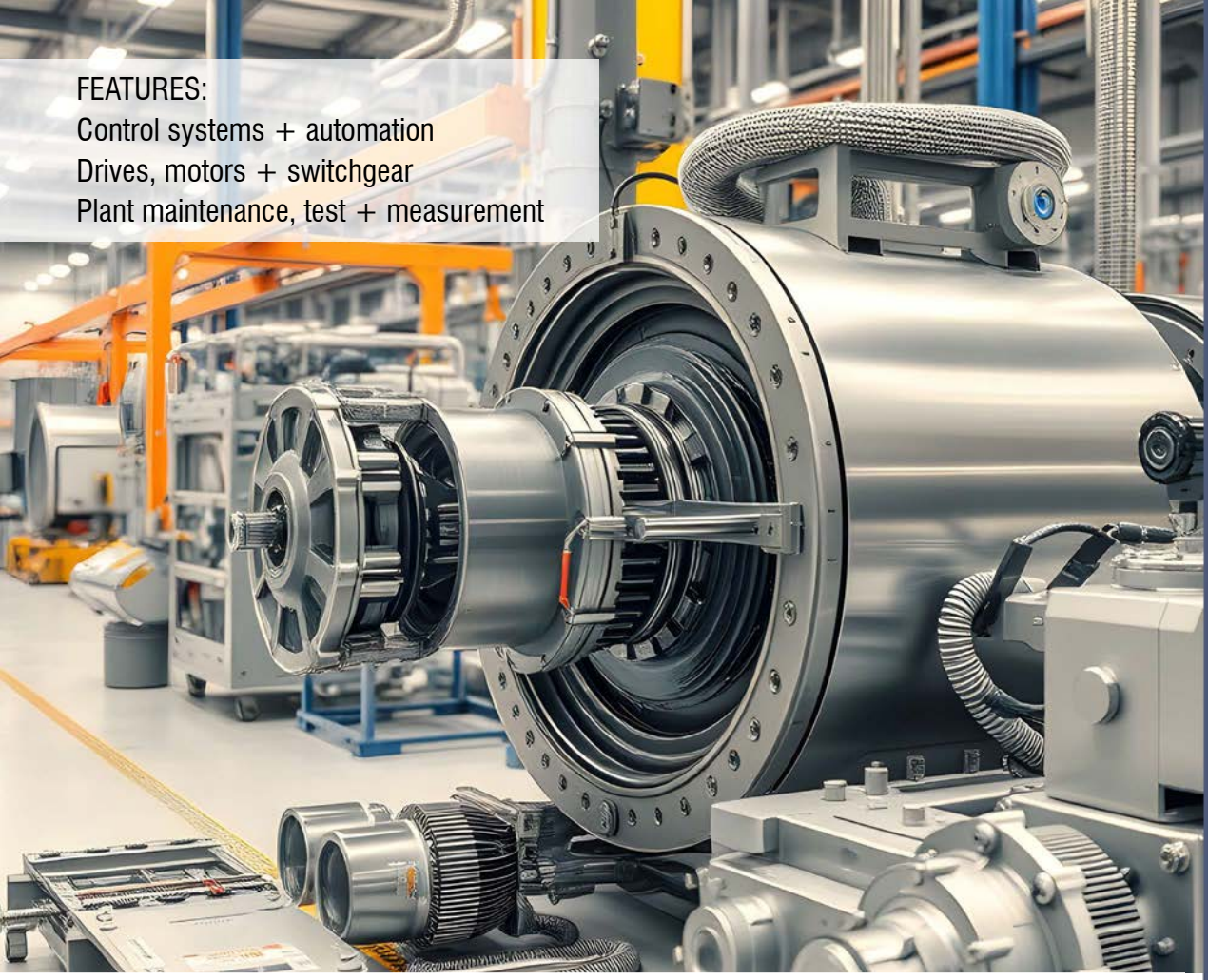

FEATURES:
Control systems + automation
Drives, motors + switchgear
Plant maintenance, test + measurement

11/2025
ELECTRICITY+CONTROL
CROWN PUBLICATIONS

WELCOME TO THE FUTURE **OF SERVICE AND REPAIR**

COMING EARLY 2026

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DRIVING SERVICE AND REPAIR. DRIVING AFRICA. DRIVING THE WORLD

In high-demand industrial environments, maintaining machines in optimal working condition is crucial – and this makes monitoring and control equipment essential to the work of any plant or maintenance engineer.
(Read more on page 3)

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Looking to the future

In this comment, I find myself looking to the future.

The content of this month's edition in many ways speaks to the future.

But specifically, I am thinking of our young learners and the future they face.

I once again recently had the pleasure of attending the Eskom Expo International Science Fair (ISF) – essentially the final event of the annual calendar of the Eskom Expo for Young Scientists, where South Africa's competitors are joined by international participants who have been selected by their countries to participate.

And once again the event showcased the exceptional talent we have in the country – and convinced all those who attended that the top end of what we can achieve truly is world class.

But it also placed in stark relief that there are huge swathes of our basic education sector that really are in crisis. And we need to be frank about this. Maths and science are still the most fundamental subjects in the curriculum, as they speak in so many ways to the ability to navigate the modern world. And we have work to do in these areas.

Competitors in the Eskom Expo ISF heard from representatives of the Department of Science, Technology and Innovation, the Department of Basic Education, and Eskom. All the speakers addressed the young people directly and honestly – laying bare the challenges we face, the failures of the past, and the need for renewed and solidly grounded young South Africans to step up to the plate.

I was impressed by what the speakers shared – knowing full well that the young people, the young scientists in the venue, are more than up to any challenge they may face.

It also reminded me that, the more we expect of our youth, the more willing and indeed able they are to deliver – and even over-deliver! It does worry me that we seem to expect so little and then seem to be excited when folk achieve our modest expectations.

This must end!

If we want to play any role at all in the world we live in, we need to be producing school-leavers who are comprehensively equipped and ready for the challenges we face, who are prepared and able to think critically and synthesise information that will gain them an advantage.

If ever there was an initiative that answers to this need, it is the Eskom Expo for Young Scientists.

Further, a particularly noteworthy observation this year: it was the 45th anniversary of the Eskom Expo for Young Scientists, and it was the 25th anniversary of Eskom's major sponsorship.

Both these milestones deserve to be recognised – as, together, they provide at least a part of the foundation that this economy will need to build the future.

We also need to recognise all the volunteers, right across the country, who make the event possible. These remarkable people work closely with the National Office and the Provincial Coordinators of the Expo to ensure that every participant has the best chance of doing the best they can.

And we need to recognise the National and Regional Sponsors who make the whole process possible.

There are many supporters from industry and academia who recognise the importance of maths and science in education – and of encouraging young learners to explore the possibilities these subjects hold.

What an investment in the future!

[See more on the Eskom Expo ISF on page 30]

Ian

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

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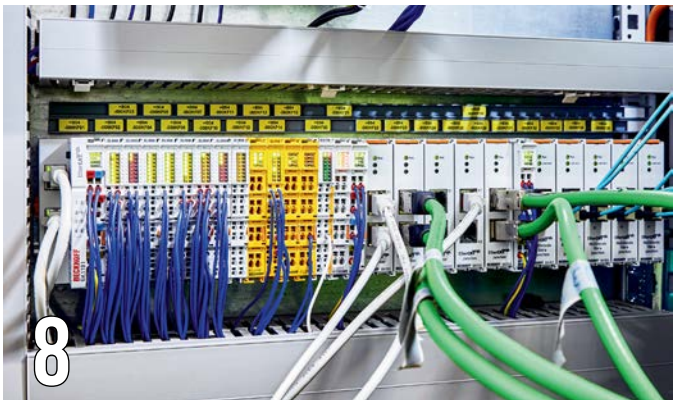

REGULARS

Monitoring and control equipment

In high-demand industrial environments, maintaining machines such as pumps, compressors, motors, and turbines in optimal working condition is crucial. Equipment failure not only halts production but can also lead to costly downtime, extensive repairs, and potential safety hazards. That's why Monitoring and Control equipment has become an essential tool in the arsenal of any plant or maintenance engineer aiming to preserve operational efficiency and asset longevity.

PREI Instrumentation is an industrial instrumentation company that attributes its success to well over 70 years of industry excellence, technological advances, and a dedication to streamlining the processes of our industrial clients across South Africa and Africa.

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Prei Instrumentation offers equipment and services across a range of reputable brands in monitoring and control – essential for effective plant maintenance.

Minister Ramokgopa announces R2.2 trillion IRP 2025

The IRP 2025 proposes a significant upscaling of energy supply in a new energy mix to meet the country's energy demand sustainably and cost-effectively.

The Minister of Electricity and Energy, Dr Kgosientsho Ramokgopa, has announced an ambitious Integrated Resource Plan (IRP) 2025 aimed at resolving the country's long-standing electricity shortfall and jump-starting economic growth.

Government plans to invest R2.2 trillion, which amounts to about 30% of the nation's gross domestic product (GDP), in a comprehensive energy transformation strategy to ensure the country's energy demand is met sustainably and cost-effectively.

At a media briefing on 19 October 2025 Ramokgopa said: "As a result of the lights being off, the South African economy has not been able to grow. Electricity has been a structural constraint to the South African economy." He said persistent power shortages have stunted economic development and contributed to high unemployment rates.

"However, now that we have turned the corner on load shedding, we are addressing the future. Energy and electricity can be a catalyst for growth," Ramokgopa said.

The IRP aims to address electricity supply issues, promote economic growth, and create jobs, in line with government's target of a 3% GDP growth rate by 2030.

"There is no economy that grows if the lights are off. There are no industries that will decide to locate in South Africa if we can't guarantee them available electricity that is of good quality and affordable."

The IRP 2025 also introduces a shift in the country's energy mix, with cleaner energy sources like hydro, nuclear, wind, and solar set to surpass coal for the first time in the nation's history.

By 2039, government aims to add 105 000 megawatts (MW) of new generation capacity – effectively building Eskom to "two and a half times" its current size (in terms of generation capacity).

This will include 11 270 MW of solar photovoltaics by 2030, 7 340 MW of wind energy, 6 000 MW of gas-to-power, and 5 200 MW of new nuclear capacity.

Minister Ramokgopa highlighted two primary challenges to the rollout of the IRP: limited skills in the energy sector and a decimated construction industry. However, he said government remains committed to transforming South Africa's energy landscape and creating economic opportunities. He emphasised the plan's broader ambitions of economic revival and job creation. "We are talking about growth, industrialisation, new skills, and resuscitating collapsed industries," he said. "And we want to ensure that each household has access to electricity, that electricity is affordable, and we can guarantee it into the future."

With a greater share of clean energy, the IRP 2025 also supports significant emissions reductions, targeting reductions of 160 million tonnes of carbon dioxide (CO_2) equivalent by 2030, and a further 142 million tonnes by 2035.

The minister also acknowledged that Eskom has already shown improvements in its operations, with the energy availability factor rising from 48% during peak load shedding to around 70% currently, and this provides a strong foundation for the ambitious energy transformation, he said.

SA's nuclear industrialisation plan

At the same briefing Ramokgopa announced that South Africa is preparing to develop a comprehensive nuclear industrialisation plan that goes beyond the use of nuclear energy purely for electricity. He said the plan will look at the broader potential benefits for the South African economy: what components in the nuclear fuel cycle can we localise, for instance.

Nuclear energy is a big part of the new energy mix outlined in the IRP 2025, which points to 5 200 MW of new nuclear capacity to be built in the country.

Ramokgopa said: "The state will ensure that we are deliberate, and we are transparent in the way we procure this clean energy technology solution."

He said the nuclear industrialisation strategy will involve close collaboration with scientists to identify specific opportunities for local manufacturing and economic development. He acknowledged that the country has lost skills – the engineers and scientists that have left the country to work elsewhere. "It's important that the industrialisation plan answers the questions: where are the skills going to come from, and how are we going to generate the pipeline of skills going into the future?"

The DEE will be collaborating with universities, and Technical and Vocational Education and Training (TVET) colleges, particularly in the fields of engineering related to the built environment and nuclear issues.

The minister said government will also meet with key players in

Continued on page 5

SA's G20 legacy programme – addressing energy efficiency in Africa

The Africa Energy Efficiency Facility (AfEEF) – a legacy project of South Africa's G20 presidency – aims to mobilise US$3 billion over the next few years to combat energy inefficiencies across the continent.

Speaking at the launch of the legacy AfEEF in Durban, held ahead of the G20 Energy Transitions Working Group (ETWG) meetings, South Africa's Deputy Minister for Electricity and Energy, Samantha Graham-Maré noted that energy inefficiencies in Africa have reached levels of up to 60% in some areas. This leaves millions of people completely without access to electricity and without clean cooking solutions.

"The Africa Energy Efficiency Facility is a response to the urgent need this presents. AfEEF is envisaged to serve as a continental platform to: mobilise finance at scale, with a target of US$3 billion by 2030; support member states to harmonise energy efficiency policies and regulations; build technical capacity across our regions and institutions; and promote digitalisation and innovation through systems such as energy management and appliance databases.

"Energy efficiency is our 'first fuel'. It is the fastest, cheapest, and most sustainable way to close the gap between energy demand and supply. It is not simply about saving energy, it is about creating opportunities for growth, jobs, and better lives for all," Graham-Maré said.

She highlighted further that the AfEEF has the potential to:

- Improve efficiency by at least 12% by 2030
- Create some 1 million 'green' jobs by 2040
- Avoid the need for up to 40 gigawatts of new generation capacity, saving billions in investment
- Reduce greenhouse gas emissions by 300 million tonnes of CO_2.

She emphasised that energy inefficiency is not just a technical problem but a human rights problem. "It affects the health of children, the productivity of industries, the education of youth, and the dignity of households.

"Without addressing these inefficiencies, we cannot hope to unlock Africa's full potential," the deputy minister said.

Building partnerships

The AfEEF is a collaborative initiative between the department, the African Union Commission through the African Energy Commission (AFREC), and the United Nations Environment Programme. The foundations of the initiative were laid at the ETWG meetings held in the Western Cape and North West earlier this year. The programme is aligned with the African Union's Agenda 2063 and the African Energy Efficiency Strategy and responds directly to the UN Sustainable Development Goals 7 and 13, focusing on energy access and climate action.

Graham-Maré said: "The AfEEF symbolises Africa's unity and resolve. It signals to our citizens, our partners, and the world, that Africa is ready to take charge of its energy future and that we are prepared to act together, decisively and ambitiously.

"But … a facility is only as strong as the partnerships that sustain it. I therefore call upon our AU Member States, to embrace the Africa Energy Efficiency Facility and integrate its objectives into national strategies. I call upon our development partners and financial institutions, to walk with us, to invest, and to share knowledge. And I call upon private sector actors, to seize the opportunities in building markets, delivering technologies, and creating jobs; and civil society and academia, to help ensure accountability, inclusivity, and innovation.

"Together, united behind the AfEEF, we can light up homes, power industries, and give our children a cleaner, safer, more prosperous Africa," Graham-Maré said.

