with transparent, community-led engagement, benefit-sharing schemes, and local ownership models.

This roadmap lays the foundation to scale from today's growth trajectory to the 320 GW per year needed by 2030 – unlocking wind's full value for economies, people and the planet.

The 2025 Global Wind Report *is now available to download. [Source: GWEC]*

For more information visit: www.gwec.net/reports/globalwindreport

Ensuring backup batteries work when they are needed

Many businesses and households around South Africa have invested in solar installations and uninterrupted power supply (UPS) backup solutions to overcome the disruptions caused by instability in the country's power supply system. And we count on these solutions to kick in when power outages occur. Even if the weather Is not always favourable for solar installations to generate power during the day, the accompanying battery storage is expected to provide adequate capacity.

Lance Dickerson, MD of REVOV, notes though that these are complex systems that involve panels, batteries, inverters and electrical engineering and should always be installed by certified installers. And when things don't work as they should, support should be readily available and quickly provided.

The same can be said for UPS systems, whether these are professionally installed automatic systems, or plug-and-play variations. The first consideration, Dickerson emphasises, is safety – electricity is dangerous when things are done incorrectly. The second is that poorly configured setups shorten the life of batteries, rather than prolonging them.

Here, Dickerson offers seven tips on prolonging the life of power backup systems. "There are a few non-negotiables if you want to ensure your system does what it is supposed to, when you need it to," he says. "The tips below should be taken into consideration and explained, and automated, when you are working with a reputable company that installs high quality systems made up of reputable brands."

Always work with reputable suppliers and installers

This may seem obvious, but it cannot be overstated. When it comes to brands of batteries, seek out those that have stood the test of time and that come with full local support in case something does go wrong. Be wary of any brand that has been around for less than three years; it is likely not in the business for the long haul. Look for geographical footprint. Ideally, expertise should be available to provide support as and when you need it. Some battery brands require overseas support – which typically entails long waiting times.

It's all in the chemistry

By now, it should be widely understood that lithium iron phosphate (LifePO4) batteries are superior to the cheaper lead acid and other lithium-ion chemistry batteries. What fewer people know, and it is important, is that 2nd LiFe lithium iron phosphate batteries come with an added advantage. Because the cells are repurposed from electric vehicle batteries, they have had to pass more stringent performance and safety tests than batteries made exclusively for storage. In harsh African conditions, this is a significant advantage.

Ensure battery charging is optimal

To prolong a battery's life, avoid fast charging as much as possible. Secondly, avoid allowing a battery to drain completely. Even though it's lead acid, think about the time your car's battery drained completely – it was never the same again. The optimal state of charge for batteries is between 20% and 80%, but a full charge to 100% regularly is crucial to maintain maximum capacity and correct state of charge parameters. This helps prolong battery life and supports best performance.

Batteries perform best at room temperature

Extreme heat or cold can damage battery cells and reduce their lifespan, which means the ideal battery location is an enclosed, cool space. However, this is not always possible, which is why the hardier, proven resilience of cells in 2nd LiFe batteries, which have endured extremely hot temperatures and rapid charge and discharge rates in their life in an EV, are often preferred.

Long-term storage requires some preparation

If batteries are going to be stored for a long time, there is a procedure that needs to be followed to ensure they are kept in good condition. Charge the battery to 50% and then store it. After six months, run the battery through one full cycle, then re-charge to 50% and store it again.

Avoid battery overuse

Ensure that you have the correct number and configurations of batteries for your needs. Do not overload the system and, whenever possible, prioritise essential loads. Running a system at maximum load or 1C* every day, is a sure way to reduce its life. The best way to ensure correct usage is to work with approved installers who have the support of local battery supply teams. Always pay attention to system alarms and warnings.

[*1C is the C-rating of a battery that can be fully charged or discharged in one hour.]

A little exercise is needed

Batteries operate better with a little regular exercise. Discharge and charge the system by 25% every seven days – this prevents long-term degradation. A properly designed installation will take care of this. For UPS systems, ensure they remain plugged into the power source to ensure the batteries are optimally charged to protect against unexpected power cuts. Avoid micro cycling, a situation where the battery is discharged by less than 5% and recharged multiple times a day.

Battery backup systems should be carefully selected, installed professionally, and well maintained.

Design automation for utility-scale solar developments

Africa is increasingly harnessing its solar energy potential. In 2024, the continent added 2.5 GW of new solar generation capacity, with utility-scale projects making up 72% of this growth. To support this continuing growth, new computational software has been introduced to the solar energy market. Developed by 7SecondSolar, AUTOPV is designed to empower energy engineers to optimise and accelerate solar farm development through design automation.

One of the biggest hurdles in developing large-scale solar farms has always been the time and complexity of the design process. AUTOPV enables energy engineers to complete in days what once took months. Solar PV design is a highly iterative process, requiring early design decisions that determine costs and timelines. Later equipment and design changes are often impossible, even if they could lead to better yield, improved longevity, or cost benefits.

"Our software automates engineering-quality design outputs, generating precise bills of quantity, detailed engineering reports, AutoCAD drawings, and multiple design variations for the same site," says Paul Nel, Chief Executive Officer at 7SecondSolar. "This helps energy engineers and developers compare cost and energy yield scenarios easily."

Designing a utility-scale solar farm is a complex puzzle – one where even the smallest adjustments can lead to major cost savings and efficiency gains. This was evident in a recent 214 MW solar project where AUTOPV was used to generate eight different design variations in just one morning. "By making small tweaks, such as adjusting the width of corridors or repositioning string inverters, we identified two most-feasible designs. One could reduce cable costs by $1 million, and the other could improve energy efficiency enough to generate an additional $50 000 in annual revenue," Nel adds. "These advantages could have been completely missed using a conventional design approach, which also would have taken weeks or possibly months to produce comparable design iterations. With AUTOPV, we did this in hours – with fully detailed, build-ready drawings showing exact cable routes and inverter placements."

Africa's drive towards renewable energy is intensifying and there is a growing need for solutions that enable faster, smarter, and cost-effective utility-scale solar PV development.

In Malawi, solar energy is emerging as a powerful tool to drive economic and social transformation. The Golomoti Solar Project, a 28.5 MWp solar PV and battery storage installation, is a prime example of how smart engineering technology can overcome complex site challenges. Engineers used AUTOPV to tackle the project's intricate design requirements, including working around protected baobab trees in the centre of the site. By generating multiple layout configurations and equipment selections, the engineering team was able to identify a number of feasible design iterations in a matter of hours.

For developers and investors, this level of precision means greater control over project costs and efficiency from the outset. Africa's push towards a renewable energy mix is intensifying and there is a growing need for solutions that enable faster, smarter, and cost-effective utility-scale solar PV development.

Advancing wind power technology

In response to South Africa's increasing demand for reliable and cost-effective renewable energy, Nordex Energy South Africa has confirmed the market readiness of its most powerful onshore wind turbine to date: the N175/6.X. This follows the Nordex Group's successful installation of the turbine on its in-house developed hybrid concrete-steel tower in Santow, Germany, earlier this year.

Built on the established Delta4000 platform – already being deployed at two wind farms under construction in the Eastern Cape – the N175/6.X features a hub height of up to 179 metres. This next-generation turbine is designed to maximise energy output, particularly in low- to medium-wind areas such as Mpumalanga, where taller towers can access stronger, more stable wind flows.

The Santow installation is the highest Nordex tower yet built and the second deployment of the N175/6.X. The hybrid tower design draws on more than 15 years of Nordex's experience with concrete tower technology, including in South Africa, and has been refined to support increased hub heights and enhanced structural efficiency.

The change in scope from N163/6.X to N175/6.X relates mainly to the longer and optimised blade and subsequent structural component reinforcements to carry the higher loads induced by the blade, while maintaining the underlying technological design concept

Robert Timmers, Managing Director of Nordex Energy South Africa, says, "With more wind projects moving to inland areas due to grid access constraints, technology that can maximise output in lower wind regimes becomes more important. Hub height plays a key role in that, and the hybrid tower supports these requirements as well as offering flexibility in construction and logistics."

The N175/6.X wind turbine developed by the Nordex Group has a hub height up to 179 metres.
[Photo credit: Nordex Group/Ulrich Mertens]

Ensuring solar installations perform to standard

Many businesses investing in solar energy assume that once the system is installed, savings and efficiency will follow automatically. This is not always the case.

Underperformance is a serious risk that can quietly drain profitability, increase operational costs and, in some instances, disrupt business continuity. If the solar system installed is not generating the power planned for, the business could be paying more for electricity than anticipated, failing to meet sustainability targets, and possibly breaching financial agreements linked to energy savings.

Richard Flamand, Country Lead of Candi Solar South Africa, a company specialising in end-to-end solar solutions for businesses, says many businesses experience a shortfall in solar performance due to poor installation, inadequate maintenance, and a lack of proper monitoring. Without a clear strategy to manage these risks, a company's solar investment may not deliver the returns expected.

What causes solar underperformance?

"Solar system performance can be affected by various factors: poor installation, inadequate system maintenance, a lack of quality data, and inadequate health and safety infrastructure," says Flamand.

For example, solar panels installed without the correct orientation and tilt, as well as improper panel sizing, or the use of lower efficiency panels, will result in sub-par performance. Dirty or damaged solar panels as well as component failures like inefficient inverters, wiring issues or defective panels, will also reduce efficiency and decrease energy output.

