

FEATURES:

- Industry 4.0 + IIoT
- Energy management + the industrial environment
- Measurement + instrumentation
- Safety of plant, equipment + people

04/2023

ELECTRICITY + CONTROL

VEGA

One radar sensor for all applications

CROWN
PUBLICATIONS

Netilion, IIoT Ecosystem

From sensors to digital services



Key facts

- Netilion, Endress+Hauser's IIoT Ecosystem allows intelligent and networked applications to be realized around the Industrial Internet of Things
- We currently have four Netilion Services available with Analytics, Health, Library and Value as well as two Netilion Smart Systems with Surface Water and Aquaculture
- Data security is ensured by using the most modern standards and through audition by independent third-party certification bodies

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With the new VEGAPULS 6X, VEGA has turned the usual complexity of choosing the right radar sensor for different applications into a simple process.

(Read more on page 3.)

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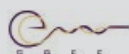
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How crucial – and costly – electricity is in our lives

Heads up! As you read this be aware that we are a third of the way through the year. Just like that!

Perhaps one glimmer of light is that now we have some certainty about a new cabinet in South Africa – and the announcement of our Minister of Electricity. Clearly the role seems to be one beyond a project management role; and without question a very, very difficult one.

We need to reflect now and again on how crucial electricity is to our lives – our economy, our manufacturing industry, communications, security, road safety, medicine, railways, water distribution – and so on. A humbling responsibility – and we face an almost insurmountable mountain to climb. But climb it we must – for years to come I fear, not for tens of months ...

Listening to an interview with the new minister, I felt he was at pains to try and explain the predicament in an accessible way – using the analogy of a car that was incapable of accelerating up to full speed. If I were to add one piece of advice it would be to include the condition of the road into the analogy. If the road (our transmission network) is not attended to, the car's top speed may nevertheless be constrained – no matter how much we recondition and maintain old plant or add new generation capacity to the grid.

This leads me to some of the features in this month's issue, which include, alongside energy management, safety of plant, equipment and people, as well as industry 4.0 and IIoT.

All industrial/operational systems require electrical energy to operate safely – even if supported by some kind of backup. In my memory, backup energy systems (like generators) were often only built into the system to ensure safety of people and the plant.

Buildings with lifts, or water pumping systems (in case of a fire, for instance, or just to keep the top floors or critical areas supplied), or even large data centres, used to have those big UPS systems and generators. Those generators would chug into action on rare occasions when a substation tripped, or power dropped for whatever reason.

And we had to test the systems – to be sure they would start! We had to be sure that batteries were in good condition – and so on.

Now, these systems kick into action many times a day – and it is beginning to feel normal.

Of course, it should be anything but normal – but so it is.

When we kit out our modern plants nowadays, we need to be mindful of exactly how we can run systems through the loadshedding (unless you are among those in the fortunate position where you are excused that ... don't tell us if you are) and we need to be sure that the backup systems are consistently maintained, and the energy system is being monitored and measured – along with all the other process variables.

Energy, now, is one of the most expensive ingredients that is essential to the products we produce.

We need to use it wisely.

Ian

Ian Jandrell



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

Farewell to an industry icon

Our industry is made up of many companies and organisations. Behind each of these success stories are the people who make up our industry, and it is sad when the time comes to bid one of them farewell.

It was therefore with great sadness that we heard that the founder and chairman of CCG Cable Terminations, Mr Franz Lackinger, had passed away. If you pick up the earliest copies of *Electricity+Control* (back then, *Electricity SA*) you will see his company – in each issue.

Franz was also a willing author, often sharing his expertise with readers through the medium

of a feature article. His articles were always informative and interesting – showing not only his knowledge, but his love for the industry and his willingness to share that knowledge.