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

Improving energy efficiency is the fastest, cheapest, and most sustainable way to close the gap between energy demand and supply.

Continued from page 4

the construction industry to determine how they can increase their capacity to meet the demands of the programme.

"Of course, the assurance they want from us is that we're not going to start and stop," he said.

With over 20 countries committing to expanding nuclear energy at the 2023 United Nations Climate Change Conference, South Africa sees the development of this sector as a strategic economic opportunity.

Ramokgopa said the plan will include identifying localisable components in the nuclear fuel cycle, exploring small modular reactor (SMR) technologies, developing local industrial capabilities and creating employment opportunities in the nuclear sector.

He noted that globally, around 100 SMR technologies are currently at various stages of feasibility assessment, with potential for significant commercial development. In addition, he said 40 of the world's top financial institutions have committed to financing nuclear projects, providing additional confidence in the sector's future.

"We want to develop a nuclear industrialisation plan that creates jobs, builds industries, and supports our broader economic transformation," the minister said.

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

SA welcomes R230 billion EU investment supporting the energy transition

President Cyril Ramaphosa welcomed a new investment package from the European Union (EU) valued at €11.5 billion (R230 billion), describing it as a significant step towards building South Africa's economy of the future and deepening long-standing ties with Europe. Ramaphosa said the initiative opens new possibilities for trade and investment and marks the beginning of a new era of partnership and cooperation between South Africa and the EU.

President Ramaphosa and President of the European Commission, Ursula von der Leyen, jointly addressed the media following the announcement of the EU's investment package. The announcement took place on the margins of the Global Gateway Forum at the headquarters of the European Commission, The Berlaymont, in Brussels, Belgium in early October.

This further investment from the EU will drive growth in critical sectors: green hydrogen, renewable energy, critical minerals and others.

Ramaphosa said the investment package will drive growth in critical sectors, such as green hydrogen, renewable energy, critical minerals, e-battery development, and vaccine production, as well as supporting infrastructure development across rail, road, ports, logistics, and digital connectivity.

"These investments will help to build the economy of the future in the South Africa of the present. We welcome the special focus on skills, small business development, and research and development. This is vital for the development of our people, our most valuable resource," the president said.

The EU remains South Africa's largest trading partner and one of its most significant sources of foreign direct investment, accounting for 41% of total FDI into the country. More than 2 000 EU companies currently operate in South Africa, creating over half a million direct and indirect jobs.

Ramaphosa said the new investment package would advance the goals of the Clean Trade and Investment Partnership, agreed upon at the South Africa–European Union Summit held in Cape Town in March 2024. The partnership is aimed at promoting the clean energy transition, technology transfer, skills development, and strategic industrial growth along value chains across Africa.

The president further expressed his confidence that as well as accelerating South Africa's just transition to a low-carbon economy the partnership will position Africa as the next frontier of clean global production. "We applaud the leadership of President von der Leyen and President Costa in giving form to this vision of a global gateway… We are grateful to the European Union for the strong support it has given to South Africa's G20 Presidency, and our agenda of solidarity, equality and sustainability," the president said.

He added that he looks forward to hosting EU Commission President Ursula von der Leyen at the G20 Leaders' Summit in Johannesburg in November, which will provide an opportunity to further advance a peaceful, just and inclusive world order.

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

Diary dates 2026

Investing in African Mining Indaba 2026

9 to 12 February 2026

Cape Town International Convention Centre (CTICC) Cape Town

Mining Indaba brings together C-suite executives, global investors, and government leaders shaping the future of African mining. It presents the opportunity for industry players to raise capital, strike deals, and expand into new markets.

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

Africa Energy Indaba 2026

3 to 5 March 2026

Cape Town International Convention Centre (CTICC) Cape Town

The 18th edition of the continent's flagship event dedicated to the energy sector, Africa Energy Indaba 2026 will again offer industry stakeholders the chance to explore opportunities across Africa, learn from industry leaders, and discuss business. At the conference, side events, exhibition and networking forums, delegates exchange knowledge and collaborate on solutions to drive sustainable growth. The event brings together CEOs, ministers, investors and experts to share insights and shape Africa's energy future.

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

Africa Automation Indaba

13 and 14 May 2026

The Radisson Collection Hotel, Waterfront, Cape Town

The inaugural Africa Automation Indaba will bring together industry pioneers, government leaders, investors, and innovators involved in automation, process control, and smart manufacturing from across the continent

The programme will look at: high-growth regions for automation in Africa; how automation is driving GDP growth and job creation; financing automation – where smart capital is focused; developing Africa's talent in automation; and how automation serves sustainability.

For more information visit: www.africaautomationindaba

Working with South Africa on G20 energy priorities

The International Energy Agency (IEA) has been working closely with South Africa's G20 Presidency this year to support discussions on key international energy issues.

As an official partner of the G20 South African Presidency, the IEA is actively contributing to the Sherpa and Finance Tracks, as well as the Taskforce 1 on Inclusive Economic Growth, Industrialisation, Employment and Reduced Inequality.

This collaborative partnership is based on the two-year Joint Work Programme which sets out the guiding framework for bilateral cooperation and activities between the IEA and South Africa for the 2025-2026 period. The JWP was signed by South Africa's Minister of Electricity and Energy Dr Kgosientsho Ramokgopa and Executive Director of the IEA Dr Fatih Birol on June 6. The JWP reinforces the IEA's support to South Africa's G20 Presidency and underscores the strength of the partnership between the IEA and South Africa since the country joined the IEA family in 2018.

In October, Deputy Executive Director of the IEA, Mary Burce Warlick travelled to Durban for the G20 Energy Transitions Ministerial Meeting, where she addressed ministers and met with energy leaders from around the world. The IEA also published several new reports to support the energy priorities that South Africa's Presidency has laid out – including energy security, affordability, reliable access, and interconnectivity across Africa.

Speaking in Durban, Warlick highlighted the IEA's work on efforts to expand electricity and clean cooking access and to help African economies move up the energy value chain for long-term economic growth. At an IEA-organised side event, discussions focused on opportunities for clean technology manufacturing, the beneficiation of critical minerals, and energy-intensive commodities in Africa. The event drew on the IEA report, *Stepping Up the Value Chain in Africa*.

Warlick also co-chaired with Minister Kgosientsho Ramokgopa a meeting of the Global Commission on People-Centred Clean Energy Transitions where participants discussed how governments can ensure energy policies are fair and inclusive and how to track progress on this. The meeting coincided with the release of an *Indicators Handbook for Just & Inclusive Energy Transitions.*

The IEA also released a booklet on *Best Practices on Regional Power System Interconnectivity*. This draws on discussions held earlier this year, at the third Energy Transitions Working Group meetings in July, where the IEA co-organised a workshop on G20 regional integration and regulatory cooperation. The workshop served to inform the development of the booklet on best practices, documenting actionable regulatory and policy solutions for accelerating interconnection, planning and implementation. In partnership with the African Development Bank, African regulators and power pools, the IEA's expertise on regional interconnectivity supports the harmonisation of regulatory frameworks, enabling of cross-border trade, and development of the African Single Electricity Market (AfSEM).

During her visit, Warlick discussed a range of broader energy issues in bilateral meetings with African Union Commissioner Lerato Mataboge; India's Minister of Power Manohar Lal Khattar; the Netherlands' Deputy Prime Minister Sophie Hermans, who is chairing the 2026 IEA Ministerial Meeting; Norway's State Secretary Astrid Bergmål; South Africa's Deputy Minister of Electricity and Energy Samantha Graham-Maré; and Singapore's Minister of State Gan Siow Huang.

The IEA Deputy Executive Director also addressed leaders at the G20 Nuclear Energy Ministerial convened by the International Atomic Energy Agency where she noted the IEA's analysis showing nuclear energy is making a comeback and can contribute to secure and sustainable power in the countries that opt to use it.

For more information visit: www.iea.org

Diary dates 2026

Enlit Africa 2026

19 to 21 May 2026

Cape Town International Convention Centre (CTICC) Cape Town

Enlit Africa offers a premier platform to connect with and learn from industry leaders, experts, policymakers and investors, across the key sectors of power, energy and water in Africa. It presents innovative solutions to drive sustainable progress for the continent. Alongside the conference programme, the event will offer masterclass sessions, deal rooms, country spotlights, and networking forums.

For more information visit: www.enlit-africa

Manufacturing Indaba 2026

14 and 15 July 2026

Sandton Convention Centre, Johannesburg

Africa is home to 15% of the world's population and abundant resources, yet it contributes only around 3% to global manufacturing. Manufacturing is crucial for job creation and driving sustainability across the continent; it offers a pathway to self-sufficiency and economic growth. The Manufacturing Indaba Conference and Exhibition are dedicated to driving Africa's reindustrialisation, encouraging local manufacturing, connecting leaders, and empowering businesses to grow and create jobs.

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

Electra Mining Africa 2026

7 1o 11 September 2026

Expo Centre, Nasrec, Johannesburg

As the largest trade show in Southern Africa and one of the top three mining exhibitions, Electra Mining is a 6-in-1 Expo. It encompasses: Electra Mining Africa, Automation Expo, Elenex Africa, PowerEx, the Transport Expo, and the Local Southern African Manufacturing Expo. It presents a world of opportunity where business communities connect, transact, and grow.

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

PC-based control for solar-powered synthetic fuel production

Synhelion AG, based in Switzerland, produces sustainable, synthetic fuels using solar energy. In summer 2024, the first industrial demonstration plant, DAWN, was put into operation in Jülich. Automated and monitored with PC-based process control technology from Beckhoff, this represents an important milestone on the way to a large-scale industrial plant. Stefan Ziegler of Beckhoff Automation reports on this application.

In the DAWN industrial demonstration plant, Synhelion uses the 'sun-to-liquid' process with concentrated solar thermal energy (CST) for the production of solar fuels. The plant consists of four central components: the heliostats (mirrors), the receiver with 600 kW thermal output, the thermochemical reactor, and the thermal energy storage unit.

Over 200 heliostats focus the solar radiation onto the receiver – that is a combustion chamber at the top of the tower in which a heat transfer medium is heated to over 1 500°C for a sustained period. The process heat generated in this way is fed into a thermochemical reactor, which produces a synthesised gas from a RED-certified carbon source (CO_2+CH_4) and water. This gas is then turned into fuels using industrial processes.

"Our focus is on kerosene, diesel, and gasoline so we can supply the transportation sector with sustainable fuels," says Adrian González, Head Engineer for Process Automation at Synhelion. The advantage of these fuels is that the existing infrastructure (tank farms, transporters, dispensers) can continue to be used. Instead of the usual kerosene, one of the tanks will contain the eco-fuel in this case, to be added in accordance with the regulations. "This is much easier and more efficient than converting a fleet of aircraft to hydrogen," says González.

The excess energy from the receiver is fed into a thermal energy storage unit developed by Synhelion and can be fed back into the process at any time. González explains that the ceramic storage tank for the process heat extends over two levels of the solar tower, indicating the dimensions of the plant. "It fulfils an important function – ensuring continuous operation independent of solar radiation."

Instead of the heliostats, an electric heating system can also be used, one which draws its energy from photovoltaic systems or wind turbines, for example. "This is particularly relevant when there is an oversupply of renewable energy in the distribution grid," says Iesse Schneider, the programmer responsible for the plant, explaining the flexible approach to energy supply.

Sophisticated control technology

Since autumn 2024, the Synhelion plant has been producing synthetic crude oil (syncrude) which is almost identical to its fossil fuel counterpart. The entire manufacturing process is controlled and monitored by around 1 000 sensors and actuators networked via EtherCAT, with TwinCAT as the process control system and a C6030 ultra-compact Industrial PC.

"Despite the many sensors and even more data points, the cycle time of the TwinCAT runtime remains well below 10 milliseconds and gives us more than enough flexibility for tests and expansions," says González.

The plant in Jülich is the industrial-scale test system which Synhelion is using to test, validate, and optimise the process control of various end products on larger plants. Consequently, the process control technology needs to be flexible and easy to expand. "With PC-based control and the scalable hardware, the control technology and I/O level can be adapted flexibly to requirements and additional

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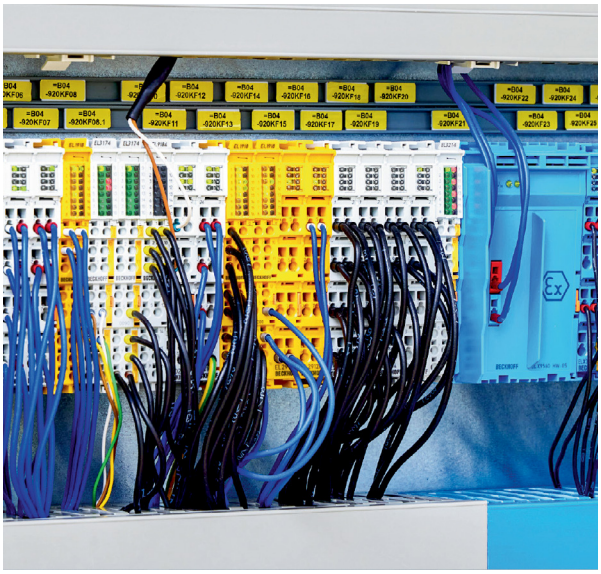
Left: In the DAWN industrial test facility, Synhelion produces sustainable fuel from solar energy using PC-based control as a process control system. Right: The flexible topology options of EtherCAT in connection with the EK1122 2-port EtherCAT junctions and the EK1521 1-port EtherCAT fibre optic junctions (right) facilitate the connection of 1 000 sensors and actuators distributed over six levels.



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Left: In addition to EtherCAT Terminals for process signals from Zone 2 hazardous areas, safety-related functions are implemented with the EL1918 and EL2912 TwinSAFE Terminals as well as EL3174, EL3214, and ELX3152-0090 TwinSAFE SC Terminals. Above, from right: Adrian González, Felix Zimmermann, and Iesse Schneider (all Synhelion) with Sebastian Böse and Wilm Schadach (both Beckhoff) in front of the receiver on level four of the solar tower.

measuring points can be retrofitted at any time," adds Wilm Schadach, Branch Manager at Beckhoff Monheim.

Although the process does not place any extreme demands on performance, the large number of different sensors and actuators was seen as critical at the beginning of the planning phase. "The comprehensive range of EtherCAT Terminals and the flexible topology options of EtherCAT really helped us to collect the I/Os that are distributed over four levels, integrate them into the controller, and map them in the HMI," says Schneider.

The ability to integrate the sensors and actuators in hazardous areas (ATEX) directly into the EtherCAT communication via ELX terminals was also a great advantage. Sebastian Böse, who works in process industry management at Beckhoff highlights that numerous EtherCAT Terminals from the ELX series are used in the project. Almost 600 terminals were installed in total, spread over 27 control cabinets on six levels. The 37 different terminal types include various EtherCAT Terminals with communication interfaces for Modbus TCP, Profinet®, and HART.