A lack of proper maintenance and expertise can result in declining performance over time, and inaccurate data analytics make it difficult to identify issues before they escalate, which can lead to non-compliance with industry regulations, legal penalties or shutdowns.

"What we're seeing is that businesses often don't have a clear strategy for managing these challenges and that directly impacts the bottom line," says Flamand. "Most businesses don't account for performance issues in their initial financial planning, creating unexpected gaps in projected savings. Even when performance issues are identified, many organisations don't have the expertise to address them effectively."

Safeguarding your solar investments

Businesses can take control and safeguard their solar investments with Candi Solar's newly introduced industry-first solution – Solar ProtectPlus. It combines performance insurance with expert asset management, ensuring solar systems deliver the savings and efficiency they were designed to provide. With this hassle-free approach, companies can protect their investment, avoid unexpected costs, and maximise their solar returns – without the burden of managing and monitoring the system themselves.

Solar ProtectPlus offers three key benefits.

- Guaranteed financial compensation is provided for any underperformance and every lost kilowatt-hour, ensuring businesses achieve their projected savings and avoid additional costs.
- Based on a simple annual fixed-cost model like the traditional O&M fee, but backed by IoT technology, AI and Swiss engineering expertise, this innovative solution takes care of all aspects of solar system maintenance and optimisation: repairs, preventive and corrective maintenance, warranty management and performance.
- Candi Solar's performance-based revenue model ensures alignment with each client's best interests. The client pays a fixed rate per kWh, directly linked to the energy their solar system generates. When the system outperforms expectations, both Candi Solar and the client benefit, turning performance into shared success.

Protecting performance

This offers an alternative solution to businesses to manage and protect their solar investments.

"Solar ProtectPlus provides complete protection against underperformance and ensures optimal system efficiency. We are removing the uncertainty, complexity and risk from solar asset management. This means businesses can focus on their core operations while we ensure their solar investments deliver maximum value," says Flamand.

Candi Solar offers assessment, optimisation and ongoing maintenance to ensure solar installations perform as specified.

"We invite all solar asset owners that are not achieving the returns they expected from their solar investments or have experienced a noticeable drop in electricity production or a spike in electricity bills, to contact us for a complimentary technical check-up."

Businesses with solar assets of 200 kWp or more can take advantage of this technical check-up with a five-day turnaround time. This initial assessment will help the business understand the solar system's true potential, its actual performance and the opportunities for optimisation.

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Driving efficiency and sustainability

Generators offer a bridge in the new energy mix

Louis Kotze, Executive, Generator Sets Division at WEG Africa.

Generators are reliable electricity workhorses providing power when and where it is needed. And with efficiency improvements, noise reductions, and flexible design options, they are becoming valuable additions in the modern energy mix.

Global electricity demand is surging. According to the International Energy Agency (IEA)[1], the world's need for electricity grew by 2.2% in 2023, and this growth is expected to continue at an average rate of 3.4% annually through 2026.

Renewable energy sources like solar and wind are rapidly gaining ground as the world transitions to cleaner energy, but most renewable sources are inherently intermittent, dependent on weather conditions and vulnerable to fluctuations. Energy storage systems are not universally applicable, especially for demanding industrial applications such as 'soft-starting' heavy machinery. And unforeseen power outages and critical situations demand immediate reliable energy.

A sustainable energy mix requires renewable and instant energy sources. Generators are often overlooked, but they can play a core role in ensuring the stability and reliability of the evolving energy mix, Louis Kotze, Executive of WEG Africa's Generator Sets Division, says, "Modern generator technology has taken big steps forward from the noisy machines we typically think of. A combination of higher efficiency standards and lower noise is making generators a valuable part of supporting renewables in high-demand energy applications."

Reliable power for green systems

Sectors such as heavy industries, mining, agriculture, manufacturing, data centres, and commercial businesses require consistent, reliable power to maintain productivity and prevent costly disruptions. Although solar and wind energy systems can carry some or most of those requirements, their intermittent nature creates gaps in energy supply.

Generators serve as a bridge between abundant renewable energy and the practical demands of a 24/7 world. Serving as on-demand power sources, modular and responsive generators provide the necessary stability, kicking in when renewables output falters.

"Although industries can store power in backup systems, these have limitations," Kotze says. "Generators close those gaps with quick and high-quality electricity. They provide emergency and base-level power when other systems cannot. With the right site design and maintenance, generator systems are efficient and cost-effective."

An efficient energy source

Generators are often criticised for air and noise pollution. However, Kotze points out that modern generators adhere to strict efficiency standards that minimise fuel consumption and emissions. Diesel engines, for instance, have undergone significant improvements, incorporating technologies like Selective Catalytic Reduction (SCR), Exhaust Gas Recirculation (EGR), and Diesel Particulate Filters (DPF).

These innovations substantially lower the amount of nitrogen oxides and particulate matter that is released into the air. Modern generators meet strict environmental standards like Euro 6 for lowering harmful emissions, EPA Tier 4 emissions requirements for non-road diesel engines, and the Stage V emission standard for non-road mobile machinery.

As an OEM in this field, WEG has also invested in noise-reduction technologies to address the common concern about generators being noisy in operation.

"Noise is one of the biggest problems with generator sets, and WEG is investing significantly in reducing generator noise levels. For example, we use innovations such as acoustic louvres that keep noise levels under 65 A-weighted decibels," says Kotze.

Bridging the energy gap

The use of generators in diverse applications reflects their versatility. From small portable units to integrated grid-scale systems, generators function as crucial backup power for critical infrastructure. They provide reliable power for industrial sites, mining, and manufacturing. They support modern digital infrastructures, such as telecommunications and data centres. They also play a crucial role in emergency response operations and transportation hubs, ensuring continuity during crises.

New energy mixes integrate various energy sources. Renewable energy offers abundant and affordable power, and reliable sources capable of rapid and consistent output complement them. In this respect modern generators are key in the new energy mix.

Reference

[1] https://www.iea.org/reports/electricity-2024/executive-summary

For more information visit: www.weg.net

With efficiency improvements and noise reducing technologies, modern generators provide power on demand.

Infrared temperature control in aluminium rolling

The aluminium rolling process is critical to the aluminium manufacturing industry, and precise temperature measurement is essential in ensuring high-quality product output and protecting equipment. Instrotech offers a solution to the challenges of providing accurate temperature measurement in such demanding applications.

Various methods are used to produce aluminium coils, including cold rolling, direct casting, and continuous casting. The process plays a fundamental role in determining the material's final properties.

During the process, aluminium slabs or billets undergo either cold or hot working, depending on the characteristics desired in the finished material. Cold rolling increases the strength and hardness of the aluminium by altering its microstructure, although it also makes the material more brittle. Conversely, hot working, conducted at temperatures between 260°C and 510°C, depending on the alloy, maintains the aluminium's ductility by preventing work hardening. As the aluminium passes through the rolling mill, its temperature varies significantly – from an initial preheating stage at around 200°C, rising to around 450°C on entering the rolling mill, and dropping below 100°C as it exits.

One of the key challenges in this process is the accurate temperature measurement of aluminium, mainly due to the material's highly reflective surface. Aluminium is widely known to be difficult to measure with infrared cameras because of its low emissivity and high reflectivity in the infrared spectrum. Especially when polished or bright, aluminium has a very low emissivity, typically ranging from 0.02 to 0.1 for long-wavelength infrared devices. This low emissivity means aluminium emits very little infrared radiation compared to other materials, making it challenging for long-wavelength infrared cameras to provide accurate temperature readings. Additionally, aluminium's emissivity can vary with temperature, a factor that further complicates precise measurement. Short-wavelength infrared cameras, which typically have a higher evaluated temperature range, are often incompatible with the temperatures used in aluminium processing, so they are less suitable for these applications.

Using the wedge effect

One effective way to address the emissivity challenge in temperature measurement is to focus on the point where the coil forms a wedge, creating a nearly enclosed cavity for infrared radiation. In the deepest part of this wedge, the cavity acts as a virtual blackbody, with a stable emissivity close to one. This approach, known as the wedge method, is particularly practical for measuring the temperature of polished steel strips, which typically have a low emissivity of around 0.37. The wedge naturally forms within the coiled strip, making it an optimal location for accurate temperature readings.

The 'wedge effect' is recognised in infrared thermography. It explains why surfaces within a wedge-shaped structure exhibit higher apparent emissivity compared to flat surfaces. The increased emissivity results from multiple reflections of infrared radiation within the wedge, where the radiation bounces off the walls, increasing the likelihood of absorption and re-emission. The process creates an environment that closely mimics a perfect blackbody, with an emissivity approaching 0.998, irrespective of the material's natural emissivity. This phenomenon markedly reduces the impact of emissivity variations and background radiation on temperature measurements. For the wedge effect to work, the depth of the wedge must significantly exceed its opening.

Although it is a long-wavelength device, the Optris Xi410 infrared camera can autonomously leverage the wedge effect. The thermal imager can accurately identify the highest temperature by configuring a region of interest (ROI) in the PIXConnect software to capture the maximum temperature within the wedge of the aluminium coil. The Xi410 can then transmit thermal data directly to a programmable logic controller (PLC), via analogue outputs or digital interfaces, to provide precise and reliable temperature monitoring in real-time.