He was respected for his expertise in manufacturing, marketing, electrical engineering, and hazardous areas, and was a founder and lifelong honorary member of the South African Flameproof Association. In addition, he served on numerous standards committees as an industry expert. All of us at *Electricity+Control* extend our sincerest condolences to his family, his staff, and his friends. He was a true icon of our industry and will be sorely missed.

FEATURES

INDUSTRY 4.0 + IIOT

- 4 Semiconductor photonics: more data, more quickly
IDTechEx
- 5 Products + services

ENERGY MANAGEMENT + THE INDUSTRIAL ENVIRONMENT

- 8 Investments in renewables need more equitable distribution
The International Renewable Energy Association (IRENA)
- 9 Challenges and opportunities in the power utilities sector
Godfrey Marema, Eaton South Africa
- 10 Accelerating the mission to net zero
Graham Abrahams, ABB South Africa
- 12 Excess heat – the world's largest untapped source of energy
Danfoss
- 14 Products + services

MEASUREMENT + INSTRUMENTATION

- 18 The basics of earth grounding systems – and the importance of testing
Comtest
- 20 The benefits of simple pressure reducing valves
Peter Telle, Ultra Control Valves
- 21 Products + services

SAFETY OF PLANT, EQUIPMENT + PEOPLE

- 22 The advantages of networking safety
Omron Industrial Automation
- 24 Sourcing the right adapters and reducers
Leigh Darroll, Electricity + Control
- 25 Products + services

REGULARS

- 1 Comment
How crucial – and costly – electricity is in our lives
- 3 Cover article
6X: VEGA's simple radar formula for better processes
- 29 Engineering the future
Manufacturing clean energy technologies
- 30 SAIEE Awards 2022
Celebrating excellence in electrical engineering
- 32 Write @ the back
Balancing climate transition with energy security



6X: VEGA's simple radar formula for better processes

How do you optimise a level sensor that already has everything: the best focusing, highest accuracy, simple operation, universal communication? What sounds like an obvious question has led VEGA to create much more than an even better sensor. When using the new VEGAPULS 6X, it's not just the sensor that counts, but what can be achieved with it in the application: Simply better processes.

Traditionally, the search for a suitable radar sensor begins with the question: which frequency would work best for this particular application? 26 GHz, 80 GHz? Or perhaps 6 GHz would be better? This is followed by thoughts about the properties of the media and how it could influence the measurement, as well as the specific installation environment. The temperature range or the presence of aggressive chemicals may give cause for concern. Will a standard process fitting be sufficient, or would special materials that meet the highest requirements be the right choice, if only because the user is not completely sure and wants to be on the safe side? And what else should be considered if the sensor is to measure great distances or be exposed to wind and weather all year round?

These and countless other questions make one thing clear: with such a wide range of options, the buyer has to make the right choice. Customers have to choose from the large variety of radar sensors currently on offer. Because the areas of application are becoming more multi-faceted and processes more complex, the buyer needs a good understanding and overview of what is available. It takes the right know-how, experience and time to avoid making costly bad investments and get a reliable measuring system.

A new certainty: 'One for everything'

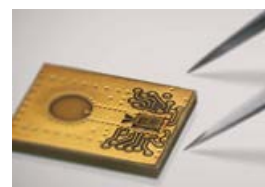
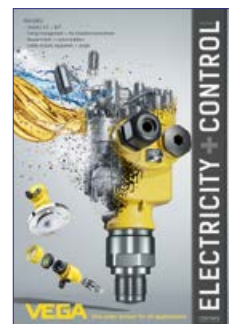
Until now, choosing an instrument was usually a laborious process and often involved a lot of questions and product research. VEGA is now turning this process inside out with its new VEGAPULS 6X. "Ultimately, it's not the sensor that counts, but what users can achieve with it in their individual applications," says Florian Burgert, one of the product managers who has been closely involved in the development from the beginning. "Just knowing that they've chosen the best possible instrument solution, and that they'll reach their goal faster with it, makes a big difference in their everyday operations."