There are also numerous safety functions that have been implemented using TwinSAFE SC and TwinSAFE Terminals. "In total, around 40 functions – some of which are SIL2-rated – were implemented on the basis of IEC 61511," says Schneider. EtherCAT and Safety over EtherCAT (FSoE) play an important role here. The initial approach was to use one EL1918 TwinSAFE Terminal with TwinSAFE Logic as the safety controller. However, as it was not possible to map all the plant's safety functions with the terminal's maximum of 512 function blocks, the function blocks – numbering more than 700 in total – were distributed across four EL1918s. These receive the information from the sensors and actuators via FSoE and communicate with each other.

Reliable data logging with open control

In parallel with process control, data logging takes place via EtherCAT at different intervals. "This can be conveniently configured for each data point in TwinCAT, and the data can be saved. EtherCAT also gives each process value a precise timestamp," says Böse. Intelligent logging strategies ensure that the data is only saved if the process value changes, for example. In total, the plant has around 50 000 data points, which TwinCAT provides via an OPC UA server. González notes: "The openness of PC-based control and OPC UA is also an advantage here." It enabled Synhelion to install a third-party data logger on the C6030 ultra-compact Industrial PC, which retrieves the data on site. This has the advantage that if the communication connection fails, the data is always recorded and is not lost. "For test facilities, this is extremely important," González adds.

EtherCAT's wide range of diagnostic options also made the work easier and quickly uncovered the typical errors that occur during commissioning of large plants of this kind. Using the extensive diagnostics, Synhelion was able to rule out communication errors quickly and concentrate on the configuration of the devices. "EtherCAT is a backbone that you can rely on," says Schadach.

TwinCAT HMI Server (TF2000) communicates with the industrial PC via ADS and displays the information in the control room on a main workstation, four small monitors, and a large process overview monitor. If required, more monitors can be added for data visualisation. The TwinCAT HMI is a perfect platform for complete plant control and goes beyond simple HMI solutions. In future, the process library will facilitate tasks that would otherwise have to be performed by a separate SCADA system.

Scaling is facilitated by technologies such as MTP and NOA, which allow the process control technology of individual modules to be integrated flexibly into existing plant structures. Böse comments: "Beckhoff already provides a large selection of HMI and PLC function blocks for the development of MTP-compliant modules. In addition, the amount of development work required is reduced significantly by means of automatic code generation."

With a view to future projects, González sees MTP as an exciting prospect: "In the medium term, we see ourselves as a company that licenses its technology and makes it available to other fuel suppliers. A general contractor can then add Synhelion's modules to its plant and integrate automation into its control technology using MTP and NOA based on our P&ID diagrams and controls."

For more information visit: www.beckhoff.com

Wojtek Piorko, Vertiv, Africa.

Powering Africa's manufacturing with future-ready infrastructure

Wojtek Piorko, Managing Director, Africa at Vertiv

As Africa's manufacturing sector accelerates its journey into the era of Industry 4.0, the benefits are becoming increasingly clear – including reduced risk, leaner supply chains and lower operational costs, among others.

Digital transformation in manufacturing requires the infrastructure to support digital technologies and the insights and efficiencies they enable.

Manufacturers across the continent are beginning to embrace digitalisation, automation and data intelligence. With the right critical digital infrastructure, they can thrive in an increasingly dynamic market. This is something Vertiv is seeing firsthand. Across every sector, organisations face growing pressure to modernise and optimise operations to stay competitive. The same applies in manufacturing. Globally, the sector is advancing its digital maturity.

Global professional services and advisory organisation, KPMG, notes in the *KPMG global tech report 2024 – industrial manufacturing insights*[1], that 76% of manufacturers are ready to adopt new technologies, the highest proportion of respondent companies across eight different sectors surveyed by the organisation – including financial services, technology, retail, pharmaceuticals, healthcare and others.

Evolving manufacturing systems

To make the most of this shift, manufacturers need to evolve their data centre infrastructure to support more data-intensive workloads. This is especially true with the explosion of data from sensors, machines and supply chains, which amplifies the requirement for scalable, secure storage and real-time data processing.

Looking at the role of industrial AI in manufacturing[2], the Manufacturing Leadership Council – an international business leadership network – notes that digital transformation is changing manufacturing. In its 'Smart Factories and Digital Production' survey, 60% of respondents stated that they see digital transformation as something that is redefining the industry. Some 75% of manufacturers see their companies as at 'midlevel' digital maturity, up significantly from 2024 and 2023, and 89% of those surveyed add that they expect smart factory and production technology investments to either increase or remain unchanged for 2025.

However, despite this optimistic outlook, manufacturers continue to grapple with several roadblocks in their digitalisation journeys. Nearly half (49%) of those interviewed by the Manufacturing Leadership Council said that outdated legacy equipment was their biggest challenge, up from 39% in 2024. Workforce-related barriers were also cited as a growing issue, as was resistance to change.

Aligning technology and production

The convergence of OT and IT is reshaping the manufacturing floor. Infrastructure that supports technologies like machine learning, robotic process automation (RPA) and Internet of Things (IoT) sensors enables real-time insights, greater precision and more efficient production.

However, this transformation comes with increased demands for computing power and system reliability. Downtime is the enemy of productivity; especially in Africa, where power-related failures are a persistent threat in urban and remote manufacturing hubs.

Unplanned outages can lead to costly delays, lost revenue and reputational damage – yet many of these incidents are preventable with the right strategies in place. Regular equipment maintenance and resilient infrastructure solutions such as uninterruptible power supplies (UPSs) and battery energy storage systems (BESS), can mitigate common causes of failure in operations, including surges and electrical spikes.

Smarter, leaner supply chains

Today's manufacturers need to be agile and efficient. To respond to sudden market shifts or to manage inventory in real time, they need supply chain visibility. Beyond pricing and stock availability, manufacturers are seeking to simplify operations to reduce waste and improve responsiveness.

Digitalisation is key. Tools such as radio-frequency identification (RFID), advanced business intelligence and logistics platforms are helping manufacturers streamline procurement, optimise networks and build smarter, data-driven supply chains.

Digitalisation as a driver of transformation

Digitalisation is helping to reshape manufacturing by automating repetitive tasks, simplifying complex processes and improving visibility across operations. As well as boosting efficiency, this shift can make manufacturing a more attractive career path for a digitally smart generation.

Success in digital transformation depends on investing wisely in the infrastructure that supports it. For manufacturers across Africa, the opportunity to lead the next wave of industrial innovation is here.

Supporting Africa's manufacturing growth

Africa's manufacturing potential is immense. However, infrastructure reliability is central to gaining value from it, and Vertiv is committed to supporting manufacturing growth with its proven technologies, global expertise and local presence.

The organisation's portfolio includes pre-configured, rapidly deployable solutions like Vertiv SmartCabinet™ and Vertiv SmartAisle™, a pre-engineered edge data centre solution designed to minimise time spent on planning, design, and site preparation; reduce deployment costs; and maximise energy efficiency. For core systems, Vertiv offers integrated power and cooling infrastructure, including Vertiv™ Liebert® EXM2™ UPS units, which deliver stable, efficient power in challenging conditions.

In addition, the VertivTM Liebert® Hipulse-U industrial UPS is an important infrastructure element for the local manufacturing sector. This UPS offers a reliable, scalable and user-friendly solution to enable availability of various critical applications.

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

A new partnership brings together automation and fluid engineering

Referro Systems, a sales and distribution company for many of the world's leading industrial automation, electrical control and instrumentation brands, recently announced that it will act as an intermediary in a new strategic partnership with Sulzer, a global leader in fluid engineering and industrial solutions. This collaboration is a significant step for Referro in its journey of sustainable growth and technological advancement.

As an intermediary, Referro Systems will facilitate and strengthen the partnership between Sulzer and its key stakeholders, enabling enhanced delivery of cutting-edge fluid engineering technologies. This partnership builds on Referro's track record of successfully enabling strategic alliances, following previous collaborations with industry leaders such as ACTOM and Festo.

Adrian van Wyk, Managing Director at Referro Systems, highlights the importance of this partnership. "Sulzer is well known for its commitment to supporting customers and meeting their needs in rotating equipment. Acting as an intermediary, we will bridge the gap between Sulzer's advanced technological solutions and the growing market demand for efficient industrial processes. This partnership is another example of our dedication to fostering collaborations that create value for all parties involved."

Through the partnership, Referro Systems will support Sulzer in expanding its reach across critical sectors such as energy, water and industrial processes, accelerating the adoption of technologies that promote resource efficiency and environmental stewardship.

Henry Craukamp, Managing Director at Sulzer South Africa, said of the partnership: "The collaboration with Referro Systems enables us to better support our customers and prospects in the Northern Cape across the sectors we serve, including energy, water and mining. This is especially significant for miners in a province where equipment and expertise have traditionally been underserved due to geographic challenges. Through this collaboration, we will expand Sulzer's reach and unlock new potential for an industry sector key to South Africa's success."

With Referro's strategic focus on facilitating impactful partnerships that drive industrial innovation and sustainability, the company will continue to act as a catalyst for growth and transformation in South Africa's industrial sector.

Above: Adrian van Wyk, Managing Director at Referro Systems. Below: Henry Craukamp, Managing Director at Sulzer South Africa.

The value of tailored service level agreements

Service Level Agreements (SLAs) are not new in the automation and control industry, nor for many related industries, but they are one of the most important aspects for any business that relies on complex automation, control and electrical systems. The difference between operational excellence and costly downtime is often determined by the quality of support a business receives from its technology partners. Neels van der Walt - Head of Department Sales and Business Development at Iritron, here explains the value of SLAs.

An SLA assures customers that the quality of service will meet or exceed their expectations. Understanding that every client's needs are unique, SLAs need to be tailored and designed to be as dynamic as the industries and customers they serve.

At Iritron, to ensure that support is always right-sized for operations, we believe in SLAs that deliver the right level of expertise at the right time. However, SLAs are not rigid agreements; they can grow and adapt as the customer's needs change. This approach increases operational reliability and efficiency, and provides the assurance for customers that the plant is supported by a partner who understands their business.

Neels van der Walt, Iritron.

Time commitments

No two operations are the same and industrial operations are never static: some clients require round-the-clock support with dedicated on-site engineers; others might need only a few hours of expert intervention each month.

SLAs that are built around specific requirements, whether the customer needs ad-hoc remote troubleshooting, scheduled maintenance visits or embedded teams working alongside their staff. They are tailored to enhance customer experiences and protect their interests.

This flexibility means that clients are not paying for more than they need and they always have access to the right expertise, when they need it.

Support through an SLA should not be limited to a single brand, technology or discipline. Engineering teams should be technology-agnostic, with deep experience across all major automation, control and electrical supply systems. Whether a plant runs on legacy programmable logic controllers, state-of-the-art SCADA, or a hybrid of old and new, an SLA should ideally cover the full spectrum of systems – from automation and control to electrical supply and instrumentation.

Evolving needs

As a business grows or modernises, the type of support needed might change. Iritron's Flexi Service Agreements are designed to evolve with an operation. Whether an organisation needs to scale up support during a major upgrade or wants to add remote monitoring or predictive maintenance analytics, an SLA should be structured for easy adjustment, ensuring the customer has the right level of cover and support.

A portfolio of services

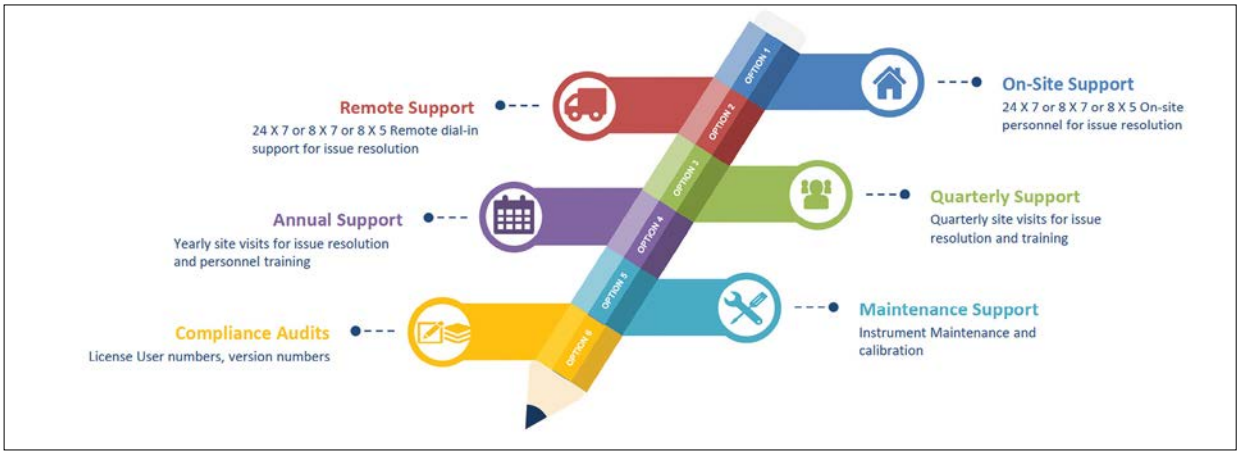
Clients benefit from a suite of services that provide remote support, 24/7 or through business-hours dial-in assistance, for rapid issue resolution, and scheduled or ad hoc visits that cover troubleshooting, maintenance and upgrades to keep their operation efficient and up-to-date.

Through regular audits that form part of an SLA, clients can ensure system health, compliance and optimal performance as well as schedule health checks and calibration to reduce the risk of downtime.

Fast response and proactive maintenance prevent costly outages and clients that have SLAs in place benefit from these additional savings. They can also budget on a predictable basis supported by accurate forecasting of their operational and capital expenditure, with a clear picture of equipment lifecycle and obsolescence.

SLAs ideally should serve as an extension of the customer's in-house team.

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



SLAs should be designed to meet each customer's needs.

EC&I – staying the course, keeping the pace

Construction is time-sensitive and needs to be tightly managed. No project is perfect. Delays or other problems arise – and construction managers and their teams need to be flexible and inventive. They cannot afford serious mistakes due to inexperience, nor fail to keep pace with their timelines.

According to Anton Beyl, Sales Manager of WEG EC&I Construction, this caution applies equally to EC&I (Electrical, Control & Instrumentation) construction teams that handle the last stretch of a project: designing, installing, and testing the electrical systems that provide power across the site. If they work without diligent attention, they can create life-threatening hazards such as faulty electrical equipment and incorrect wiring. If the teams have limited experience they can cause damage to installed equipment. And if they lack an appreciation for specific client requirements, they can instigate unnecessary costs and delays.

Beyl makes the point that this is why an established reputation matters in EC&I.

"EC&I construction extends from the overhead lines to the plug where you insert your phone charger. We are responsible for electricity reaching where it is needed on site; and because we handle the last mile, it's especially important that we provide reliable service based on experience. This means we can deliver efficiently, without causing delays quite late into a project, when there is much less space and time to make adjustments," he says.

Balancing priorities – the value of experience

EC&I construction projects call for a balance between affordable costs and professional delivery. Although it may seem preferable to select the most readily affordable EC&I construction services, the lowest price should not be the only criterion. There is too much at stake, Beyl says.

Selecting the wrong EC&I contractor can impact construction negatively in various ways: if there is a misunderstanding of material and technical requirements specific to the site's purpose and budget, if quality management is neglected, or if the appointed contactor fails to coordinate timelines with different construction managers and team leaders.