Precise temperature control

When rolling high-grade products, the decisive difference is precise temperature control. If the required temperatures are precisely maintained, the product quality can be assured, and damage to the roll stand will be avoided. In aluminium cold rolling, the wedge measurement technique can be used at the coiler or between the roll and the product during the rolling process. This overcomes the challenges posed by low temperatures and variable emissivity and eliminates background reflection influences. Hence, the manufacturer can implement continuous process temperature monitoring. It ensures that the system consistently tracks temperature variations throughout the production process, allowing for real-time adjustments and supporting the documentation of process and tool temperatures, providing insights into the production process, and enabling closed-loop control for automated adjustments that maintain optimal conditions and prevent deviations.

The Optris long wavelength camera can exhibit the wedge effect to measure the strip temperatures in cold rolling and coiling applications accurately. In these applications, the autonomous thermal imager from the Xi Series provides multiple interface options, enabling the camera to be integrated easily into new or existing process control systems. There is no need for special software or unique sets of wavelengths as are required by some devices in this challenging application. Optris infrared cameras offer an affordable solution.

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

In the aluminium rolling process, precise temperature measurement is essential in ensuring high-quality product output and protecting equipment.

Redefining non-invasive temperature measurement

The iTHERM-SurfaceLine-TM611 from Endress+Hauser is ideal for demanding process conditions.

The non-invasive thermometer iTHERM SurfaceLine TM611 by Endress+Hauser provides accuracy and response time comparable to invasive temperature measurement.

The iTHERM SurfaceLine TM611 can be used across all industries for a range of demanding applications. The surface-mounted thermometer measures process temperature without the risk of leakage and flow disruption. A specially designed thermal coupling element provides ideal thermal conductivity to the sensor and reduces ambient influences, providing optimum measurement performance.

The instrument offers increased safety for personnel, plant. and the environment. Non-invasive thermometers measure the process temperature on the surface of a pipe without penetrating the pipe wall. This eliminates the risk of leakage, process contamination and flow disturbance. In addition, there is no wear on thermowells or influence from vortex-induced vibration, reducing the risk of failure and plant downtime.

In its design the Endress+Hauser surface thermometer iTHERM SurfaceLine TM611 redefines non-invasive temperature measurement. It features a thermal coupling element with advanced geometry specifically designed for the pipe diameter, providing a large contact surface that optimises heat transfer to the sensor. This advantage is enhanced by an RTD/TC sensor with low thermal mass that fits precisely into the coupling element, eliminating any air gaps. A special heat transfer material applied to the coupling element compensates for any pipe imperfections. This product design results in accurate measurements without the need for error-prone electronic compensation, calculations or algorithms.

The device also offers significant cost and time savings. In contrast to traditional invasive temperature measurement methods, non-invasive thermometers offer significant savings at various steps – from project engineering to procurement, installation and operation. Development and design times are markedly reduced by eliminating the need for wake frequency and insertion depth calculations. Installation becomes more economical with reduced material expenses for thermowells, nozzles, pipe extensions and flanges. This cost efficiency also extends to services such as weld seam tests and material certification. Non-invasive thermometers also minimise lifecycle costs by eliminating risks such as thermowell breakage, leakage and regular inspection.

Designed to meet wide-ranging requirements

The product is equipped with all relevant international certifications, including explosion protection according to ATEX, IECEx, CSA and NEPSI and functional safety (SIL). In addition, iTHERM SurfaceLine TM611 is available with the full range of Endress+Hauser iTEMP temperature transmitters, including all common analogue and digital communication protocols, optional Bluetooth® connectivity and advanced diagnostics according to NAMUR NE107. The stainless steel clamps provide for easy and safe installation, making the instrument suitable for retrofitting or temporary measurements.

These features establish the non-invasive thermometer as the perfect solution for energy and safety monitoring, as well as for demanding applications, such as high flow velocities or process pressures, highly viscous or corrosive media and applications including pigging or small pipe diameters.

For more information visit: www.za.endress.com

The flowIQ® 3200 for C&I applications. [Source: Kamstrup]

New flowIQ smart water meter

As the first smart water meter for commercial and industrial purposes, the updated flowIQ® 3200 from Kamstrup comes with built-in acoustic leak detection up to DN40. This enables the meter to detect possible leakages – not only after the meter inside a building, but also before the meter in the adjacent service connections and distribution mains.

The new meter also features a more compact and lightweight meter housing, half the size of comparable meters. And to provide a more sustainable alternative to brass, it is manufactured in stainless steel and composite (PPS) material, offering maximum resistance to corrosion and high tolerance to chlorin and other disinfectants.

Electronic manometer with LED display

The new generation of PG type manometers from ifm are equipped with IO-Link and modern display units. Illuminated LED markings provide a quick overview of the current measured value. In addition to the various settings options for the display unit, IO-Link offers advantages such as easy commissioning, quick sensor replacement and remote access options.

ifm has further developed its tried-and-tested generation of PG type pressure sensors with analogue displays, by digitalising the sensors and expanding visualisation options. The redesigned display unit provides a quick overview of the previously defined measuring ranges and limit values through a ring of coloured LEDs. Instead of manually applying markings to the display housing, the minimum, middle and maximum ranges can now be visualised using differently coloured LEDs. With IO-Link, the desired measuring ranges can be defined quickly and easily and adapted to each application. The bright LEDs enable the user to see from a distance whether the pointer is in the green area or already close to the limit.

Process values and additional information are transmitted continuously using IO-Link technology and because the data is transmitted in a purely digital form based on a 24 V signal, it is conversion- and loss-free. The new generation PG pressure sensors offer a measuring range from -1 to 400 bar. As with previous models in the PG product family, the sensors are equipped with a robust ceramic measuring cell. For maximum safety in critical applications, the measuring cell has a diagnostic function that displays the cell's status.

The electronic manometers are used in the food industry and other industrial environments. To meet the prevailing requirements, ifm developed two device variants with differing approvals and technical properties. For example, the device variant for food applications is permanently temperature-resistant up to 150°C and will compensate for dynamic temperature jumps that can occur in cleaning cycles.

The sensors are supplied also with different connection variants and they can be easily and safely mounted in containers or pipes using an Aseptoflex Vario connection. The first devices of the new PG generation were launched at the Hannover Trade Fair in Germany in April 2025.

The new generation of PG pressure sensors has a modern design, illuminated LEDs make the display easier to read, and IO-Link helps simplify parameter setting.

For more information visit: www.ifm.com

Visualising sound to detect leaks

Fluke, locally represented by Comtest, is a global technology leader in manufacturing compact professional electronic test and measurement tools and software. The Fluke ii Industrial Acoustic Imager is a hand-held easy-to-use tool that visualises sounds coming from small leaks in compressed air, gas, and vacuum systems.

The instruments in the Fluke ii Industrial Acoustic Imager series are equipped with an array of microphones to provide an expanded 'field of view', enabling maintenance teams to locate leaks from compressor systems quickly and accurately, even in the noisiest environments. The product series includes Fluke's SoundSight™ technology, which overlays the sound map onto the image. Any technician that can use a camera, can use the Fluke Industrial Acoustic Imagers.

Return on investment

Even the smallest air leaks can compound over time, leading to massive energy waste and lost production time. According to the US Department of Energy, compressed air systems can lose 20 to 30 % of their output from leaks alone. For example, according to the DOE, a 1.5 mm-sized air leak at a flow rate of just 6.5 cfm will cost R19.02* per year. That is just one leak.

The Fluke ii900 Industrial Acoustic Imager.

One Fluke customer, a manufacturer, was spending between 30 and 45 minutes to find just one air leak. After testing the Acoustic Imager, the maintenance manager stated, "Rather than taking at least an hour to move everything out of the way, position the lift, spray the joint, and then put everything back, it now takes me only 30 seconds to a minute to locate an air leak with the ii camera. Some days, we can identify and repair 30 or 40 leaks in just a couple of hours." The manager added: "Moreover, we can use the ii cameras during production hours, when it's exceptionally loud in here, and we can still detect leaks at the rafter level, up to six to nine metres away."

Another customer commented on the use of the LeakQ software, "Now I have something visual to show my customers. I can present them with images as an excellent aid, and this emphasises the importance of fixing those leaks to maximise system capacity."

The Fluke ii915 full package includes:

- The Fluke ii915 Acoustic Imager
- USB-C charger with country-specific connectors.
- Rugged lithium-ion smart battery pack
- USB-C cable
- Rugged, hard carrying case
- Adjustable hand strap and neck strap
- Sensor array protector.

*Values are indicative and subject to change.

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

Expanding transmission grids – a global issue

The International Energy Agency has over the past few years highlighted the importance of strengthening and expanding grid infrastructure as fundamental to stabilising supply and securing electricity systems globally.