VEGA now offers one sensor for all applications: VEGAPULS 6X. Selecting the right frequency or determining the DK value of the medium are no longer obstacles, because choosing the right sensor specifications has become much easier. The new configurator asks for the type of application and quickly determines which sensor version is required. The procedure now entails just a few mouse clicks. Of course, an advisory discussion with a VEGA radar specialist

is still a good alternative to the configurator. In any case, users gain unprecedented simplicity and a measurement solution that delivers perfect results independently of the media properties, process conditions, vessel shapes and internal installations.

Radar made for people

With VEGAPULS 6X, VEGA has rounded out its radar measurement technology with four important innovations: more safety and self-diagnosis, new radar chip technology, new application possibilities and simpler adjustment. "Furthermore," says Jürgen Skowaisa with emphasis, "our technology has reached such a high level today that reliable function is no longer the issue. The only risk is choosing the wrong sensor." In its new approach with VEGAPULS 6X, VEGA now provides the tools to get the right sensor version for the application in 99% of cases, and experienced application engineers are on standby to help with the special, more difficult applications. "In future, the user will no longer have to worry about the technology, frequency or instrument version – the measurement will simply work." □



VEGA has developed the VEGAPULS 6X to simplify sensor selection and meet the multifaceted needs of almost all applications.

For more information contact VEGA.

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Email: info.za@vega.com

Visit: www.vega.com

Semiconductor photonics: more data, more quickly

As high-performance computing, artificial intelligence, machine learning algorithms and other technologies become increasingly data-hungry, hardware cannot always keep pace. In addition, the need for real-time assessments of moving data points – such as for accurate velocity-mapping of other objects in autonomous systems and facial recognition for security systems – is crucial to an increasingly hands-free society. UK-based research firm IDTechEx recently released a report titled: Semiconductor Photonic Integrated Circuits 2023-2033, which looks at the possibilities presented by developments in this field.

IDTechEx suggests that, generally speaking, the promise of semiconductor photonics can be summarised in just four words: more data, more quickly.

Photonic integrated circuits compared to electrical systems

Discussion around the effectiveness and applicability of photonic integrated circuits must be contextualised by comparing the system to its electrical-only counterpart, electrical integrated circuits. Most semiconductor chips today are entirely electrical; they are compact packages (most are measured in square millimetres) consisting of billions of transistors ('on or off' switches) that can be used to store and process data, and electricity is used to operate them. A photonic integrated circuit (PIC) uses light (photons being the quanta of light) to transmit data, although it will likely also include some electrical components, such as a laser diode source that is electrically pumped and emits photons as a result.

Although the architecture of a PIC is slightly different to that of an electrical IC, PICs can and have been created by leveraging the same manufacturing processes as used for the more mature electrical IC industry. Just as silica and similar materials act as effective dielectric insulators between the copper traces in electrical ICs, they can also confine and 'guide' light, in fibre or waveguide configurations. By virtue of



Potential markets for photonic integrated circuits.

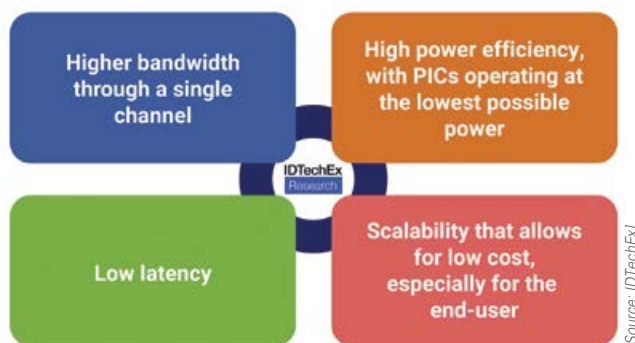
[Source: IDTechEx]

their physical properties, photons do not experience resistance in the same way that electrons do. Rather, photons can be lost via material absorption, scattering, or other effects, which can be mitigated by a careful choice of materials. When injection and propagation losses are suitably mitigated, photonic systems can enable long-distance communications of substantial amounts of data, where sending data via electrical means is unwieldy due to the resistance in the conductive material. The use of light to transmit and receive data has enabled a revolution in the communications industry, one of the main industries continuing to develop products to enable higher data transmission rates.