Other shortfalls may be in the inability to work with products sourced from multiple vendors, or deploying site crews without the appropriate technical qualifications or sufficient site safety training. One of the key considerations in EC&I construction projects is to align with the project's objectives and timelines. EC&I contractors often cannot access a site until other contractors have reached their goals. But they shouldn't just wait until they are summoned, says Beyl.

Anton Beyl, Sales Manager, EC&I Construction, WEG Africa.

"If we waited for the site to call us before we started procuring materials and readying our teams, that would lead to big delays. The EC&I project managers must be present and involved from early on and communicate with other contractors and stakeholders to look for the EC&I windows."

However, he warns that it is inappropriate to bring the entire EC&I team onto site too soon. "It is best to bring the EC&I contractor on site only when there is sufficient access for them to start work. This varies from project to project, and a competent EC&I team can work among

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EC&I construction teams handle the last stretch of a project: installing the electrical systems that provide power across the site.

Spotlighting industrial digitalisation

From left: Sunil Singh, Ben de Klerk, and Andre Froneman, all of Datacentrix.

Resilience, security and compliance today form the foundations of sustainable industrial operations. Sunil Singh, Divisional Managing Director for Managed Services and eNetworks at Datacentrix, made this statement speaking at Datacentrix's inaugural Industrial Indaba 2025. He said the convergence of IT and OT is critical for future business success.

"The industrial sector is undergoing a profound transformation, driven by the urgent need to secure operations, strengthen resilience and remain competitive in a rapidly evolving digital economy," said Singh. "The path forward lies in embracing digitalisation – strategically and securely."

Datacentrix hosted its first Industrial Indaba in Limpopo, speaking directly to customers and other industrial stakeholders in the region.

Enablers of digital empowerment

Ben de Klerk, Regional Manager: Eastern Cape and Operational Technology Lead at Datacentrix, added that technology, people and processes are the enablers needed for digital empowerment.

He suggested that industrial businesses need to invest in the core digital infrastructure that enables transformation, and should prioritise system, process and people integration before innovation.

"Technology alone cannot drive digitalisation," de Klerk continued. "People remain central to success. Empowering employees with the right skills, fostering digital-first mindsets and encouraging leadership that embraces change are all critical steps. Furthermore, training staff on compliance protocols promotes a culture of accountability and awareness. Digital transformation doesn't necessarily mean that people will be replaced by technology. It is however important to equip people to re-develop and embrace change, rather than resist it."

Once established, integrated systems and processes need to evolve to serve agile operations based on data-driven decision-making, with robust cybersecurity and operational resilience embedded foundationally. In this way, industrial businesses can establish a relevant cyber-physical ecosystem that supports automation, predictive analytics and agility.

Despite the promise of digitalisation, the industrial sector faces persistent challenges inhibiting transformation. These include legacy systems, disparate infrastructure and a shortage of digital skills, which together contribute to unnecessary complexity for compliance requirements. These challenges are further compounded by the constant need to balance operational safety, security and uptime. De Klerk emphasised that resilience, security and compliance are not separate goals but deeply interconnected strategic imperatives.

"The future of industry isn't just digital," he said. It needs to be intelligent, adaptive and self-optimising. Industrial organisations face specific risks – from operational disruptions to cyberattacks – and effective digitalisation hinges on embedding robust security and resilience measures from the outset. This means building agile, integrated infrastructure based on a Zero Trust security architecture, including relevant access controls and threat detection systems, which are essential for mitigating risks. Disaster recovery and incident response protocols for operational resilience are also essential.

"By adopting a proactive and layered security approach, industrial organisations can protect their assets, maintain operational integrity and build stakeholder confidence," he said.

"A robust compliance strategy involves aligning with international frameworks, such as ISA/IEC 62443 and the National Institute of Standards and Technology's (NIST's) Cybersecurity Framework, as well as local and industry-specific regulations. Regulatory compliance should not be seen as a barrier but approached strategically as a powerful enabler of trust and growth. Automation in reporting, alignment with global standards and the cultivation of a compliance-focused culture can position organisations to meet legal obligations and, importantly, to differentiate themselves in competitive markets," de Klerk emphasised.

The power of collaboration

He went on to highlight the critical role of strategic partnerships, affirming an increasing recognition by industrial organisations that traditional approaches no longer keep pace with today's demands. Partnerships help to accelerate deployment and enhance scalability, and by collaborating with trusted technology and business partners, industrial organisations can access expertise, share risk and leverage best practices. Partnerships also create pathways for continuous improvement, ensuring that resilience, security and compliance are at the core of business operations.

"With this collaborative approach, we achieve efficiency

Datacentrix says industrial businesses need to invest in the digital infrastructure that enables transformation, emphasising that system, process and people integration should be prioritised.

and instil business resilience. We use technology to gain foresight – and we move beyond ensuring survival to achieve a competitive advantage and secure growth."

Integrated visibility

Adding to these insights, Andre Froneman, OT Solutions Specialist at Datacentrix, highlighted the role of integrated visibility in driving sustainability. He emphasised electrical metering for precise tracking of energy usage and demand peaks; visual and thermal process inspections for real-time defect detection and predictions of potential equipment failure; and ESG reporting which enables organisations to attribute emissions to specific processes and achieve audit-ready optimisation and compliance with regulations such as the South African Revenue Service's (SARS) Carbon Tax Act and global Carbon Disclosure programmes.

In closing, Singh said: "Datacentrix goes beyond the delivery of technology. We aim to co-create value – together with our clients and technology partners – to empower industry by enabling the integration, automation and visibility needed to facilitate data-driven decisions and strategic outcomes.

"For industrial businesses, the path forward, as we see it, is clear: embrace industrial digitalisation strategically, fortify operations with resilience, security and compliance, and harness partnerships to unlock sustainable growth and competitiveness."

The Datacentrix Industrial Indaba 2025 was made possible by a number of participating Gold sponsors including: Cisco, Cyolo, Dell Technologies, Fortinet with Maxtec, Software Defined Automation, and Tenable with Obscure Technologies; as well as the indaba's Display sponsors: Connect Mobile, HikVision with Pinnacle, Q-KON, Radwin with SkyArc Satellite, Tarsus Distribution, TxOne Networks, and Zebra Technologies.

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the civil and mechanical contractors. But if you start slow, it's hard to pick up the pace. Effective EC&I construction is about timing and collaboration."

Selecting EC&I contractors

Beyl offers some pointers for selecting the right EC&I contractor for a project. He suggests that procurement or project managers should judge an EC&I contractor by their reputation. An established and widely regarded EC&I company will meet the following criteria.

- Look for a proven track record, work done on similar projects and in relevant industries, plus strong client testimonials and repeat business.
- Ask for certifications as well as industry-specific accreditations, and ensure that the technical staff are skilled, qualified, and responsible.
- Pay attention to the EC&I construction contractor that asks questions to grasp any specific project and site requirements, such as appropriate materials and different vendor components.
- Look for a contractor that demonstrates commitment to safety and compliance, their experience with those requirements is crucial.
- Expect transparency, reliable communication, and excellent project management, including early involvement from key managers to understand timelines and choreograph the timely deployments of their teams.

Nonetheless, no matter how experienced they are, the best EC&I construction company holds a key attribute: "They always treat every job like it is their first and last," says Beyl. "The best contractors know that they are only as good as their last job. No matter how big and experienced they are, the best EC&I teams treat their current project as their most important project, and they pay attention to keep things moving, and to close that last mile, supplying the power to where it is needed on site, safely."

For more information visit: www.weg.net

New ways of working in SA's automotive manufacturing industry

"In South Africa's automotive sector, one can look at the problems and challenges, or one can look for the opportunity. We prefer opportunity – but we know that we need to create it," says Marius Schafer, Commercial Director at Tier 1 automotive component manufacturer Malben Engineering.

Following the August National Association of Automotive Component and Allied Manufacturers (NAACAM) expo – where the company showcased its automotive component manufacturing capabilities and networked with a diverse group of industry peers, stakeholders and original equipment manufacturers (OEMs) – Schafer noted that common focal areas and concerns were discussed at the event, including industrial transformation in the local automotive sector and the value of innovation and collaboration.

Innovation

"As a company that manufactures complex assemblies and has a stronghold in the e-coating space, Malben Engineering attracted considerable interest at the expo. We are a proudly South African manufacturer of high-quality safety-critical automotive components and play an important part in the larger industrial ecosystem," Schafer said.

The significance of the automotive manufacturing industry in South Africa's economy saw the event attended by the country's Deputy President Paul Mashatile and Minister of Trade Industry and Competition, Parks Tau and other government representatives. Speaking at expo, Tau acknowledged Malben Engineering for its sustainability achievements, noting it as the first local automotive component manufacturer to trial the use of green steel, for which the company won the 2024 SEIFSA environmental award.

Localisation

Localisation – in the production of raw materials and in manufacturing components from imported raw materials – was a major focus of the expo, with one of the most widely discussed topics being China's impact on the local market.

Schafer says that during a recent automotive industry conference in Algeria, the challenge of making a car – in Africa, for Africa – was raised: "To make this viable, it was agreed that stability at policy level is needed. This applies for all the industry stakeholders," he said.

It is important that agreed policies should continue, providing stability even when governments change. "For the automotive sector, business is built on a 20-year cycle. Companies will not invest in presses, tools and machinery if there is the risk of constant change. An automotive manufacturing business has to be there for the long haul," Schafer says.

To this point, Malben Engineering's 50-year plus track record serves as an important foundation: "In this sector, solid, sustainable businesses are essential – managed by people who are experienced and understand the automotive industry," he adds, highlighting further: "The impact of what we do goes beyond the automotive parts being made."

Schafer believes that the local automotive industry needs to think more broadly: "China is leading the way globally. We must think differently to compete effectively. We cannot rely on tariffs on imported vehicles; we need to change how we do business.

"This approach is driving a lot of our thinking as a business, looking to collaboration, joint ventures and strategic partnerships as new ways to create a sustainable competitive edge."

Collaboration

"At Malben, excellence is a priority for us and we are looking at how we can industrialise locally and competitively to transform into a multinational via collaboration with a range of sector role players: the OEMs, our peers, steel mills, steel service centres and others. For the automotive industry to navigate successfully through the pressures it is encountering now, we need to look at all the elements we can bring together."

He highlights that Malben is involved in various sector forums where it has the opportunity to influence positive industry change. "For us to protect and grow our market – and the entire automotive sector – we need to be proactive and innovative. It is the only way we can contribute to making the sector sustainable."

Schafer says that for a company like Malben Engineering, membership of the NAACAM provides a valuable platform through which it can connect with decision-makers, its current and prospective clients, and promote its business. "Through our NAACAM membership – and events like the expo, Malben can provide inputs into future strategic direction and policy-making. We can take part in industry surveys, and access key industry findings more quickly – informing internal decision-making such as when operational shifts or strategic changes are needed.

"Through industry organisations we can play our role as an active and proactive participant in the local automotive component manufacturing sector," Schafer says.

Left: Marius Schafer - Commercial Director and right: Marco Smargiasso -Technical Director at Malben Engineering's company stand at the 2025 NAACAM expo.

Collaboration to advance digital manufacturing

Technology company Siemens and leading machine tools and laser manufacturer TRUMPF recently announced a partnership that aims to elevate industrial production by harnessing advanced digital manufacturing solutions. The collaboration joins Siemens' Xcelerator portfolio with TRUMPF's well-known machine-building and software expertise.

It addresses a critical challenge in modern manufacturing: the disconnect between information technology (IT) and operational technology (OT) systems that has historically hindered production efficiency and innovation. By leveraging Siemens' Xcelerator portfolio and TRUMPF's manufacturing excellence, the collaboration aims to deliver comprehensive solutions that bridge this gap. Both companies are working on open and interoperable IT interfaces that will help to advance artificial intelligence (AI) readiness for motion control applications.

"Real transformation in a factory begins when machines on the shopfloor are connected through a shared digital network – so that data flows seamlessly, decisions happen faster, and production responds to changing conditions," said Cedrik Neike, Member of the Managing Board at Siemens AG and CEO of Siemens Digital Industries. "Working with TRUMPF, we are making that connection effortless. We're bridging the gap between IT and OT so manufacturers can move faster, adapt in real time, and prepare for the AI era."

Overcoming complexity with system integration

As industry is evolving, software is becoming the key differentiator in manufacturing. From intelligent control systems to data-driven optimisation, a seamless integration of hardware and software enables new levels of flexibility, efficiency, and value creation. For Siemens and TRUMPF, this shift has created significant opportunities, but also new complexities. Their collaboration will enable faster innovation cycles, better integration of hardware and software, and a more scalable approach to delivering solutions and value through standardised interfaces.

[Source: Siemens AG]

From left: Tom Schneider (TRUMPF), Stefanie Frank (Siemens AG), Cedrik Neike (Siemens AG). Stephan Mayer (TRUMPF), Yürki Voss (Siemens AG), Till Küppers (TRUMPF).

The partnership will also deliver tangible customer benefits through modular system architecture and unified system solutions. Standardised interfaces will allow for smooth connectivity between shopfloor equipment and enterprise-level systems. Customers will benefit from increased operational efficiency, reduced engineering costs, and future-ready scalability using open, modular automation solutions. These benefits support AI readiness which will enable customers to achieve faster time to market, improved production flexibility, and competitive manufacturing operations.

"TRUMPF is a leading company for smart factory solutions in the sheet metal industry. The cooperation with Siemens underpins our position as a solution provider. With the open standards, our customers will benefit more from the digital networking of the production – from our machines to robots, grippers and part recognition with the help of AI. We're taking industrial manufacturing to a new level with Siemens," said Stephan Mayer, CEO of Machine Tools at TRUMPF.

The partnership builds on regular exchanges among development teams at Siemens and TRUMPF, which underscores the importance of vibrant ecosystems for solving industry's most pressing challenges.

Precision in confined spaces – miniature inductive sensors

The inductive IY/IZ type sensors from ifm are designed to simplify connection and offer a longer than standard sensing range for accurate and reliable position detection and a high switching frequency for dynamic processes.

The sensors are available with an M5 housing or smooth, cylindrical 4 mm housing for confined installation conditions. The M5 thread makes it easy to screw in the IY housing. The IZ housing with a smooth 4 mm sleeve can be fastened precisely and efficiently using the corresponding holder.

The robust housing matches demanding industrial environments. The sensors can be used in various industrial areas where space is limited, in machine tools, for example, as well as automated assembly systems and electronics production. They detect end positions of small grippers and clamps and can be used to monitor speed of gears and rotary movements accurately.

Supporting stable processes

The longer sensing range makes it easy to position the sensors. Position detection is reliable even where mechanical tolerances are in play, preventing accidental switching. This increases process stability and consistency.

The robust housing has been specially developed to ensure durability and reliability in demanding industrial environments. With an IP67 protection rating, the sensors deliver reliable performance even under extreme conditions where dust, moisture and vibrations are present. Thus, they improve process stability and efficiency in various industrial sectors.