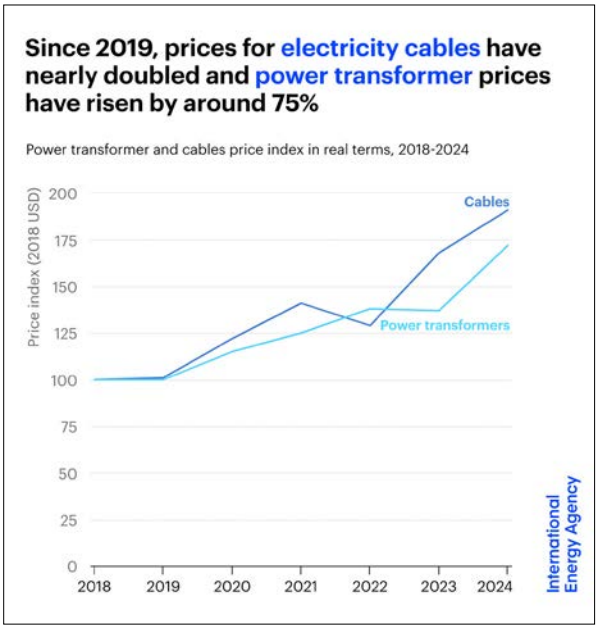
In a special report published in late 2023, *Electricity Grids and Secure Energy Transitions*, the IEA estimated that for countries to achieve their stated national plans and targets worldwide, global grid investment would need to nearly double by 2030, to over $600 billion per year – following a decade of stagnation. It also emphasised that regulations need to be reviewed and updated to support the deployment of new grids and to improve the use of existing assets.

Considered alongside the agency's recently released *Electricity 2025* report, which explores current trends in the sector, and its latest *World Energy Outlook*, which suggests that countries around the world are moving into a new 'Age of Electricity', the need for increased investment in expanding power grids becomes all the more evident.

Transmission infrastructure connects power generation sources to demand centres, integrating variable renewables like wind and solar. As the world's energy system evolves, grids need to be strengthened, to become more flexible and more resilient and to support reliable power systems and enable cross-border energy exchanges.

However, the development of new transmission infrastructure currently faces several challenges in supply chains – increasing prices for essential components, rising lead times, record-high order backlogs, as well as in procurement, skills and other areas.

Identifying strategies to address these challenges, the IEA's report *Building the Future Transmission Grid* published earlier this year, makes eight recommendations to help governments, regulators, buyers, manufacturers and other stakeholders navigate the complex landscape of supply chain challenges. For example, streamlining permitting, ensuring a skilled workforce and providing diverse, resilient and sustainable supply chains will help strengthen the transmission grid supply chain, and help build a modernised and expanded grid to power the clean energy transition.



Rising prices of cables, transformers and other components, extended lead times and a backlog of orders, are holding back the development of new grid infrastructure.

Supply chain challenges

The report highlights that as supply chain bottlenecks intensify, prices and procurement times for essential components like power transformers and cables have almost doubled in four years, creating significant hurdles for grid developers.

While permitting remains the primary cause of delays in transmission projects, particularly in advanced economies, supply chain issues have emerged as a critical limitation. An IEA survey of industry leaders found that procurement now takes two to three years for cables and up to four years for large power transformers – twice as long as in 2021. Specialised components face longer delays, with lead times for direct current cables – often used for long-distance transmission – extending beyond five years. The price increases for components are equally concerning. In real terms, cable costs have nearly doubled since 2019, and prices of power transformers have increased by around 75%. Competing demand from grid expansion projects that are under way simultaneously in many regions around the world is exacerbating the bottlenecks. The increased development of offshore wind power projects has further increased demand for specialised high-voltage subsea cables, putting additional pressure on already strained supply chains.

The report shows that manufacturers are responding with plans and investments to increase production capacity, but these expansions will take time to implement, and uncertainty remains regarding future demand levels and the availability of skilled workers. The report finds that around eight million people worldwide are currently employed in constructing, maintaining and operating grids, and this workforce will need to grow by at least 1.5 million skilled people by 2030, to meet projected demand.

Overcoming the constraints

Supply chain constraints come at a particularly challenging time. When the report was released, the IEA flagged more than 1 600 gigawatts of solar and wind projects in advanced development stages awaiting grid connections. The report indicates that while global investment in power transmission grew by 10% in 2023 to reach $140 billion, this figure would need to exceed $200 billion annually by the mid-2030s to meet rising electricity demand.

Timely investment in the supply chain requires confidence among manufacturers on the level of future demand for networks and components. In this regard, the IEA recommends enhancing the visibility of future infrastructure needs via transparent and credible advance planning, encouraging proactive grid investment, designing effective procurement frameworks, and ensuring a skilled workforce across the sector. Additional recommendations include streamlining permitting processes, optimising the use of existing grid infrastructure through digital technologies, and measures by policymakers to encourage greater diversity and resilience in supply chains. The report emphasises that coordinated efforts across the entire supply chain will be essential to overcome the current bottlenecks and enable the development of reliable power systems for the future.

For more information visit: www.iea.org.

Liberalising South Africa's electricity market

In a major shift towards liberalising the South African electricity market, the Department of Electricity and Energy recently released the new electricity wheeling framework, officially referred to as the updated Regulatory Rules on Network Charges for Third-Party Transportation of Energy.

In announcing the release of the new rules, Minister of Electricity and Energy Dr Kgosientsho Ramokgopa said this move marks one of the "most consequential interventions" in opening up South Africa's electricity sector.

"This is going to help us remake the energy and electricity landscape in the country and bring to life what was envisaged in the Energy Action Plan that the president announced in July 2022.

"It is also consistent with our objective of ensuring that we can achieve energy security in the country. It will enable us to diversify generation sources so that we don't rely only on Eskom for electricity generation," he said.

Conditions for third-party participation in the wheeling of electricity include:

- Participants must be licensed and registered with the National Energy Regulator of South Africa (NERSA)
- Power purchase agreements, connection and use-of-system agreements must be appropriately concluded
- Grid code compliance and auditable metering are required.

Open access

The updated wheeling framework is aimed at supporting open access to the electricity network, which will allow consumers to choose power sources – enabling competition and potentially, lower electricity prices.

The rules are also aimed at supporting:

- Non-discriminatory access: ensuring equal access to the grid for all users
- Cost reflective tariffs: charges that reflect the actual cost of network use
- Fairness and equity: balancing the interests of customers and licensees with non-biased tariffs
- Transparency: promoting unbundled tariffs that show true costs, subsidies and levies
- Network reliability: maintaining the integrity and security of the grid during wheeling
- Standardisation: creating consistent processes across all network service providers
- Regulatory certainty: reinforcing NERSA's role in governing fair and transparent access
- Just Energy Transition: enabling access to renewable energy through wheeling.

"We are democratising this space. We are opening the market to multiple generators of electricity, in addition to Eskom. With competition comes efficiency, comes innovation, research and investment, and we are potentially going to drive the prices down," Minister Ramokgopa said.

Piloting the Independent Transmission Programme

In a parallel development, Minister Ramokgopa in April announced that government will pursue private investment for the construction of new transmission lines through the Independent Transmission Programme (ITP).

Minister of Electricity and Energy, Dr Kgosientsho Ramokgopa has announced the first pilot project of an ITP.

A pilot programme for the ITP will, as a start, pave the way for the construction of 1 164 km of new 400 kV transmission lines across three provinces – the Northern Cape, Northwest and Gauteng – designed to support the integration of renewable energy into the grid. This has otherwise been restricted by the country's outdated transmission infrastructure and limited government and Eskom funding which have not allowed for the development of new transmission infrastructure.

Ramokgopa said, "As a result of these constraints, we have not been able to fully exploit our renewable energy assets. The Eskom balance sheet and the sovereign balance sheet do not hold sufficient reserves to carry the kind of investments that are required in this space. In terms of the national Transmission Development Plan, we need to modernise and expand transmission by about 14 000 km. To do this, we need about R440 billion. The state is not in a position to provide that kind of support. So, we are introducing the Independent Transmission Programme," Ramokgopa said. He added that a ministerial determination has been issued accordingly, to create a dispensation to allow for private sector participation. The aim is to accelerate the development of transmission infrastructure.

The ministerial determination designates the Department of Electricity and Energy (DEE) as the procurer and the National Transmission Company South Africa (NTCSA), the Eskom subsidiary responsible for the grid, the transmission system and market operations, as the buyer of the ITP capacity over the concession period. This pilot project marks the first time private capital will be directly involved in developing core grid infrastructure. The pilot forms part of a broader plan to decentralise South Africa's transmission sector and it is expected to unlock 3 222 MW of new generation capacity by August 2029.

Ramokgopa emphasised: "For the South African economy to grow, we need first to unshackle the structural constraints, which relate to electricity and the inefficiencies in logistics. Second, we need greater investment by the private sector. Electricity gives us the opportunity to transform and grow the economy," he said.

In terms of timelines for the pilot project, a Request for Qualification will be issued in July and a Request for Proposals will be issued in November. This process will be overseen by the Independent Power Producer Office (IPPO), which has managed the country's renewable energy procurement programme since 2011. It is anticipated that a build, own, operate and transfer model will be used for this pilot project.

For more information visit: www.sanews.gov.za

Collaboration in action

Working together through a collaborative partnership, ACTOM, a leader in the field of energy infrastructure and electromechanical equipment, and Sungrow, a leading supplier of renewable energy and energy storage solutions, have developed the Integrated Medium Voltage Transformer and Inverter Station. Leigh Darroll, Editor of* Electricity + Control *spoke to Lee Mbenge, Divisional Chief Executive Officer at ACTOM, about this innovation.