Light at the frontier of data

One of the ways in which photonic systems are being developed in the communications industry is to address the input/output (I/O) bottleneck. This is where data is unable to be moved into or out of a chip/chiplet at the same or a faster rate than the rate at which processing occurs. Thus, a backlog is created in the data stream, where processing/storage conducted in other chips/chiplets is stalled while they await the data. This is a significant problem for systems that deal with large amounts of potentially unstructured data, but require low latency to function, such as neural-language programming algorithms. Several companies are working on optical I/O solutions that reduce latency, allow for high bandwidth, and keep power expenditure at a minimum.

The IDTechEx report covers the global PIC market across six different application sectors, providing a 10-year



Four key market drivers for PIC development. These derive from growing data demands across multiple market segments and applications, such as communications and networking, AI/ML algorithm runs, and HPC.

[Source: IDTechEx]

forecast for each, up to and including 2033, in terms of the potential market value of PIC systems. The principal focus of the report is the communications industry, given the maturity of PICs within this industry compared to the other industries reviewed where PIC deployment is relatively newly emerging.

Additionally, the report covers evaluations of materials used in PIC design and manufacture, the developments being undertaken by large companies and start-ups to improve on key metrics such as performance and cost in respect of systems and architecture, as well as a review of

the product offerings from key market players.

Although the importance of photonic circuitry at the chip-scale is already evident in the communications industry, there are questions around the ease and cost of adoption of PICs for other markets, compared to established technologies. The IDTechEx report answers the major questions and addresses the challenges and opportunities presented by photonic integrated circuit technologies. □

For more information visit: www.IDTechEx.com/SemiPIC

INDUSTRY 4.0 + IIOT : PRODUCTS + SERVICES

Collaboration and integration facilitate system design

The Eplan Partner Network was founded just more than two years ago and around 60 companies have since joined it. The network brings together strategic partners such as Phoenix Contact, Siemens and Rockwell Automation, and technology partners – including, for example, ABB, Lapp Kabel, Wago and Weidmüller – under one guiding principle: to provide the highest degree of integration capability with Eplan for their solutions.

In the era of digital transformation, companies are combining forces to enable various software applications to communicate easily with each other. They rely on different software applications from different manufacturers. The Eplan Partner Network was created to open up the full potential of productive interactions between the various solutions in the environment of product configurators, CPQ (configuration, pricing and quotations), PLC (programmable logic controllers) and PLM/ERP (product life-cycle management/enterprise resource planning). Eplan has set targets for the network to further develop their integration and create a solid basis for the manufacturers.

Customers benefit from the tested quality of the software, ongoing developments and a systematic increase in advantages for their own workflows. Open interfaces and deep integration offer a wide range of opportunities to implement digital transformation in real-world installations.

Integration is key

The Eplan Partner Network is a global framework organisation which includes: strategic partners, technology partners, solutions partners and research partners. By way of joint development of integrations, supported by inherent quality assurance and open interfaces, users derive valuable benefits from the applications.

International expansion

In addition to the strategic partners, technology partners make up the most comprehensive area in the Eplan Partner Network, with 38 companies from this sector. Digital Ecosystem Manager Luca Cavalli at ABB, says, “Eplan plays an important role in the growing network of electrical systems designers. A clear example is the



The Eplan Partner Network supports open interactions between the various players to streamline design of digital automation solutions.

seamless integration between ABB's digital e-Configure platform and the Eplan Data Portal, which streamlines the design process for users. With the introduction of sustainable energy systems and smart industry upgrades, ABB is committed to supporting professionals in managing these changes. The integration of engineering tools and configuration tools ensures time savings and high-quality data for users.”