For more information visit: http://www.ifm.com

The inductive IY/IZ type sensors support process stability in challenging industrial environments.

Taking the right steps in upgrading to IE3 motors

Left: Willem Strydom, Business Development Electronics Manager, SEW-EURODRIVE. Right: Natasha Meintjies, Business Development Electronics Proposal Engineer, SEW-EURODRIVE.

With South Africa's Minimum Energy Performance Standards (MEPS) mandating the use of premium efficiency IE3 motors now in effect – since June 2025 – SEW-EURODRIVE sees a valuable opportunity for geared motor users to boost efficiency in their operations. However, the company says forward planning, trusted expert guidance and adopting a system-level approach are important considerations that will help organisations take the best next steps.

The new regulations governing minimum energy performance standards for electric motors may leave many users unsure about what action they must take. In this uncertainty they may be tempted to pursue rash decisions before checking the facts and assessing their options.

Willem Strydom, SEW-EURODRIVE'S Manager for Business Development Electronics, says, "We have been supplying IE3 motors as standard in our relevant geared units for some years already, and at no added cost, so there is nothing in the regulations surprising to us or our customer base.

"However, there are still many players in the market who might not be up to date with the regulatory developments – and we can assist them."

He notes that fear-mongering messages in the market may make some companies feel pressurised to replace less efficient motors unnecessarily. On the other hand, he says, the coming moratorium on the sale of IE1 and IE2 motors, which will take effect in May 2026, may lead to some stock holdings of these units being 'dumped' on the market at cut-rate prices. Consequently, companies may be tempted to buy old technology that will cost them dearly in terms of energy consumption.

Boosting efficiencies, among other benefits

"The regulations remind the market of the financial and sustainability value of using more efficient motors - but the real benefit lies in system efficiencies," says Strydom. "This is where companies can benefit the most when planning their shift to IE3 motors."

Natasha Meintjies, Business Development Electronics Proposal Engineer at SEW-EURODRIVE, explains that the customer's journey often begins with an energy efficiency test – which SEW-EURODRIVE conducts at no cost at the customer's site.

"By measuring the energy consumption on the customer's existing motors and comparing this to our IE3 motors, we can provide them with an energy cost saving analysis," says Meintjies. "There is typically an immediate cost saving of 4 to 8% of the motor's power consumption, but more significant benefits can be achieved when moving to the system level."

This includes the use of SEW-EURODRIVE's more energy-efficient drives, which can take the energy savings up to 20 to 30%, she says. These results are achieved by integrating the latest monitoring and optimisation technologies into the system.

"With these technologies the customer also gains more overall process stability and reduced maintenance costs," she says. "Our modular designs ensure that all the components work together to deliver the best efficiencies and performance, making the whole system more reliable."

Strydom adds that SEW-EURODRIVE's global research and development has ensured that the company already has 'super premium efficiency' IE4 and 'ultra premium efficiency' IE5 motors in its market offerings.

"Our in-house laboratory in Germany is also third-party approved to test our motors for energy efficiency - as the IE3 benchmark has been mandatory for some years in Europe," he says. "The test certificates that we issue are therefore accepted by South Africa's national regulator. We worked on this well in advance to be ready for these regulations."

He highlights that MEPS will be a valuable enabler for companies to mitigate the impact of rising power costs, especially as they reassess their drive systems too, taking an integrated approach and working with guidance from experts like SEW-EURODRIVE.

Specifics of the MEPS regulations

The MEPS specification applies to a broad range of three-phase low voltage electric motors with rated power output between 0.75 kW and 375 kW and includes motors with non-standard mechanical dimensions and geared motors. Motor users are allowed to run their existing IE1 and IE2 motors until they need to replace them due to failure. Retailers are allowed to sell IE1 and IE2 motors only until May 2026.

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

Designed for hygiene and efficiency, SEW-EURODRIVE IE3 motors are well suited to the demands of food and beverage production facilities, among other applications.

A continuing partnership in VSDs

BMG and Danfoss Drives have reaffirmed their long-standing partnership, working closely together to support productivity in industry operations across Africa.

This year BMG and Danfoss Drives celebrate a decade of close collaboration since signing a strategic alliance agreement in 2015. This formal partnership agreement strengthened BMG's original distribution agreement for Danfoss variable speed drives and the soft starter range, which has been in place since 2007.

"BMG and Danfoss Drives share a commitment to innovation, sustainability and integrity. The teams work closely with industry in Africa to create a more efficient and sustainable environment and a highly productive and globally competitive region," says Sean McCree, Business Unit Manager: Electronics, BMG. "With the supply and support of a wide range of Danfoss variable speed drives and soft starter systems, our customers have seen improved productivity, optimised process control and reduced energy consumption in their operations. Typical applications for the systems are in food and beverage production, HVAC, mining and minerals, water and wastewater, as well as the chemical, oil and gas sectors.

"The BMG team's technical expertise is extended via the company's branch network which also supports short lead times, flexible pricing, a dependable 24-hour after-sales support service and valuable stock-holding capabilities," says McCree.

BMG was appointed by Danfoss Drives in 2019 as the first authorised Danfoss DrivePro® service partner in Africa and this official certification has been renewed each year. It is a prestigious appointment and gives customers the assurance that BMG meets strict requirements to offer customised support and technical assistance for Danfoss VLT®, iCX and VACON® frequency converters.

Danfoss DrivePro services, which cover the entire lifecycle of Danfoss and VACON AC drives, are designed to improve productivity and performance, minimising downtime and assuring the user of consistent operational performance.

BMG has made a significant investment in distribution, engineering facilities and technical skills. Dedicated Variable Speed Drives (VSDs) workshops in Cape Town, Gauteng and KwaZulu-Natal are approved warranty centres for Danfoss/Vacon and Synergy VSD products. These electromechanical facilities are manned by globally trained experts and offer specialist services, including repairs, maintenance, fitment, pre-commissioning, telephonic support, software loading/upgrades and testing applications, as well as small panel manufacturing.

The BMG Electronics team, with in-depth VSD experience, provides expertise in specialist areas, including energy efficiency, mitigation of harmonic distortion related to low voltage drives, application of solar VSDs, as well as condition-based monitoring using variable speed drives.

Many customers insist on official OEM certifications before services can be conducted and with BMG's extensive experience and specialised training, the team is well-positioned to meet these requirements. The BMG Electronics workshop service and field service departments are supported by ISO 9001 Quality Management System, 14001 Environmental Management System and 45001 Occupational Health and Safety compliant systems. At BMG, safety is integral to the company's working culture.

The team also offers scheduled and specialised VSD training to customers and shares its expert knowledge about advanced VSD technology that enhances plant productivity.

BMG's range of Danfoss electronic, mechanical and intelligent mechatronic devices are designed to optimise automation processes and reduce energy consumption. The VLT Automation Drive, which has received global awards for innovation and user-friendly features, optimises project costs, provides the lowest possible cost of ownership and maintains high efficiency processes.

BMG has also adopted the release of the iC7 Series Drives, which feature a six sigma design approach, embedded crypto chip cyber security, integrated fieldbus and excellent motor shaft performance. These drives are suitable for induction and synchronous motors, as well as grid monitoring (THDv).

Recent successes for BMG and Danfoss include a pump upgrade project, and reduced system costs and improved plant security at a chemical facility. The refurbishment of an ageing, unreliable elevator involved the installation of a VLT lift drive, which has resulted in quiet, comfortable and stable elevator operation. Through the supply and installation of Danfoss Drives, BMG's agricultural team has assisted local farmers to accelerate tobacco drying processes, reduce the costs of irrigation and expand crop production.

The BMG team is also committed to preventing unnecessary breakdowns, which is why reliability is the primary focus when designing drive systems for new and upgraded facilities. All BMG components are matched precisely to each other and to specific application requirements, to ensure high productivity, sustainability, smooth operation and long service life.

For more information visit: www.bmgworld.net

Monumental fans installed for mine ventilation project

LH Marthinusen (LHM), a division of ACTOM (Pty) Ltd, has successfully completed a fan installation project for a major mine in the Phalaborwa region, consolidating its position as a leading provider of electro-mechanical solutions for the mining industry. The project involved the design, manufacture, and installation of four overhung centrifugal fans. It is one of the largest installations of its kind in the southern hemisphere.

Size and scale

Each of the 4-metre diameter centrifugal fans is powered by 3 MW 11 kV ACTOM motors, and delivers an airflow of 400m^3/s at 5 500 Pa. Each fan's performance is precisely controlled by an integrated Inlet Guide Vane (IGV) system to ensure optimal ventilation efficiency. The entire fan assembly, including outlet ducting, stands about 15 metres tall and spans 7.2 metres wide, designed to handle substantial amounts of water in the airstream.

Gareth Bodley, General Manager of the Fan Division at LHM says, "This project represents a major achievement for LHM. We've delivered a robust and reliable ventilation solution that will enhance safety and operational efficiency for the mine. The size and complexity of this installation demonstrate LHM's capabilities in handling large-scale, demanding projects for the mining industry."

The fan system provides critical redundancy for the mine's ventilation system, ensuring continuous operation even during maintenance. "Fans like this can be seen as the lungs of the mine," Bodley emphasises. "With this new system, the mine can maintain full production without interruption, enhancing safety and productivity in its operations."

Engineering excellence

The project's scope included the refurbishment and reuse of existing equipment, along with the design and manufacture of new components. LHM engineers implemented innovative design improvements including, for example, specialised, maintenance-free bearings for the IGV assemblies, which provide long-term reliability and efficiency.

"LHM is a leader in electro-mechanical repairs and refurbishments and a provider of cutting-edge solutions, supported by our technology partner TLT-Turbo GmbH, which holds expertise in advanced ventilation solutions and continues to inspire industry leading innovations," Bodley says. "This project demonstrates our ability to design and deliver advanced fan systems that meet the particular challenges of the mining industry. We have enhanced the previous design, to ensure longevity, and minimise future problems."

Meeting project timelines

The project, which began in October 2023, was scheduled for final completion in June 2025. The first phase, involving the installation of new equipment, was completed in December 2024; the second phase focused on the refurbishment of existing components. The key components for this project were manufactured and assembled in LHM's state of the art 6 000 m^2 fan manufacturing facility in Driehoek, Gauteng.

"We are proud to have delivered this project successfully, confirming our expertise and commitment to the mining industry," Bodley concludes. "The project has already generated significant interest in our Fan Division, and we look forward to continuing to provide innovative solutions for our clients," he adds.

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

The ventilation fans installed at the mine each stand about 15 metres tall and 7.2 metres wide.

Production partner awards for switchgear assemblies

Hamar Controls, a trusted provider of advanced electrical, control and instrumentation solutions to Africa's mining and industrial sectors for over 40 years, has been honoured with two Smart Infrastructure Partner of the Year Awards from German multinational technology corporation, Siemens.

The awards were presented at the annual Siemens Partner Conference in September where Hamar Controls was recognised for its exceptional manufacturing output within the Siemens SIVACON S8 partner programme.

As part of a continuous partnership with Siemens, the SIVACON S8 switchgear assemblies and motor control centres are manufactured under licence at Hamar Controls' factory in Roodepoort, Johannesburg, in full compliance with IEC 61439. Widely adopted across the mining sector, SIVACON S8 is also well suited for use in a range of industrial applications – from food and beverage processing to paper manufacturing – essentially, in any environment where electric motors require controlled switching. To ensure continued compliance and quality, Hamar Controls' manufacturing facility and practices are subject to annual audits by dedicated Siemens specialists.

"We are delighted to have received these awards, and we are extremely proud of our partnership with Siemens, a brand that is globally recognised for its outstanding quality and engineering excellence," says Hamar Controls Managing Director, Chris Joubert. "All electrical and switchgear components are developed and supplied directly by Siemens and all components comply with international switchgear standards, ensuring the

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highest standards of performance and reliability. At the same time, we are committed to supporting local industry by sourcing all fabrication materials, including sheet metal and copper, locally."

Although the SIVACON S8 is a fully tested solution, each unit can be individually designed, manufactured and assembled to meet the specific operational requirements of the customer's plant. One of its key value-adds is the ability to accommodate up to sixteen starters within a single tier, allowing for a more compact footprint and subsequent efficient use of space, which is a critical consideration in many industrial environments. Hamar Controls recently manufactured several of these systems, which are currently under commissioning at a mining operation in Zambia, with others on route to petrochemical operations in Nigeria.

"We have also supplied SIVACON S8 solutions to one of South Africa's leading paper manufacturers and several more motor control centres are on the factory floor for supply to the same customer," adds Joubert.

He highlights that the SIVACON S8 solution forms part of Hamar Controls' ongoing factory expansion of its panel building facility. "As part of our strategic shift to grow our panel building operations and further improve our product and service solutions, we have expanded and upgraded our factory and strengthened our quality and control processes. Additionally, we have extended our testing facilities to allow bench testing of SIVACON S8 Draw Out units."

Established in 1981, Hamar Controls has built a reputation for the quality of its products and for its commitment to integrity and ethical business practices. "We take pride in manufacturing every unit to the same exacting standards, without exception," Joubert says.

A Hamar Controls 3 200 A Siemens SIVACON S8 MCC supplied to an industrial client in South Africa.

In addition to its Siemens SIVACON S8 partnership, Hamar Controls supplies a range of switchgear and drives representing premium international brands. As well as its electrical panel building, it manufactures distribution boards and MCCs, programmable logic controllers (PLCs), distributed control systems (DCSs), a wide range of lock-out stations, and high-pressure pump panels. "If it's electrical equipment that fits within a box, we have the expertise and capability to supply it," says Joubert.

Laboratory services are critical to grid reliability

In a recent series of blog posts, Doble Engineering points to the essential role played by 'behind the scenes' laboratory services in maintaining stable energy supply. Here we share a slightly abridged version to highlight the often overlooked – and easily neglected – services and the valuable insights they provide for utilities.

Utilities today are facing unprecedented challenges; all assets need to be carefully maintained.

Utilities today are under extraordinary pressure. AI-powered data centres are driving exponential load growth. Transformers are aging faster than they can be replaced. And lead times for critical components now stretch into years. In this environment, every asset counts, and each failure avoided matters.

That's why lab services have become a cornerstone of grid reliability. They deliver the deep, behind-the-scenes insights utilities need to understand equipment condition, anticipate risks, and make smarter decisions, faster.

This four-part series looks at how laboratory services strengthen grid reliability: from the essential tests utilities rely on today, to real-world case studies, technical analyses, and the future of diagnostics.

Reliability starts with insight

Grid reliability isn't just about rapid response; it's about proactive prevention. And prevention starts with knowing what's going on inside your assets before a fault occurs. That's where diagnostic lab testing comes in.

Lab analysis can detect early indicators of stress, degradation, or contamination long before those issues manifest in the field. A spike in dissolved gases might signal overheating. Elevated furans may indicate insulation breakdown. Sludge in insulating oil could point to accelerated aging.

Equally important, lab testing provides validation. When field sensors or inspections raise a red flag, lab diagnostics confirm what's really happening or may uncover what others missed. Where online monitoring shows real-time conditions, offline lab testing goes deeper, evaluating aging, contamination, and material degradation with a level of detail field tools cannot match.