Lee Mbenge, Divisional Chief Executive Officer at ACTOM.

Presenting a model of the Integrated Medium Voltage Transformer and Inverter Station, Mbenge points to the different components that are packaged into a containerised utility-scale station, engineered specifically for use with renewable energy plants and intended to simplify and streamline installation and commissioning, as well as operations and maintenance.

The 4.4 MW inverter, from Sungrow, is a modular assembly of four 1.1 MW inverters. It can be scaled up further, combining two by 4.4 MW inverters to provide an 8.8 MW inverter. The medium voltage transformer is supplied by ACTOM Power Transformers, engineered to accommodate the feed from a renewable energy plant via the inverter. The ring main unit (RMU), which manages the feed from the transformer to the transmission substation and in turn the grid, is third party supplied – in the case of the first prototypes developed it was supplied by ABB, China. The low voltage combiner box, which manages protection and control of the station, as well as communications with the overall energy management system of the respective installation site, is supplied also by Sungrow.

Mbenge says Sungrow approached ACTOM to work with it, as a local partner, in developing this combined transformer-inverter station for a specific project. This was in response to a requirement for localisation from the client, as is standard for renewable energy projects developed by independent power producers in South Africa. Mbenge explains that initially, the intention was to deliver two of the transformer-inverter stations as 'spares' for the project. However, once they were installed, the client adopted them as primary equipment, in line with its own localisation objectives.

Research & development

Mbenge notes that as well as navigating the partnership arrangement with Sungrow, the development of the initial prototypes entailed a significant learning curve. Although installations of this kind are in operation in China and in Europe, for ACTOM, the concept of the integrated transformer-inverter station was all new.

The company has developed its own pad-mount transformer skids, which offer a reference as mobile, plug and play units. However, incorporating a utility-scale inverter into an integrated transformer-inverter unit introduces another dimension, and managing the unique dynamics of renewable energy, not least dealing with the volatile harmonics of renewables, also had to be considered. ACTOM embarked on an in-house process of development and testing, which took about five months. Mbenge outlines that testing itself involves first, an on-paper assessment of the technology by the customer, then a factory and technical assessment of the manufacturing facility, and finally type testing of assembled units, for the respective application. At the time that *Electricity + Control* spoke to Mbenge, ACTOM was finalising another demonstration model to be exhibited at Enlit Africa 2025 in May.

An Integrated MV Transformer and Inverter Station in production at ACTOM Power Transformers.

He says the company is also working with academia, electrical engineering experts at the University of the North West and the University of the Witwatersrand, in investigating and understanding the specifics and variabilities of renewable energy, in order to optimise further new developments in the equipment it supplies in this sector.

Markets

The Power Transformers Division at ACTOM is already engaging with the market to extend the uptake of the integrated MV transformer and inverter station, reaching independent power producers, mainly via their EPC consultants and engineering consultants, Mbenge says. The containerised station is especially engineered for renewable energy projects and will serve BESS (battery energy storage) projects equally well – to support the supply of dispatchable energy to the grid.

Mbenge adds that ACTOM is already working in this field, having supplied mainly electrical balance of plant on some of the first BESS projects. It is also working with Eskom's NTCSA in supplying auxiliary transformers as part of the implementation of the Transmission Development Plan.

He notes that the Transformers Division at ACTOM has previously worked only on production and supply, and with the new integrated transformer-inverter station it is now providing installation and commissioning services as well. These new capabilities are supported by colleagues in ACTOM's HV Equipment Division in a training programme enabling transfer of skills and shared lessons across the company's different divisions.

Looking at the potential market, Mbenge says ACTOM initially will focus nationally and in the SADC region – he points to renewable energy projects happening in Botswana, Namibia and eSwatini. He adds that the combined transformer-inverter station is also suitable for mining and other industrial sites where companies have installed their own solar or wind energy plants. The agricultural sector is another potential market and Mbenge notes that the integrated unit would serve especially well to support microgrids, extending electricity access to unserved areas that are inaccessible to the national grid.

Key benefits and the value of localisation

Among the main benefits of the integrated MV transformer-inverter station are that it is supplied as a containerised unit, making it easier to transport and quicker to install on site than would be the case with separate sourcing, supply, installation and commissioning of the various components. "It is, in effect, a plug-and-play solution," says Mbenge. "There is no need for more cabling or connections on site, no big site teams working on an installation, the whole process is simplified."

Mbenge adds that the 4.4 MW integrated stations are supplied in a standard 20-foot container, and the 8.8 MW module in a standard 40-foot container.

He also emphasises the benefits of localisation: supporting the development of local skills, local jobs, and local manufacturing, reducing logistics complexities and costs, and contributing to growing the South African economy.

Asked about delivery lead times – he says, "about 20 weeks (5 months) from drawing approval by the customer". This compares well against the standard lead time for imports which would be around 32 weeks (8 months).

"Local support and maintenance offer further benefits for the customer – in response time, language, availability of spares. In power generation, every hour counts. Quick access and local understanding enable faster turnaround times."

Mbenge adds that monitoring and control are built into the unit, and the software included in the LV combiner box, which manages protection and control, is designed to communicate with the control centre for the site. This supports remote monitoring and quick responses on any anomalies that arise.

The first units were produced at the ACTOM Power Transformers facility in Knights, east of Johannesburg, and going forward, ACTOM will be responsible for all production, quality control and maintenance support for the integrated MV transformer and inverter station.

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

Radial water blocking on MV XLPE cable systems

The high-performance cross-linked polyethylene (XLPE) material is the most common insulation used in medium voltage (MV) cables, from 6.6 kV to 33 kV, mainly because of its mechanical and electrical properties. However, the properties of XLPE are significantly affected if the material is exposed to water and moisture, resulting in water trees. Donemore Torerwa, electrical engineer and GM: Product Development and Applications at Aberdare Cables, explains that it then becomes important, in design, to ensure that the cable structure offers water ingress protection to the XLPE insulation.

The life of XLPE cable is usually estimated to be above 30 years, but once XLPE material is exposed to water or moisture ingress the longevity of the cable is affected. Hence it is important that, from the start of manufacturing, the cable production processes are effectively controlled to prevent any moisture or water ingress. (This is also a good reason why cable users should choose to buy their cables from reputable cable manufacturers.)

Torerwa emphasises that it is also important to prevent moisture ingress when the cable is in use, by ensuring that the jointing and termination workmanship is up to standard, and the cable will withstand the conditions under which it is installed.

SANS 1339 is a compulsory standard in South Africa covering MV cables from 6.6 kV to 33 kV. The standard specifies longitudinal and radial water blocking for MV cables when required by the user of the cable. Longitudinal water blocking is the most commonly deployed water blocking method, applied by many cable manufacturers in the local market, mainly because it is relatively easy to implement. Longitudinal water blocking alone, however, may not be enough to provide lasting water blocking capabilities for the cable in some environments, especially in areas with high water levels in the ground. Radial water blocking then becomes key, in design and manufacturing, to ensure enhanced water blocking capabilities for MV XLPE cables. Radial water blocked MV cables are not common in South Africa but are more common in high voltage (HV) cables, rated for 44 kV to 132 kV, making use of corrugated seamless aluminium (CSA).

Longitudinal water blocking is intended to prevent the ingress and spread of water in the areas between cores, around armouring, metallic screens and insulation. This is done with the use of moisture absorption barriers installed within the structure of the cable along its length. Typically, water block yarns and tapes are installed in the interstices of the multicore cables or around the bedding layers of a single core cables. If exposed to moisture, the yarns absorb and swell, preventing further ingress of the water or moisture inside the cable and thus offering protection. In terms of SANS 1339 of 2020, the cable will be type tested for conformance and users should ask to see these type test reports when purchasing cables that are claimed to have such features.

Radial water blocking features are less common in the industry in South Africa and the SANS 1339 standard does not go into detail in specifying the requirements for radial water blocking. Radial water blocking technology relies on an impermeable concentric layer around the cable preventing radial water ingress. Radial water blocking in high voltage cables is achieved through the CSA structure, which offers mechanical protection, earthing and screening as well as radial water blocking for the cable. For MV cables the common radial water protection materials used globally include lead sheathing, aluminium laminate tape and smooth welded aluminium tape.

The cable that offers both longitudinal and radial water ingress protection can be used in areas with high water levels, mostly the coastal areas in South Africa as well as any wetland. For such applications, the paper cable with lead sheath has always been the best option. This is the main reason why MV paper lead sheathed cables are preferred in most coastal areas, as opposed to XLPE MV cables.

It is important to note that due to the thermal performances of XLPE MV cables, paper MV cables have much lower current or load rating than XLPE MV cables. Paper MV cables may also introduce environmental concerns related to the impregnated oil and lead. This makes XLPE a better option, especially if it the cable has radial water blocking features.

Understanding the challenges related to the continued use of paper cables and the need to improve the life of the XLPE cables, particularly when used in high water level areas, Aberdare Cables, the leading manufacturer of cables in South Africa, has extended its range of products to include radially water blocked MV cables, making use of aluminium laminate technology. These MV cables with radial water blocking are available for the Africa market as well as globally.

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

Aberdare Paper Armoured Cable.

Aberdare Vultex 1C Unarmoured Cable.

Aberdare Vultex 3C Unarmoured Cable.

First IPP-built main transmission substation completed

South Africa's first self-build main transmission substation (MTS), by an independent power producer (IPP), has been completed and energised. The Koruson 400/132 kV MTS outside Noupoort in the Northern Cape, has been designed and built to connect 1.5 GW of renewable energy to the national grid.

Tristan de Drouas, CEO of EDF Renewables, on the MTS site.

The project has been developed by a consortium led by EDF Renewables, with partners, H1 Holdings, Gibb-Crede, and a local community trust. The consortium is also developing the adjacent Koruson 1 cluster of projects, which will connect to the grid through the MTS, as part of Round 5 of the IPP Office's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP).

The MTS, which is integrated into an existing 400 kV overhead line, will provide the infrastructure for the renewable energy farms to complete their respective connections to the grid and start exporting energy.

Tshepo Tshivhasa, Head of Grid Engineering at EDF Renewables highlights the project's several firsts. "This is the first greenfield transmission substation in more than seven years to be connected to the grid, and it is the first greenfield transmission substation that is a full self-build – developed, financed, engineered, constructed, and commissioned by an independent power producer. It also marks the first time that the National Transmission Company of South Africa (NTCSA) has approved a self-build scope of works of this magnitude."

Phase 1 of the energisation will see the Koruson 1 project connect three wind energy facilities (WEFs), totalling 420 MW, to the national grid. In Phase 2, the neighbouring Envusa Energy Koruson 2 project, will connect two WEFs and a solar farm, totalling 520 MW, to the national grid. Each of the individual renewable energy facilities will have its own distribution connection, consisting of 132 kV overhead lines and Eskom switching stations, built under a self-build agreement with the national grid operator.

"This MTS includes the implementation of a full suite of the latest Phase 6 protection, control, and automation schemes, some of which were developed specifically as part of this project, enhancing operational reliability and efficiency," says Carl Wlotzka, Senior Project Manager, EDF Renewables.

Additionally, he notes that the MTS integration into the existing transmission network alters grid dynamics. "This meant modifications were required, such as the replacement of two 400 kV towers with new 400 kV transposition towers, to ensure compliance with the latest operational standards.

"With advances in technologies and the private sector taking on what typically used to be a grid operator project, one can expect to encounter challenges that need to be overcome. EDF Renewables, its contractors, and the national grid entity, continued to push through the challenges and table solutions to bring realisation," said Wlotzka.

"The entire team has worked extremely hard and is proud to be part of this 'first of its kind' project, which will lay the foundations for future self-build (and NTCSA) projects in South Africa. This project marks a significant step forward in strengthening South Africa's renewable energy infrastructure while maintaining grid stability and efficiency," said Tristan de Drouas, CEO of EDF Renewables.

EDF Renewables has commissioned the Koruson main transmission substation.

Building SA's power infrastructure

As South Africa seeks to modernise its power infrastructure, ACTOM's Engineering Projects and Contracts (EPC) Division is stepping to the forefront. It recently showcased its capabilities for the first time at Enlit Africa 2025, presenting its extensive expertise in delivering turnkey solutions for high voltage substations, grid connections, and complex industrial and renewable energy projects. With a growing footprint across the SADC region, ACTOM EPC is equipped to play a valuable role in advancing energy infrastructure and supporting the shift towards a more resilient and sustainable power landscape.

Nicholas Msibi, CEO of ACTOM EPC.

Nicholas Msibi, CEO of ACTOM EPC, says, "This is a critical time for South Africa's power sector. As the energy transition moves forward, our infrastructure needs to catch up fast. We are proud to be part of providing the solutions."

Strengthening the grid

One of ACTOM EPC's recent successes is its being awarded a R1.3 billion contract to construct a Main Transmission Substation (MTS) in Swellendam, on behalf of Independent Power Producer Red Rocket. The substation will connect renewable power from the nearby wind farm directly into Eskom's transmission network, strengthening energy security and enabling greater renewables uptake.

"This project demonstrates that local expertise can deliver at global standards," says Msibi. "It's a major contract, yes, but importantly too, it is a signal that we are trusted to build the infrastructure that underpins South Africa's energy future." He adds that the Swellendam substation is not an isolated win, but part of a bigger pipeline of utility-scale projects. "We're seeing growing demand for substations that can integrate renewables efficiently. That is one of our strengths."

An integrated turnkey model

ACTOM EPC brings together six specialised ACTOM business units under a single delivery model. This includes ACTOM Power Systems, the division executing the Swellendam project; ACTOM Contracting for electrical and instrumentation works; and ACTOM Industry, which supplies motors and drives for industrial operations. ACTOM Rail Transport, ACTOM Energy and KOEBEC complete the EPC offering, each contributing sector-specific expertise.

"Our model is one of the most efficient in the EPC industry," Msibi says. "We offer clients access to full asset/infrastructure life cycle solutions. Working with us our clients have access to engineering expertise, equipment and products manufactured at our world class facilities in South Africa, and we offer after-sales maintenance and repairs. Our integrated business model gives us better control of project timelines, costs, and quality. And because all these capabilities are under the ACTOM banner, we are more agile and responsive."

He also highlights ACTOM's strong balance sheet as a key differentiator in the infrastructure space. "You need to have a solid balance sheet and cash flow to be able to execute projects of this scale," he says. "We're fortunate that over the years, we've built a very strong balance sheet. That means we can take on large projects like the Swellendam MTS and deliver them without financial strain or delays."

Enabling South Africa's energy transition

With grid congestion threatening to slow South Africa's renewable energy rollout, ACTOM EPC is stepping up to deliver the physical infrastructure that will help unlock more generation capacity. "The transition to cleaner energy cannot be achieved without strong transmission and distribution infrastructure," says Msibi. "We are here to bridge that gap, and we are doing it with solutions that are tailored to South Africa's conditions."

He emphasises that ACTOM EPC's local engineering teams hold a number of advantages: "We understand the terrain, the energy standards, the compliance environment, and the real-world constraints, because we're on the ground. That's what makes us effective."

ACTOM EPC is ready to engage with utilities, municipalities, developers and fellow EPCs. Looking ahead, Msibi sees ACTOM EPC playing a bigger role in the rollout of South Africa's Transmission Development Plan. "We're not just showing up, we're showing that we are serious about being a long-term partner in the country's energy build-out. South Africa needs to grow its power grid, and ACTOM EPC is ready to play its part in that."

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

All-in-one condition monitoring for transformers

The Calisto T1 from Doble encapsulates the functionality of bushings, partial discharge and input/output modules in a single configurable package that is cost-effective. It provides a clear user interface through a built-in server and manages user access, alert settings, alert management and data visualisation – bringing together data from Doble and third-party devices. Standard communication protocols include Modbus and DNP3 with optional IEC 61850, that allow data to be moved between Calisto T1 and other applications such as SCADA.

Simplifying condition monitoring installations

Calisto T1 offers configurable, multi-functional monitoring in a single, small enclosure. It works with existing firewall and cybersecurity regulations. The system visualises and can overlay data from multiple assets through a single user interface.

It enables comprehensive alert management, providing for three levels of alert on each data channel. Alert levels contain default values and are configurable. The system also holds a built-in audit trail of alert generation and acknowledgement for post-event investigation.

Calisto T1 allows for field upgrade of hardware so the customer can start small and grow. For example, a customer can start with IDD (Intelligent Diagnostic Device) bushing monitoring and add main tank PD (partial discharge) monitoring later.

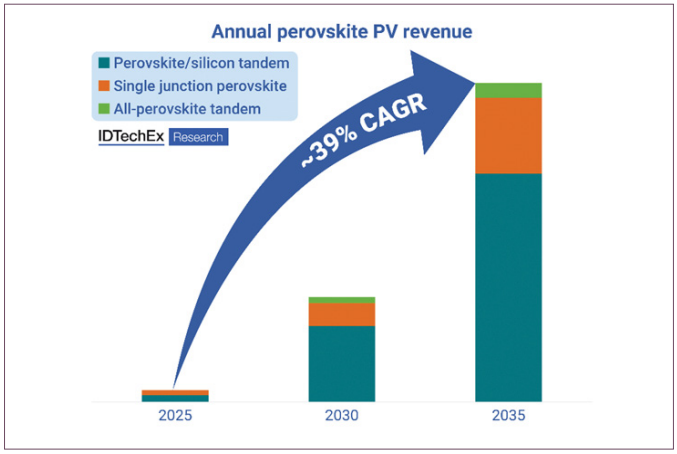
The intuitive user interface supports teamwork and investigation of alerts and asset issues.

Perovskite photovoltaics – the next technology for solar power?

Maia Benstead, Technology Analyst at IDTechEx

Solar power is one of the fastest growing renewable energy technologies. In 2023, over 340 GW of new solar power was installed[1]. With rising energy demand, concerns over energy security, and increasing decarbonisation goals, the growth in solar power installations is only expected to continue. Silicon technology currently dominates the solar panel market. Substantial investments, government initiatives, and consistent research to enable a reduction in the cost of solar energy have helped drive significant growth of this technology. However, silicon solar is reaching an efficiency limit and, along with this, the rigid and heavy nature of the technology restricts its overall scope for application. Perovskite photovoltaics have won attention as an alternative solar power technology due to their lightweight and flexible properties and substantially lower manufacturing costs.