With these insights, utilities can intervene early – avoiding unplanned outages, extending asset life, and focusing maintenance where it's needed.

Diagnostic lab services

Doble's diagnostic lab services provide a comprehensive, chemistry- and materials-based view into asset health. The tests serve to validate field results, uncover hidden issues, and turn raw data into evidence-based guidance for asset management.

Key services include:

- Dissolved Gas Analysis (DGA) – detects arcing, overheating, and insulation breakdown
- Furan analysis – evaluates paper insulation aging and end-of-life risk for transformers
- Liquid quality testing – assesses moisture, acidity, interfacial tension, sludge content, and oxidation stability
- Metallurgical evaluation – examines mechanical wear, arcing, corrosion, and other failure indicators
- Forensic failure analysis – identifies root causes of field failures to inform future prevention
- Additional screening, such as corrosive sulphur and metals-in-oil analysis, as well as testing for tap changers and breakers, further strengthens utilities' ability to detect hidden stressors.

By pairing these insights with fleet-level trends and equipment history, Doble helps utilities move from reactive to predictive maintenance.

Among the major hurdles utilities face today are:

- Transformer shortages and 60-month lead times
- Increasing load volatility driven by AI and electrification
- Transmission congestion and substation stress
- A retiring workforce and growing skills gap.

In this reality, scheduled testing cycles are no longer enough. Asset management strategies must be flexible, data-driven, and prioritised based on condition, not just age.

Lab diagnostics support this evolution by:

- Providing evidence to justify asset replacement or refurbishment
- Preventing unnecessary capital spend
- Supporting warranty claims and insurance documentation
- Informing transformer relocation or loading decisions.

As utilities transition from time-based to condition-based maintenance, Doble's lab services offer the accuracy and credibility needed to guide those decisions.

Reliability you can measure

While lab testing might happen behind the scenes, its impact is unmistakable in preventing catastrophic failures, deferring multimillion-dollar transformer purchases, and catching contamination before it spreads. For utilities facing mounting

pressures, that kind of reliability is essential.

Real-world examples

In Part 2 of the series, Doble shares cases where lab analysis has helped prevent failures, reduce costs, and improve fleet performance – highlighting how the right insight, at the right time, can change the outcome entirely.

Catching a failure in progress

A large US utility submitted a transformer oil sample to Doble's lab as part of routine DGA testing. The test results showed unusually high concentrations of fault gases, indicating a potential low-energy arcing or hot spot condition.

Doble flagged the result immediately and recommended resampling within days. The follow-up test confirmed what the trend suggested: acetylene levels were rising, pointing to high-energy arcing.

With this information, the utility coordinated an emergency outage while the transformer was still in service. Once offline, further lab tests and field inspections confirmed that a lead inside the transformer was overheating and degrading insulation. Left unchecked, the issue could have escalated into a major failure and extended outage.

DGA monitoring and rapid lab diagnostics enabled the utility to avoid an unplanned failure and reduced potential repair costs. The transformer was repaired and safely returned to service without downstream disruption.

The power of trending and testing

Another utility, conducting routine condition monitoring on a high-value transformer, noted over several months that DGA results showed a slow but steady increase in combustible gas concentrations. No single result triggered alarm thresholds, but the trend was unmistakable.

Instead of guessing, the utility submitted additional samples and worked with Doble to correlate gas generation trends with operating conditions. The data suggested localised overheating rather than a system-wide fault.

With that insight, the utility scheduled a controlled outage and performed an internal inspection. Sure enough, loose connections and minor insulation degradation were found, enough to cause the gas buildup but caught before escalating into a major failure.

Proactive trend monitoring and collaborative lab analysis enabled timely maintenance, preserved valuable equipment, and kept the grid reliable.

Lessons from the field

These cases illustrate why lab services matter.

- Early warning saves time and money by turning symptoms into actionable diagnoses.
- Trending and interpretation matter; not every issue is obvious in a single test.
- Outage planning improves when maintenance is guided by lab-backed evidence.
- Reliability gains are tangible, from preventing failures to extending asset life.

The diagnostic tools: DGA, furan and forensics

In Part 3 of the series, Doble takes a closer look at the diagnostic tools used, and explains why these tests carry so much weight in modern utility operations. Not all tests are created equal. Some, like dissolved gas analysis and furan testing, serve as the grid's early-warning system. Others, like forensic analysis, help utilities learn from failures to prevent them happening again. Together, they provide a complete picture of asset health and a foundation for confident decision-making.

Escalating demand for electricity and the increasing integration of renewables are among factors placing new stresses on utility networks.

Dissolved gas analysis: the gold standard

In transformer diagnostics, dissolved gas analysis is the single most powerful tool available. DGA detects fault gases produced by arcing, overheating, and insulation breakdown inside oil-filled equipment. More important than the absolute values are the trends: a sudden spike or steady increase in gases like acetylene can signal problems long before they're visible in the field.

By flagging early-stage faults, DGA gives utilities the lead time to plan maintenance, coordinate outages, and prevent major transformer failures. That's why it's often called the 'gold standard' of transformer testing.

Furan testing: seeing inside insulation

While DGA focuses on gases in oil, furan testing provides a window into the paper insulation that protects transformer windings. Over time, cellulose insulation degrades, and once it reaches end-of-life, there's no way of reversing the degradation.

Furan levels in oil indicate how much insulation has broken down, offering one of the clearest measures of a transformer's remaining useful life. Utilities use this data to decide whether to extend loading, schedule refurbishment, or replace equipment altogether. In a world where transformer lead times stretch into years, knowing insulation health is critical for planning.

Supporting oil and breaker tests

The broader suite of diagnostics, including LTCare (for OLTCs) and Breaker Analysis (DBA) programmes ensure no piece of the asset health picture is overlooked.

- Oil quality screen tests reveal whether insulating liquids still meet the demands of load and thermal stress.
- Corrosive sulphur and metals-in-oil analyses detect early chemical attack or contact wear, which may not yet show up in gassing trends.
- Particle count, carbon/particulate testing in OLTCs and oil circuit breakers uncover wear debris, contact erosion, or switching-induced damage before failure.

From dissolved gases to furans to forensics, laboratory diagnostics provide the clarity utilities need to act with confidence to maintain asset health.

Individually, these tests may not carry the weight of DGA or furan analysis, but together they provide the details needed to make informed maintenance decisions across the fleet.

Forensic analysis: learning from failure

Even with the best preventive testing, failures can happen. When they do, forensic analysis uncovers the root cause.

Labs examine aged paper and pressboard, test tensile strength, and measure the degree of polymerisation to assess insulation breakdown. Metallurgical analysis reveals cracks, erosion, or poor weld quality. Contaminant analysis identifies foreign particles or byproducts that may have triggered the fault. Cross-sectional imaging exposes thermal damage and wear patterns invisible to the naked eye.

The value of forensic testing is not only in understanding a single failure but applying those lessons across the fleet. Root cause insights can inform future strategies, prevent repeat issues, and strengthen warranty and insurance claims.

Powering decisions

From gases to furans to forensics, laboratory diagnostics provide the clarity utilities need to act with confidence. Each test adds a different layer of visibility into asset health, and together they form the foundation of proactive, risk-informed asset management.

The future of grid reliability

In Part 4 of the series, the focus turns to the future of grid reliability, which starts in the lab: from managing AI-driven load growth and EV integration, to testing new liquids and next-generation substation equipment.

The electric grid is entering a new era of complexity. From AI-driven data centres to electric vehicle charging networks, demand for electricity is accelerating faster than infrastructure can keep pace. Renewables integration, modular substations, and distributed energy resources are reshaping power flow and stressing equipment in new ways.

These shifts accelerate aging, introduce new failure modes, and put unprecedented stress on transformers, breakers, and insulating liquids. Examples include:

- High-frequency harmonics stressing transformers and switchgear
- New insulating liquids, such as natural esters and silicones, with different aging profiles
- Emerging degradation modes that traditional testing alone cannot fully capture.

Laboratory diagnostics provide a way to measure these risks directly, offering visibility into how assets respond to new stresses before they undermine reliability.

From testing to decision-making

Laboratory results are most valuable when they inform action. A gas sample, liquid screen, or materials test is not an endpoint; it's the evidence utilities need to make confident decisions. That's why laboratory services are integrated with engineering consulting, field diagnostics, and condition monitoring. When an online sensor flags an anomaly, laboratory analysis can validate the finding and pinpoint the cause. When results suggest insulation degradation, expert interpretation provides context, urgency, and recommended next steps.

This ability to translate data into decisions is especially critical as utilities face workforce transitions. With many experienced engineers retiring, laboratories help fill the gap by providing clear, risk-based guidance rooted in decades of diagnostic knowledge.

Scalable and responsive support

The pace of change in the energy sector means utilities often need answers quickly. Laboratory services are adapting with increased capacity, faster turnaround, and flexible reporting. Whether analysing a rushed sample from a transformer under load or benchmarking a fleet's insulation liquids, labs can scale to match immediate and longer-term needs.

Beyond testing, laboratories also play an educational role, helping utilities build internal confidence through training, webinars, and guidance on evolving standards. This knowledge transfer strengthens resilience and ensures teams are prepared to act on the results they receive.

Looking ahead

The future grid will be more dynamic, distributed, and digitally enabled than ever before. But reliability will continue to hinge on one principle: informed decision-making.

Laboratory services uncover the invisible, validate what's uncertain, and guide the actions that keep power systems running. As utilities plan for tomorrow's challenges – from AI-driven load growth to EV integration and new materials – the foundation for resilience starts in the lab.

Acknowledgements to Doble Engineering for the information shared in the blog posts.

For more information visit: www.doble.com

Insights provided by lab testing and analysis help prevent failures, reduce costs, and improve fleet performance.

A longstanding partnership

Omniflex today provides a central monitoring solution that covers three Sasol sites.

Sasol first partnered with Omniflex, then known as Conlog, in the 1960s, marking the beginning of a longstanding relationship that continues to this day. During this time, Sasol has expanded its production to encompass three sites and is now transitioning from fossil fuels to the clean energy sector. Here, Ian Loudon, responsible for international sales and marketing at remote monitoring specialist Omniflex, reflects on the longevity of the partnership with Sasol, key technology milestones along the way, and the most recent project in South Africa.

It was towards the end of the 1960s that Sasol first approached Conlog, based in Durban, to supply instrumentation and interface equipment. Conlog provided the key alarm logic equipment as the company developed its reputation in engineering and Sasol expanded its chemical production to include fertilisers and solvents.

Expansion

The partnership was strengthened in the 1970s as global oil crises boosted interest in alternative energy and independence from global oil supply chains. To increase production, Sasol built plants Two and Three and Conlog was tasked with supplying over 22 000 critical alarm points for the plant, as well as the entire logic control and plant marshalling interface system, making the company the second largest contractor on site behind Honeywell.

Much of the plant interface system was designed by Halliburton in the USA, using Conlog personnel to ensure technological independence for Conlog and Sasol. At the time, Anglo American acquired 50% of Conlog shares and that allowed the company to scale up its offering; it became the largest local manufacturer of industrial electronics with capacity to tackle large-scale projects.

This laid the foundations for the technical relationship that continues today. Sasol 2 and 3 became operational in the 1980s with Conlog's support instrumental in the design and supply of the logic and interface systems. The Conet network, one of the world's first industrial local area networks, was shaped in part by the needs of Sasol's industrial sites for high-integrity and long-distance monitoring. The system is still in operation today.

Conlog becomes Omniflex

In 1997, Conlog's industrial division became Omniflex. Although operating under a different name, the company continued to provide remote monitoring off-site and has since advanced its technologies from hard-wired alarm annunciators to remote, high-volume real-time monitoring across entire plants.

Its familiarity with Sasol's people and systems led to Sasol approaching Omniflex to provide solutions to improve productivity and maintenance responsiveness. Omniflex then introduced real-time monitoring of the electrostatic precipitators (ESPs) across 17 substations. This meant Omniflex was trusted with installing Maxiflex monitors for motors, auxiliary equipment, panels and alarms to provide wider visibility of the plant. The technology overcame the need for manual inspections across its east and west sites, allowing one person to monitor the plant remotely from a control room and conduct a full inspection within five minutes, compared to the previous inspection method which required 48 field controllers checking the plants over a time of about five hours.

Sasol maintenance electrician Johan Oosthuizen says, "I'd rate the project a nine out of ten. It's doing exactly what we wanted it to do. My bosses are happy, which means I'm happy too.

"One aspect that especially impressed me was how helpful and responsive Omniflex were – even though they weren't on site, we always got the support we needed."

Its work with Sasol is one example of Omniflex's 60 years of innovation. The company this year celebrates its 60th anniversary.

A faster route to ground fault location for solar installations

The GFL-1500 Ground Fault Locator is a three-piece troubleshooting system designed to assist technicians and enable faster and more confident fault resolution.

As the local representative for Fluke, Comtest is offers the Fluke GFL-1500 Solar Ground Fault Locator, a frontline troubleshooting tool that helps technicians pinpoint active ground faults in solar photovoltaic (PV) systems. It works by producing a traceable signal in the array, allowing for fast, intuitive, non-contact tracing directly to the fault location.

This eliminates the frustration of traditional exploratory and time-consuming troubleshooting and reduces unnecessary exposure to electrical hazards. In addition, to improving safety and reducing downtime, this solution redefines how technicians locate active ground faults in solar PV systems. By replacing complex, manual diagnostics with an easy-to-follow trace signal, the GFL1500 streamlines fault isolation, helping teams restore system operation quickly and effectively.

The Fluke GFL-1500 is a three-piece troubleshooting system. It includes:

- A transmitter, CAT III 1500 V dc, CAT IV 600 V, which meets the safety standards set out in IEC 61010-1 and 61010-2-030
- A receiver, CAT III 1500 V dc, CAT IV 600 V, which meets IEC safety standard 61010-1
- A signal tracing clamp, rated for use on insulated conductors up to 1500 V.

Whether the site of the work is at the inverter, combiner, or module level, the GFL-1500 Ground Fault Locator has been rigorously tested for safety and durability. It provides a rugged, safe, fast, and reliable solution to identify ground faults in high-voltage environments – enabling technicians to work confidently and efficiently in the field.

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

Refurbishment of damaged mini substations

South African electrical enclosure specialist Power Process Systems (PPS) recently completed the full refurbishment of four mini substations in the Katlehong area. The company provides cost-effective infrastructure modernisation solutions for municipalities and utilities.

The project scope included a complete renewal of the substations' outer shells and critical inner works, covering the Ring Main Units (RMUs), transformers, and low-voltage (LV) panels. Restoring the units from their damaged state to full operational capacity, PPS has extended the life of the substations, obviating the need for costly replacement.

With this refurbishment PPS also added value with built-in vandal protection and safety features for the public, enhanced monitoring, improved surveillance, and a higher level of auditability for maintenance staff. These measures support improved reliability and long-term sustainability in municipal electricity networks.