In a new report titled *Perovskite Photovoltaics Market 2025-2035: Technologies, Players & Trends,* the UK-based independent research organisation IDTechEx covers the perovskite photovoltaic market comprehensively, including the emerging trends and application areas driving its growth, and provides a detailed assessment of the key technology types: thin-film perovskite, perovskite/silicon tandem and all-perovskite tandem. Data-driven benchmarking of the key solar technologies and an assessment of the main and emerging players helps to formulate detailed 10-year forecasts for the perovskite PV market. Further assessment of the scalability of manufacturing processes, key material trends, and alternative applications for perovskite PV are used to form a holistic outlook for the perovskite solar market. IDTechEx forecasts annual perovskite PV revenue to reach almost US$12 billion by 2035.



The perovskite photovoltaic market is forecast to exceed US$11.75 billion by 2035.

Perovskites as a material

Perovskites are a class of materials with a cubic crystal structure in the form ABX_3. In semiconducting perovskites (used for PV), the A site is typically filled by a large organic cation, either methylammonium (MA+) or formamidinium (FA+). The B site is occupied by lead or tin and is octahedrally coordinated by halide (X site) ions. Perovskite solar cells can be deposited as a thin film, typically 5 to 500 nm thick, using solution-based deposition processes. The perovskite active layer is deposited onto a substrate such as glass or plastic and is sandwiched between electron and hole [2] transport layers and electrodes, which allow the effective conduction of charge to power an external load. Fabrication of perovskite solar cells is sheet-to-sheet or roll-to-roll compatible, allowing for scalable and automated manufacturing, which is particularly attractive from a financial perspective. Perovskite synthesis also uses relatively abundant and low-cost raw materials, another factor that helps to lower manufacturing costs considerably.

Solar cell structures

Perovskite photovoltaics can be divided into single-junction or tandem solar cells. All single-junction solar technologies possess a theoretical maximum power conversion efficiency (PCE) of about 30%. As with silicon solar technology, single-junction perovskite solar cells will reach an efficiency plateau. Their lightweight and flexible nature has led to single-junction perovskite solar cells being explored for use in building-integrated photovoltaic applications, where the solar panel replaces building materials, such as windows. This sector has so far seen limited applications, but growth is anticipated with the ramp up of perovskite manufacturing capacities. Continuing technological innovations to improve durability and the lowering of costs with economies of scale will contribute to increased perovskite PV uptake.

Overcoming the efficiency limit of single junction solar cells is possible by employing a tandem device architecture. Stacking two sub-cells on top of one another, the device's PCE limit is increased to around 43%. Again, due to their low cost and lightweight nature, perovskites provide a significant opportunity for the development of high-performance solar cells.

The optical properties of perovskites can be engineered by manipulating the chemical composition of the material. Perovskites can be produced with the capability to absorb high-energy wavelengths of visible light (blue) and convert this efficiently to energy. Silicon has a relatively poor conversion of these wavelengths but converts lower energy wavelengths (red) more efficiently. By integrating both materials into a tandem structure, the conversion efficiency of incident light and, hence, power output per unit area, is increased.

There are two typical tandem configurations: two and four-terminal. In the case of the 2-terminal (2T) configuration, the perovskite top cell and the silicon bottom cell are monolithically integrated and connected in series. In a 4-terminal (4T) architecture, the two cells are fabricated independently and stacked mechanically. The 4T architecture requires more manufacturing steps, but employing this structure allows for independent sub-cell optimisation to provide a relatively low-cost drop-in solar solution. Existing silicon solar manufacturing lines can be used, with the perovskite sub-cell fabricated independently, and then processed to form the finished perovskite/silicon tandem solar panel. In IDTechEx's view, considering the scale and maturity of the silicon solar market, the use of perovskites to enhance this technology

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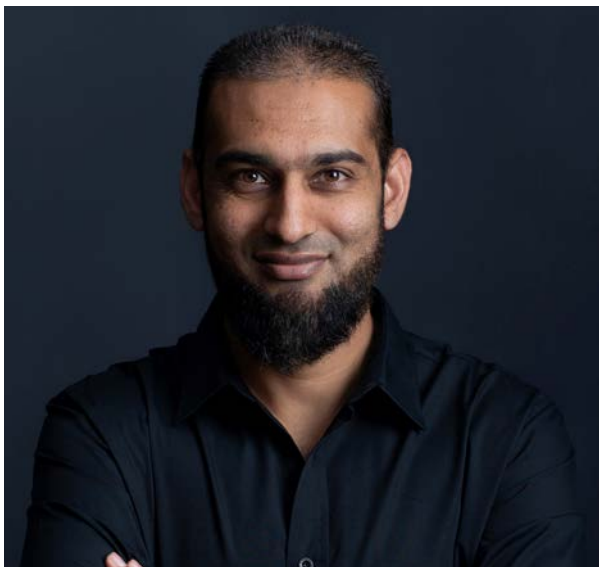
Bridging South Africa's IT skills shortage

Highlighting that South Africa is experiencing a significant shortage of skills in information technology (IT), Mohammed Sayed, Service Delivery Manager at DMP SA says this is jeopardising the country's digital transformation and economic growth. Essential fields such as cybersecurity, data analytics, artificial intelligence (AI), and software development are notably impacted, with some reports indicating a deficit of 20 000 to 70 000 qualified professionals.



Mohammed Sayed, DMP South Africa.

This serious shortage of IT skills affects business operations as well as the market as a whole. Globally, the IT industry is one of the fastest-growing sectors, and for a developing country like South Africa, keeping up with global standards is a major challenge. In Sayed's view, this situation presents a problem, but it also offers opportunities for growth and development.

With IT being one of the fastest-growing sectors globally, countries like India have excelled in this area over the past 10 to 20 years. Many IT products originate from America, and Indian teams have taken over much of the support, due to the skills they have.

South Africa has a relatively young and willing-to-learn population. The key is to put the right pieces into the puzzle to skill people in the right areas. Every stumbling block should be seen as an opportunity to foster growth and development.

MSPs can fill the gap

As IT skills development continues, Managed Service Providers (MSPs) present an interim practical solution to South Africa's IT skills deficit. Collaborating with MSPs enables South African companies to tap into specialised IT expertise that is otherwise scarce in the local market.

For example, MSPs provide a comprehensive range of security services, such as data management and protection, threat detection and incident response, enabling businesses to strengthen their cybersecurity and cyber resilience postures without building and maintaining internal teams.

For companies that want to outsource their IT needs, engaging the services of an MSP offers many advantages, including in skills development. Training is often expensive and does not always provide the full experience. By outsourcing to an MSP, companies can benefit from their skills and build skills internally over the long run.

Tailored solutions

Additionally, MSPs can compare customer environments and make recommendations based on what works best. Leveraging the skills of an MSP, companies benefit from the tailored solutions and expertise that they can provide without the need for extensive training.

Working with international vendors and partners, MSPs can bring advanced skills into the South African market without requiring customers to train their internal staff and enabling them to benefit from MSPs' international connections and knowledge.

Furthermore, MSPs offer platforms where the customer's infrastructure does not need to be on-site. For example, local organisations can use MSPs as third-party vendors to maintain another copy of their backed-up data in a different location. This provides additional data protection and an added layer of security.

Skills development remains essential

Digital processes, including AI, are key for the future – and this means South Africa does need to address its IT skills shortage effectively so that it is not reliant on importing skills from other countries. It is important that skilled individuals should share their knowledge, and those seeking assistance should have the opportunity to progress. Proper training plans are essential, starting from the post-matric level and involving government and universities. All training programmes should include a period of practical experience.

Universities tend to focus on theory rather than practical experience, yet practical experience is essential in developing skills. If universities and technical institutions can incorporate more practical processes, this helps to put theoretical learning into a real-world perspective.

Getting IT skills development right and developing young talent early, will make a significant difference. Without this planning and commitment, the skills gap in South Africa will continue to widen, disrupting business operations and adding to the already high youth unemployment levels.

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

From data to action: Inspiring environmental protection

From left: Prof Glenda Gray, Mr Leo Chiloane and two members of the uLwazi Node team, with Mr Mmboneni Muofhe, Deputy Director-General at the DSTI.

In 2009, the United Nations General Assembly proclaimed 22 April as International Mother Earth Day. The proclamation recognises the earth and its ecosystems as humanity's common home and the need to protect the planet to enhance people's livelihoods, counteract climate change, and stop the collapse of biodiversity. On 22 April 2025, the National Science and Technology Forum (NSTF) celebrated the award-winning work of the uLwazi Node team, which operates the South African Environmental Observation Network (SAEON) Open Data Platform (ODP), with Manager: Leo Chiloane. SAEON's Open Data Platform is managed by the uLwazi Node within one of the National Research Foundation's (NRF's) business units: NRF-SAEON. The uLwazi Node ODP team was awarded the NSTF-South32 'Data for Research' Award at the 2024 NSTF-South32 Awards, known by some as the 'Science Oscars' of South Africa.

International Mother Earth Day

International Mother Earth Day recognises our collective responsibility, as called for in the 1992 Rio Declaration, to promote harmony with nature and the earth, to achieve a just balance across the economic, social, and environmental needs of the present and future generations of humanity. The 2025 theme, 'Our Power, Our Planet',

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presents the most significant opportunity for this sector.