"At PPS, we believe refurbishment offers municipalities a smart, economical pathway to modernising their networks. By extending the lifespan of existing infrastructure and embedding new security and monitoring features, we provide solutions that are practical and future-ready," says Nhlanhla Zondo, Director at Power Process Systems.

The successful completion of the project in the Kagiso area demonstrates PPS's commitment to supporting South Africa's energy infrastructure with innovative, cost-effective, and sustainable solutions. "Electricity underpins economic development and quality of life. Our products help to ensure power is delivered safely and reliably, assisting utilities to recover revenue and communities to thrive," says Zondo.

Before and after photos illustrate a previously damaged mini substation completely refurbished with renewed outer shells, repaired inner works and enhanced security features.

Insights into lubricant management and maintenance

Condition monitoring specialist, WearCheck, has officially launched its website for Lubrigard, its dedicated lubricant management division.

Built in collaboration with WearCheck, the Lubrigard platform demonstrates the company's commitment to Lubricant Enabled Reliability (LER) – the principle that maintaining lubricants in peak condition promotes optimal asset performance, extended equipment life and reduced operational costs.

Lubrigard Division Manager, Chris Hattingh, has been with WearCheck for more than 15 years, specialising in LER for the past five. He sees the new Lubrigard website as a pivotal growth point in the division's journey, an extension of his team's offering, and an important source of information about LER processes, which helps customers with decision-making.

With the new website serving as an efficient business tool, Hattingh is pleased to be able to offer clients clear and simple solutions once key objectives are established, cutting through complexity. Clients now have direct access to Lubrigard's value propositions in one place, and can immediately engage and request tailored, online support, eliminating the wait for proposals.

"Visitors to the new website also gain insight into Lubrigard's FLAC strategy – a comprehensive focus on Fuels, Lubricants, Air and Coolants. Our holistic approach uses data mining and targeted analysis to highlight contamination in key systems early, before it impacts performance or causes breakdowns," Hattingh highlights.

WearCheck's Lubrigard Division Manager, Chris Hattingh.

"Using advanced sensory technologies and oil analysis data, the Lubrigard team provides real-time insights into the health of both the lubricant and the components it serves. We also offer a range of specialised products tailored to specific applications," Hattingh adds. "Our unique techniques allow us to monitor the condition of the oil and fuels as well as the performance of the machinery through improved WearCheck oil analysis data.

"Furthermore, at Lubrigard we use RPVOT (rotating pressure vessel oxidation test) testing to measure lubricant oxidation resistance. This is especially crucial for turbine oils and illustrates the depth of our technical capabilities."

Hattingh notes another component of Lubrigard: iGard is an IoT based system, that integrates sensory technology, historical oil analysis trends and real time data. Thus, it provides a fully integrated view of asset health, early wear warning and proactive maintenance planning.

Specialised testing of steel pressure vessels

DEKRA Industrial South Africa has strengthened its position as a leader in hydrogen-induced cracking (HIC) inspections, using advanced non-destructive testing (NDT) techniques. Investing in state-of-the-art inspection equipment and global technical collaboration have enabled DEKRA to offer this enhanced capability to clients in the petrochemical, refinery and related industries where accuracy, reliability and confidence are required for early detection and management of cracking and damage in steel assets.

"Hydrogen-induced cracking remains one of the most critical threats to the integrity of pressure vessels, pipelines and steel infrastructure in the petrochemical sector," says Bennie Groenewald, Business Line Manager, NDT / Advanced NDT at DEKRA Industrial. "Our advanced inspection portfolio – particularly in HIC detection – is technically robust and backed by DEKRA Industrial's global network and local expertise. With continuous investment in equipment and people, we are setting new standards for asset integrity in South Africa's petrochemical sector."

Precise techniques

Unlike surface damage, HIC occurs internally due to atomic hydrogen diffusing into steel structures, leading to blistering and stepwise cracking. The challenge lies in detecting early-stage damage accurately before it escalates to catastrophic failure.

To meet this challenge, DEKRA Industrial follows a phased approach.

- Total focusing method (TFM) for high-resolution ultrasonic imaging and sub-surface defect detection as small as 200 microns
- Time-of-flight diffraction (TOFD) ultra-low angle (ULA) techniques for enhanced probability of detection and length sizing
- Metallographic verification and destructive testing where needed, to ensure complete characterisation of damage.

These methods allow for qualitative and quantitative evaluation of HIC, significantly improving maintenance planning, repair decisions and operational safety.

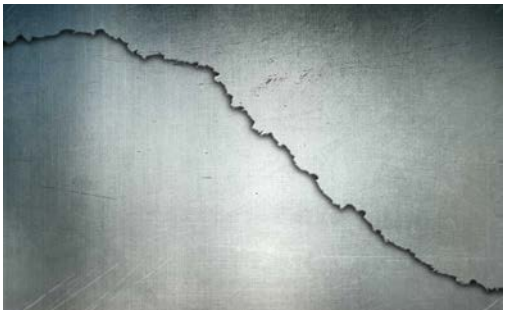
Global expertise, local capability

What gives DEKRA Industrial a competitive edge is the integration of global research and development, European standards and hands-on field experience in the South African context. Backed by the DEKRA Group's international innovation and research teams, the company has direct access to the latest techniques, procedures and technical feedback from similar NDT inspections performed across the world.

In support of this, DEKRA Industrial South Africa recently invested in new advanced inspection equipment, tailored specifically to inspect for HIC and related forms of damage. This includes next-generation phased array ultrasonic testing (PAUT) units and data-processing software, now operational across key sites in the local petrochemical sector.

Additionally, three senior DEKRA NDT specialists (certified to Level 2 and 3) have undergone specific international training to ensure the effective use of these technologies. This investment in people and technology ensures that inspection results are interpreted with a high degree of accuracy and consistency, giving clients actionable insight.

As part of its broader mission, DEKRA Industrial remains committed to promoting safety, reliability and technical excellence in the industries it serves.



DEKRA Industrial's advanced testing services include inspection services to detect hydrogen-induced cracking in steel vessels.

The environmental impact of generative AI

Earlier this year, MIT News published the first of a two-part series, exploring the environmental implications of generative AI. In this first article (shared below) it looks at why this technology is so resource-intensive. A second piece published subsequently. investigates what experts are doing to reduce genAI's carbon footprint and other impacts.

Adam Zewe, MIT News

The rapid development and deployment of powerful generative AI models come with environmental consequences, including increased electricity demand and water consumption.

The excitement surrounding potential benefits of generative AI [1], from improving worker productivity to advancing scientific research, is hard to ignore. While the explosive growth of this new technology has enabled rapid deployment of powerful models in many industries, the environmental consequences of this generative AI 'gold rush' remain difficult to pin down, let alone mitigate.

The computational power required to train generative AI models that often have billions of parameters, such as OpenAI's GPT-4, can demand a staggering amount of electricity, which leads to increased carbon dioxide emissions and pressures on the electric grid.

Furthermore, deploying these models in real-world applications, enabling millions to use generative AI in their daily lives, and then fine-tuning the models to improve their performance draws large amounts of energy long after a model has been developed.

Beyond electricity demands, a great deal of water is needed to cool the hardware used for training, deploying, and fine-tuning generative AI models, which can strain municipal water supplies and disrupt local ecosystems. The increasing number of generative AI applications has also spurred demand for high-performance computing hardware, adding indirect environmental impacts from its manufacture and transport.

"When we think about the environmental impact of generative AI, it is not just the electricity you consume when you plug the computer in. There are much broader consequences that extend to a system level and persist based on actions that we take," says Elsa A Olivetti, Professor in the Department of Materials Science and Engineering and the lead of the Decarbonisation Mission of MIT's new Climate Project [2].

Olivetti is senior author of a 2024 paper, *The Climate and Sustainability Implications of Generative AI* [3], co-authored by MIT colleagues in response to an Institute-wide call for papers that explore the transformative potential of generative AI, in both positive and negative directions for society.

Demanding data centres

The electricity demands of data centres are one major factor contributing to the environmental impacts of generative AI, as data centres are used to train and run the deep learning models behind popular tools like ChatGPT and DALL-E.

Data centres are temperature-controlled buildings that house computing infrastructure, such as servers, data storage drives, and network equipment. For instance, Amazon has more than 100 data centres worldwide [4], each of which has about 50 000 servers that the company uses to support cloud computing services.

While data centres have been around since the 1940s (the first was built at the University of Pennsylvania in 1945 to support the first general-purpose digital computer [5], the ENIAC), the rise of generative AI has dramatically increased the pace of data centre construction.

"What is different about generative AI is the power density it

MIT News explores the environmental and sustainability implications of generative AI technologies and applications.

requires. Fundamentally, it is just computing, but a generative AI training cluster might consume seven or eight times more energy than a typical computing workload," says Noman Bashir, lead author of the impact paper, who is a Computing and Climate Impact Fellow at MIT Climate and Sustainability Consortium (MCSC) and a postdoc in the Computer Science and Artificial Intelligence Laboratory (CSAIL).

Scientists have estimated that the power requirements of data centres in North America increased from 2 688 megawatts at the end of 2022 to 5 341 megawatts at the end of 2023, partly driven by the demands of generative AI. Globally, the electricity consumption of data centres rose to 460 terawatt-hours in 2022. This would have made data centres the 11th largest electricity consumer in the world, between the nations of Saudi Arabia (371 terawatt-hours) and France (463 terawatt-hours), according to the Organisation for Economic Co-operation and Development.

By 2026, the electricity consumption of data centres is expected to approach 1 050 terawatt-hours (which would bump data centres up to fifth place on the global list, between Japan and Russia).

While not all data centre computation involves generative AI, the technology has been a major driver of increasing energy demands.

"The demand for new data centres cannot be met in a sustainable way. The pace at which companies are building new data centres means the bulk of the electricity to power them must come from fossil fuel-based power plants," says Bashir.

The power needed to train and deploy a model like OpenAI's GPT-3 is difficult to ascertain. In a 2021 research paper, scientists from Google and the University of California at Berkeley estimated the training process alone consumed 1 287 megawatt hours of electricity (enough to power about 120 average US homes for a year), generating about 552 tonnes of carbon dioxide.

While all machine-learning models must be trained, one issue unique to generative AI is the rapid fluctuations in energy use that occur over different phases of the training process, Bashir explains.

Power grid operators need to have a way to absorb those fluctuations to protect the grid, and they usually employ diesel-based generators [6] for that task.

Increasing impacts from inference

Once a generative AI model is trained, the energy demands don't disappear. Each time a model is used, perhaps by an individual asking ChatGPT to summarise an email, the computing hardware that performs those operations consumes energy. Researchers have estimated that a ChatGPT query consumes about five times more electricity than a simple web search.

"But an everyday user doesn't think too much about that," says Bashir. "The ease-of-use of generative AI interfaces and the lack of information about the environmental impacts of my actions mean that, as a user, I don't have much incentive to cut back on my use of generative AI."

With traditional AI, the energy usage is split fairly evenly between data processing, model training, and inference, which is the process of using a trained model to make predictions on new data. However, Bashir expects the electricity demands of generative AI inference to eventually dominate as these models are becoming widely used in so many applications, and the electricity needed for inference will increase as future versions of the models become larger and more complex.

Plus, generative AI models have an especially short shelf-life, driven by rising demand for new AI applications. Companies release new models every few weeks, so the energy used to train prior versions goes to waste, Bashir adds. New models often consume more energy for training, as they usually have more parameters than their predecessors.

While the electricity demands of data centres may be getting the most attention in research literature, the amount of water consumed by these facilities also has environmental impacts.

Chilled water is typically used to cool a data centre by absorbing heat from computing equipment. It has been estimated that, for each kilowatt hour of energy a data centre consumes, it would need two litres of water for cooling, says Bashir.

"It may be called 'cloud computing' but the hardware does not live in the cloud. Data centres' consumption of water (just as they consume electricity) has direct and indirect implications for biodiversity," he says.

The computing hardware inside data centres brings its own, less direct environmental impacts. Although it is difficult to estimate how much power is needed to manufacture a GPU, a powerful type of processor that can handle intensive generative AI workloads, it would be more than what is needed to produce a simpler CPU, because the fabrication process is more complex. A GPU's carbon footprint is compounded by the emissions related to material and product transport.

There are also the environmental implications of obtaining the raw materials used to fabricate GPUs, which can involve mining procedures and the use of toxic chemicals for processing.

Market research firm TechInsights estimates that the three major producers (NVIDIA, AMD, and Intel) shipped 3.85 million GPUs to data centres in 2023, up from about 2.67 million in 2022. That number is expected to have increased by an even greater percentage in 2024.

It seems that the industry is on an unsustainable path, but there are ways to encourage responsible development of generative AI that supports environmental objectives, Bashir says.

He, Olivetti, and their MIT colleagues argue that this will require a comprehensive consideration of all the environmental and societal costs of generative AI, as well as a detailed assessment of the value in its perceived benefits.

"We need a more contextual way of systematically and comprehensively understanding the implications of new developments in this space. Due to the speed at which there have been improvements, we need to catch up with our abilities to measure and understand the trade-offs," Olivetti says.

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Eskom Expo ISF celebrates young scientists

This year's Eskom Expo International Science Fair celebrated South Africa's leading young scientists with a great collection of prizes, from full bursaries and cash rewards to tech devices that will support their future studies in science, technology, engineering, mathematics and innovation (STEMI).

Front row: Eskom bursary winners – Nobuhle Sibeko, Jaco Deysel, Ozwikona Makuya, Simesihle Khuzwayo, Melokuhle Khuzwayo, Sohil Bharat. Back row: Representing Eskom and the Eskom Development Foundation – Tshepiso Temo, Mbulelo Yedwa, Portia Papo, Mologadi Motshele, Dr Claudelle von Eck, Beke Moloi.

Held at the Convention Centre at Emperors Palace in Kempton Park from 6 to 10 October 2025, the fair brought together some of the brightest young scientists from across South Africa and other countries in Africa and abroad, including Lesotho, Namibia, Zimbabwe, Ireland, India and Russia.

At the Special Awards ceremony Eskom awarded six full bursaries worth R5 million. The bursaries are awarded contingent on the recipients' meeting the required criteria in their matric results. The bursaries cover full tuition, accommodation, meals, textbooks and a living allowance for studies in STEM subjects at accredited South African universities. Through this investment, Eskom reaffirms its commitment to empowering future leaders and building a sustainable, knowledge-driven nation.

Melokuhle Khuzwayo and Simesihle Khuzwayo, Grade 12 learners at King Bhekuzulu High School representing the KwaZulu-Natal Far North Region, were awarded full bursaries for their project, 'Double Trouble Double Solution: Neutralising Acid & Plastics with Nature's Help'. The twins investigated whether autolysed biomass extracts (ABE), derived from banana peel and yeast, could serve as sustainable alternatives to traditional liming agents to neutralise pH and remove microplastics in acidic wastewater. Their findings suggest that, with further refinement, ABEs could become low-cost solutions for rural communities that do not have access to conventional wastewater treatment methods.