The market outlook

Perovskite/silicon tandem solar cells are overall expected to dominate the perovskite PV market. With similar mechanical properties to single-junction silicon solar and the potential to achieve higher PCEs, they are suitable for traditional solar applications, including solar farms and rooftop applications. As first-generation solar technologies reach end-of-life around 2030 and beyond, an increase in the uptake of perovskite/silicon tandem solar will likely be seen, especially as costs decline markedly with economies of scale. The higher power output per unit area for perovskite/silicon tandem solar cells, and a comparative price to silicon solar, makes them especially attractive to utility providers, industry, and consumers, where technology and price optimisation are important. Many manufacturers are therefore already touting perovskite/silicon tandem solar as the next "major solar technology".

More details on the types of perovskite photovoltaic technologies and the applications and key players driving the market growth are available in the IDTechEx report which is accessible from the website.

Editor's notes

[1] IRENA, the International Renewable Energy Agency, reports that solar energy accounted for 42% of total (record) growth of 585 GW of renewables in 2024 https://www.irena.org/News/articles/2025/Apr/Renewables-in-2024-5-Key-Facts-Behind-a-Record-Breaking-Year

[2] A 'hole' refers to the absence of an electron in the atomic structure of a semiconductor material; the American Chemical Society [www.acs.org] explains that when sunlight strikes a solar cell, electrons in the silicon are ejected, which results in the formation of 'holes' – the vacancies left behind by the escaping electrons.

For more information visit: www.IDTechEx.com

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highlights the need for renewable energy and urgent climate action. Climate change, man-made changes to nature, as well as actions that disrupt biodiversity, such as deforestation, land-use change, intensified agriculture and livestock production or the growing illegal wildlife trade, all accelerate the destruction of the planet. International Mother Earth Day is a call to action – signalling the need to shift to a more sustainable economy that works for people and the planet. It reminds us that protecting the planet is everyone's responsibility.

The value of open access data

uLwazi (meaning 'knowledge') is one of the seven nodes of the SAEON, established in 2018 with a focus on data management and the development of platforms and decision-support tools for government departments. The ODP is a metadata repository operated along FAIR data principles (FAIR: findability, accessibility, interoperability, and reusability). The goal is to make data and data products accessible and understandable, to assist decision-making and support a sound response to various social, economic, and environmental challenges in SA. Some of the ODP metadata is visible in the Global Earth Observation System of Systems (GEOSS), International Oceanographic Data and Information Exchange (IODE) and DataCite. The ODP was certified as a trusted repository by the CoreTrustSeal in 2023.

Leo Chiloane, Manager of the NRF-SAEON uLwazi Node, explains: "The ODP is a data infrastructure that facilitates the publication, discovery, dissemination and preservation of earth observation and environmental data, nationally."

The primary data systems are developed to support projects funded by organisations such as the NRF, the Department of Science, Technology and Innovation (DSTI), and the Department of Forestry, Fisheries, and the Environment (DFFE). In addition, the team engages in several other collaborations and small funding streams, locally and internationally. Alongside these funded projects, ongoing programmes are dedicated to the description and publication of Earth and environmental data sets, a responsibility managed by SAEON and its stakeholders.

Chiloane adds that the uLwazi Node helps foster global scientific collaboration. "Interoperability between data management systems is constantly evolving and we are excited about linking transdisciplinary data sources to enhance national and international collaborations," he says.

One of the projects includes the South African Risk and Vulnerability Atlas (SARVA), an initiative of the DSTI and a 10-year Global Change Grand Challenge. It is currently in its third phase of implementation with this phase focusing on data access and value-added products for decision-making. Examples of open access data sets include land-use change, urbanisation, climate change, biodiversity loss, social and physical infrastructure, education, child health and poverty indicators.

SARVA is an open science platform that offers decision-ready, spatial and non-spatial data, dashboards, infographics, and maps related to natural and human-made hazards, including climate change, biodiversity loss, and epidemics. It aims to disseminate data that assesses the risks and vulnerabilities facing SA, combining multidisciplinary datasets from various organisations.

SARVA is continuously updated and maintained, providing a living product that supports collaboration and data sharing across institutions. It helps SA respond to global challenges by providing accessible and up-to-date information.

In the face of accelerating environmental degradation, advanced technologies are stepping in to empower conservationists. Earth Observation (EO) using satellite data for environmental monitoring has become especially valuable in preserving biodiversity, combatting climate change, and managing natural resources.

Earth Observation datasets offering open access play a key role in protecting natural systems by aiding in environmental monitoring to provide early warning systems, with ample time for mitigating solutions to be outlined. It helps in identifying stressors such as overflowing riverbanks/storm surges, wildfires, illegal deforestation, gas pipeline leaks and other sources of greenhouse gases (GHGs). However, despite EO's great potential for protecting our natural environment, more than half of the world's ecosystems today are not mapped. To help narrow this knowledge gap, it is important to foster regional and international collaboration to facilitate a harmonised approach to mapping and data monitoring. Making use of emerging digital technologies will also enable Earth Observation data to make a greater impact.

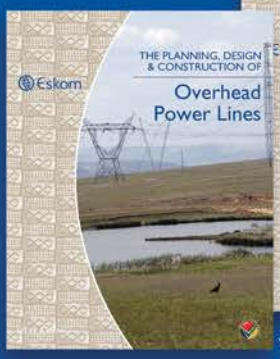
The uLwazi Node team hopes that the NSTF-South32 Data for Research Award will elevate awareness of its work and attract critical collaborations.

"Data management work can be quite siloed, particularly in SA, so these awards are a great way to connect with others," says Chiloane. "For us, success is not just about people using our data, but also about building a community where researchers can share their derived data products back, creating a cycle of collaboration and innovation."

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

Eskom

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



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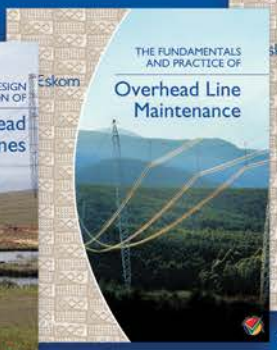

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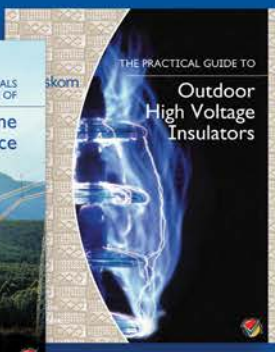

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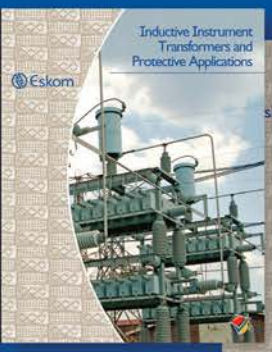

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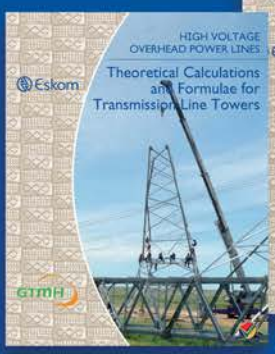

Volume 6 (Part 2): High Voltage Overhead Power Lines: Theoretical Calculations and Formulae for Transmission Line Towers

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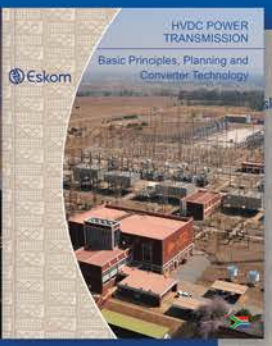

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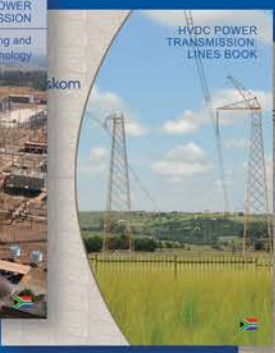

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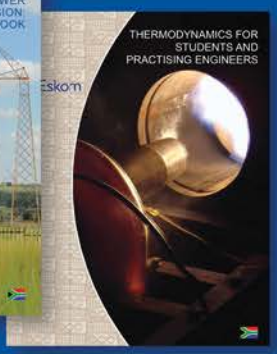

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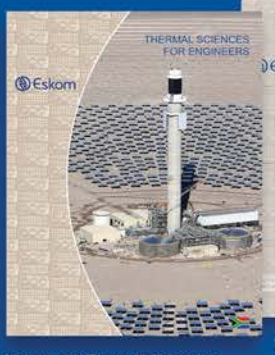

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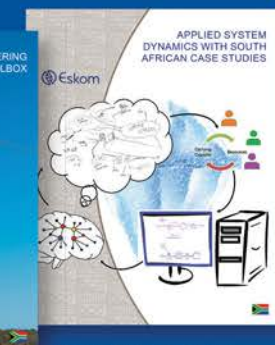

Volume 13: Applied System Dynamics with South African Case Studies

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

Volume 1: Mentorship and Coaching

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

Volume 1: Procurement Management Key Concepts and Practices

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

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

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

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Africa SADC area
MARECHAL ELECTRIC AFRICA (PTY) LTD.
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