Sohil Bharat, a Grade 12 learner at Newcastle High School representing the Northern KwaZulu-Natal Region, was awarded a full bursary for his project 'Vulcan Shield', a simple, inexpensive, reliable and intelligent mine fire suppression system that provides additional fire safety in underground mines. The prototype demonstrated the ability to detect a fire within one minute, align itself and extinguish the fire in about 21 seconds. Bharat developed his innovation through meticulous planning, design, testing and refinement.

Ozwikona Makuya, a Grade 12 learner at Mbilwi Secondary School representing the Vhembe Region, was awarded a full bursary for the research project 'MacSonic'. Inspired by the struggles learners face when using mobile phones for studying such as distractions, scattered resources and burnout, Ozwikona created MacSonic as a powerful, all-in-one, smart, easy-to-use app that brings together everything learners need to study. This project marks a positive step towards digital learning solutions that address the real needs of South African students.

Jaco Deysel, a Grade 12 learner at Jim Fouché High School representing the Bloemfontein Region, was awarded a full bursary for his project 'The Impact of a Look-up Table Design on AES Encryption Speed and RAM Demand'. Deysel's research responds to the growing need for robust encryption systems. Currently, the strongest military-grade data protection method available the Advanced Encryption Standard (AES) demands high processing power, making it inaccessible to most start-up businesses. He designed and developed a computer program to encrypt and decrypt five differently sized text files using AES, resulting in enhanced performance and broader accessibility to AES in resource-constrained environments such as small businesses.

Nobuhle Sibeko, a Grade 12 learner at Lindley High School representing the Bethlehem Region, was awarded a full bursary for her project 'The Buhle 14-Day Dream (B14) Protector System'. Sibeko's project addresses one of the most significant challenges faced by teenagers today: managing time and regulating emotions. The system offers a creative solution to procrastination and burnout, showing that with the right support, learners can manage stress effectively.

Eskom Development Foundation Acting Chief Executive Officer, Mologadi Motshele, said: "Eskom Expo is the only initiative of its kind that brings together thousands of learners from across every province, ensuring inclusivity and accessibility. With Eskom's sustained CSI support, the expo has impacted the lives of more than 17 000 young people this year alone. What makes this especially significant is Eskom's long-term commitment to strengthening South Africa's development route for future scientists, engineers, and innovators. By consistently investing in the expo as a



Left: Christopher May, the 2025 Top Senior Scientist. Centre: Khushi Lall, the 2025 Top Junior Scientist. Right: Lethabo Kgwete, the 2025 Top Development School Scientist.

trusted national platform, Eskom is creating opportunities for learners to showcase their talents and driving the broader national agenda of skills development, innovation, and economic growth through science, technology, engineering, mathematics and innovation."

The Special Awards evening also saw engineering and technology leaders Babcock International and Siemens Energy award six full bursaries worth a combined R6.2 million – covering tuition fees, textbooks, accommodation, meal allowances, and a laptop. The bursaries will support the selected winners in their studies towards a Bachelor of Science in Engineering at any South African university of their choice.

The Babcock International bursaries were awarded to: Suprise Ndlovu from Boikagong Secondary School (Bojanala Region), Sohil Bharat from Newcastle High School (Northern KZN), Mokgadi Ralefeta from Dendron High School (Capricorn Region) and Simesihle Khuzwayo from King Bhekuzulu High School (KZN Far North).

Siemens Energy awarded two full higher education bursaries to Lethukuthula Khumalo from Nkodibe High School (KZN Far North Region) and Azola Sihlahla from Dulati Combined School (Southern KZN Region).

Olivia Barker, a Grade 11 learner from St Mary's DSG Pretoria, representing the Northern Gauteng Region, was awarded the Dr Derek Gray Gold Medal, which includes attendance at the Stockholm International Youth Science Seminar during Nobel Week in December 2026, and a three-year study bursary in the sciences or engineering at the University of Pretoria, provided she meets the required criteria in her matric results.

Additional cash prizes

The 2025 Top Senior Scientist, winning a R100 000 cash prize, was Christopher May from Otto du Plessis High School, representing the Port Elizabeth Region. In his research project, 'Differential Geometric Modelling of Sound Signals and Ultrasound Imaging', the Grade 12 learner impressed the panel of chief judges with his demonstration of sound reasoning, logical arguments, and grasp of complex mathematics concepts. May designed a method to analyse the properties of sound using differential geometry. He created a geometric model of a sound wave and then applied differentiation techniques to analyse its properties. He went on to apply this method to ultrasound imaging where he successfully enhanced features such as subtle edges and the textures of anatomical structures. This resulted in enhanced medical imaging and improved diagnostic accuracy. May's research highlights the value of mathematics as a tool to improve healthcare. Khushi Lall from Tyger Valley College, representing the Northern Gauteng Region with her research project, 'Garlic: Nature's Secret to Food Preservation', was selected as the 2025 Top Junior Scientist, winning a R75 000 cash prize. Food preservation has become a challenge globally because of the rise of resistant microbes. This was the motivation behind Lall's research project. The Grade 9 learner impressed the Chief Judges with her remarkable understanding of bacteria such as *Staphylococcus aureus* and her exceptional precision when executing laboratory techniques. According to the judges, such scientific investigative skills combined with reasoning and logical thinking, are the mark of a scientist in the making.

Lethabo Kgwete from Moleshatlou Secondary School, representing the Capricorn Region was awarded Top Development School Scientist and received a cash prize of R75 000. In his research project 'The Effect of Livestock Green Compost Tea', the Grade 11 learner investigated the effect of this compost on crop yield. Motivated by the challenges faced by small-scale farmers in rural areas, including access to affordable and sustainable fertilisers, Kgwete developed a cost-effective and eco-friendly compost called the Livestock Green Compost Tea. The compost tea is prepared by combining fruit peels, dry grass, leaf litter, water, wood ash, eggshells, and other organic matter in a steeping container. The mixture is brewed for several days to produce a nutrient-rich liquid. The treated crops (tomatoes, spinach, and onions) consistently showed greater height increases and faster overall growth. Lethabo's research holds much promise for increasing crop yield through sustainable green fertilisers.

A total of 30 Gold, 77 Silver and 131 Bronze medals were awarded at the Grand Awards ceremony, and the opportunity to travel to represent South Africa at prominent international science fairs in Taiwan, Tunisia, China, Indonesia, the USA, and Türkiye was awarded to deserving learners with the support of various long-standing sponsors of the Eskom Expo. These recipients will be announced in the coming months.

Eskom Expo Executive Director, Parthy Chetty, said: "We extend our congratulations to the brilliant winners of the International Science Fair. Your ingenuity, perseverance and passion for discovery inspire us all. This achievement is a celebration of scientific excellence and a powerful reminder of what's possible when curiosity meets opportunity. To students everywhere: let this be your spark. STEM subjects open doors to solving global challenges, shaping the future, and making a lasting impact. Whether in labs, classrooms, or communities, your ideas matter. Know that your journey in science starts now. Keep asking questions, keep exploring."

For the full list of 2025 Eskom Expo ISF winners visit: www.exposcience.co.za

Regional interconnections – unlocking Africa's potential

In this thought leadership article, Janice Foster, Energy Managing Director at Zutari, looks to the possibilities Africa offers for a reimagined and regionally interconnected power system. Setting the stage, she highlights that in advancing its energy transition, Africa and sub-Saharan Africa have the potential to leapfrog traditional energy models through smart infrastructure deployment. The solution, she says, lies not in isolated national strategies, but in a fundamental reimagining of how power systems can transcend borders to create shared prosperity.

Regional interconnectors represent more than transmission lines. They are instruments of transformation that can unlock stranded renewable resources, smooth volatility, reduce costs, and, crucially, distribute benefits equitably across nations. This is the essence of smart infrastructure: combining physical assets with intelligent market design to turn electrons into engines of development.

Across sub-Saharan Africa, pioneering interconnector projects are already demonstrating transformative impact. The Cahora Bassa HVDC transmission network linking Mozambique to South Africa has operated since 1979, indicating the enduring value of well-designed cross-border infrastructure.

Janice Foster, Energy Managing Director at Zutari.

The Sodo-Moyale-Suswa High Voltage Power Line linking Ethiopia and Kenya, operational since January 2023, has already lowered Kenya's supply costs. The Kenya-Tanzania transmission line, as a first stage of the Zambia-Tanzania-Kenya (ZTK) Interconnector, creates the first physical link towards the interconnection of the East African Power Pool (EAPP) and Southern African Power Pool (SAPP). In West Africa, trading across the CLSG interconnector (*Côte d'Ivoire*-Liberia-Sierra Leone-Guinea) is enabling Liberia to begin reducing its reliance on costly, unreliable generation.

The success of physical interconnectors depends critically on robust market mechanisms. Across Africa's regional power pools, sophisticated trading platforms are emerging. The SAPP operates mature, competitive markets that provide transparent price discovery and dispatch signals, supporting expanded bilateral trade while maintaining grid stability. The EAPP is preparing to launch a regional day-ahead market, creating the institutional framework for efficient use of interconnections and attracting investment in renewable energy generation. The West Africa Power Pool (WAPP) is developing market infrastructure, positioning the region for large-scale cross-border renewable energy trade.

However, sophisticated market platforms alone cannot guarantee that interconnector benefits reach all stakeholders; success requires deliberate policy design that embeds equity and resilience from the outset. To maximise benefits across all communities, policymakers must focus on four key areas:

- Harmonised market rules ensuring open access through standardised grid codes and transparent tariffs
- Socially inclusive design that extends infrastructure beyond transmission lines to include local substations and distribution interfaces
- Resilience-focused construction incorporating N-1 redundancy, cyber-secure systems, and coupling interconnectors with flexible resources like storage and demand response
- And innovative financing through blended finance mechanisms and risk pooling to attract private capital.

Several critical projects will shape Africa's energy landscape through 2035, including the Angola-Namibia (ANNA), the relaunched ZTK and the ZIZABONA Interconnectors, and the delayed, but important, Malawi-Mozambique connection.

However, Africa faces significant investment challenges.

Transmission infrastructure is capital-intensive, and the scale of investment required for both refurbishment of ageing infrastructure and ambitious new-build programmes to connect renewable resource zones is substantial. The IEA estimates that electricity investment in Africa must rise from less than $30 billion in 2022 to over $120 billion by 2030, with renewables and power grids constituting most of the spend.

Innovative financing approaches are essential to address these challenges. The $1.3 billion Regional Transmission Infrastructure Financing Facility (RTIFF), launched in March 2024, is an example of how blended finance can accelerate project delivery by sharing risks and reducing financing timelines.

Regional interconnectors represent much more than transmission projects; they are market-making institutions that, when paired with open, rules-based trading, can deliver transformative impact through shared regional advantage. The agenda is clear: complete the spine projects, launch robust day-ahead markets, and embed equity into the fundamental rules of electricity trade.

Success will be measured not only in megawatts transmitted, but in lives transformed, from the industrial zones powered by cross-border renewable energy to the rural communities gaining access through expanded distribution networks. By connecting countries across sub-Saharan Africa, these projects unlock resources that might otherwise remain stranded and provide buffers against localised shocks.

The effectiveness of this vision rests on cooperation. Cross-border electricity trade requires trust, political commitment, and institutional frameworks that balance diverse interests. When these elements align, interconnectors demonstrate what is possible when infrastructure serves both technical and human needs, catalysing growth and fostering the regional solidarity essential for long-term resilience and prosperity.

Africa's energy transition will not be won plant-by-plant, but link-by-link. Smart infrastructure, combining steel and substations with rules and trust, hold the key to turning the continent's abundant resources into shared, sustainable development for all.

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

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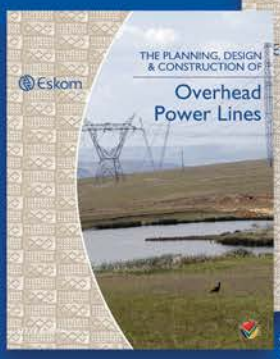
The Eskom Power Series was conceived in response to the continuing worldwide loss of critical technical skills and experience. The aim of the series is to promote international best practice, including experience acrued by Eskom over the years, as a guide and legacy and to serve as a source of reliable,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



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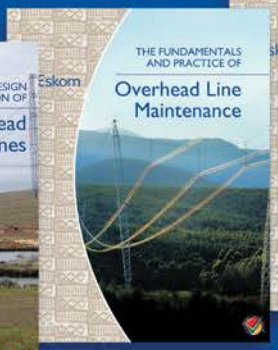

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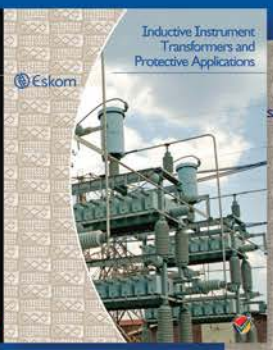

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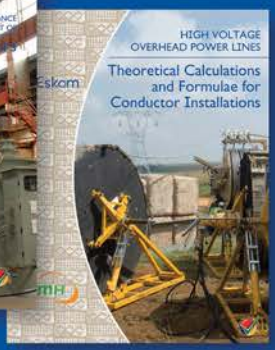

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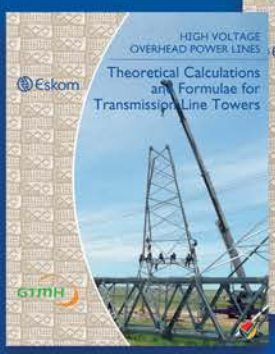

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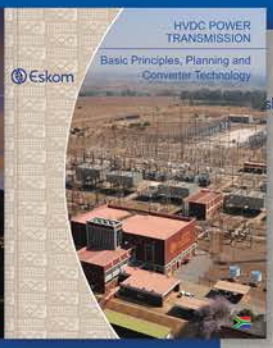

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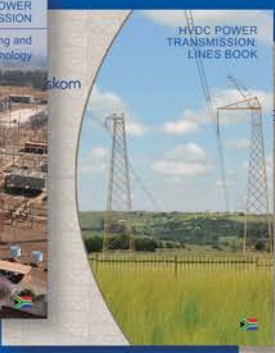

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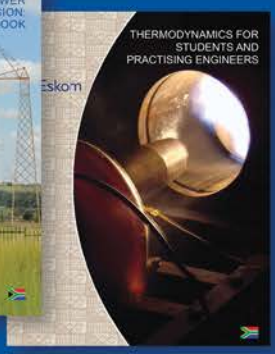

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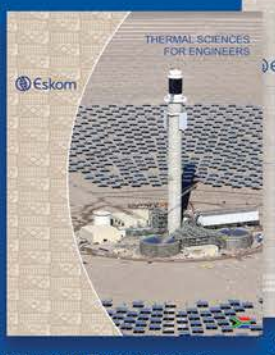

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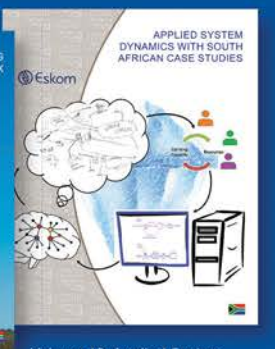

Volume 13: Applied System Dynamics with South African Case Studies

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.

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