Sandra Huang of Digiwin, another technology partner, says, “The interface between Digiwin PLM and Eplan helps engineers to focus fully on their project planning. All relevant information including bills of materials, parts data and project data are automatically synchronised between the Eplan Platform and Digiwin PLM. Users benefit from consistent and up-to-date data throughout the project life cycle.”

Among the solutions partners there are numerous well-known automation companies, systems integrators, data management and programming companies, technology vendors and accessories fabricators, together providing the wide range of solutions used in the Eplan environment.

With regard to research partnerships, a cooperation agreement was recently signed with TH Lübeck University, expanding the circle of existing research partners: the European 4.0 Transformation Centre (E4TC) and the Institute for Control Engineering of Machine Tools and Manufacturing Units (ISW) of the University of Stuttgart.

For more information visit:
www.eplan-software.com/partner/



Andrew Cruise,
Managing Director of
VMware Cloud provider
Routed.

Managing evolving cloud complexity

As the cloud landscape grows and sprawls, it's becoming increasingly complex for users to keep up with all the moving parts, processes, and new developments. The cloud 'ecosystem', as it is called, refers to all these multiple building blocks that make up a cloud operating model, encompassing people, processes, and technology, from vendors to service providers and end users. And the cloud ecosystem is constantly evolving.

Andrew Cruise, Managing Director of Routed, a local cloud platform provider and VMware specialist, anticipates that one of the trends he sees maturing in this process will make the environment less complex for end users. "Historically, vendors approached the market in a siloed fashion. As complexity has increased, and options have become much more varied for partners and end users, vendors have started integrating their products more. This approach is now maturing quite rapidly," he says.

In short, vendors are "learning to play nicely together", because the market is forcing them to do so. "Previously, vendors had a lot more power. Now, there's more choice, and vendors are having to up their game. Microsoft is a good example. Historically, the company would not go near an operating system that wasn't Microsoft Windows, but it has now developed a version of Microsoft SQL Server for Linux. And this is happening across the market, with big and small vendors," says Cruise.

"Other similar examples include VMware, traditionally an on-premises hypervisor software, branching out into a more multi-cloud approach. Or Veeam, traditionally on-premises backup software, branching out into cloud-

based backup and using the cloud. All players are casting the net a bit wider."

As in any ecosystem, some organisms evolve more slowly than others. Cruise says customers should think carefully about how whatever piece of hardware or software is being sold to them fits into the bigger picture. "While vendors should be working together, and most are, customers should be wary of resellers who are not telling the ecosystem story. It could mean getting stuck in a silo, restricted by, or locked in with one vendor, if the customer doesn't consider how that vendor's products fit into the cloud ecosystem. Before buying into anything, it's important to look at how the solutions you choose integrate with others and fit into the bigger picture, and to feel confident that the vendors you are working with are talking to each other."

Cruise says customers gain the added benefit of more skill sharing and a higher level of expertise in this evolving environment. "In South Africa, as in many other countries, we are seeing a skills drain – experts in the field are moving to international territories or companies because they can offer more competitive packages. But, in this case, it means customers and partners are in good hands when looking to resellers, service providers and vendors for support. Major vendors are snapping up the best people and centralising the expertise – and this can be beneficial for all the stakeholders in the ecosystem. Whether the provider is VMware, Veeam, or Routed, customers can feel confident that these vendors are talking to each other, and to their partners and providers."

For more information contact Routed.
Visit: www.routed.co.za

Local support for electronics design

TRX Electronics, the authorised independent representative in South Africa for Mouser Electronics, Inc. highlights some of the latest products available for local delivery.

Molex Quad-Row Board-to-Board Connectors are suitable for use in smartphones, wearable devices, AR/VR and IoT devices, drones, and unmanned vehicles. The Quad-Row connectors offer a pitch of 0.175 mm, a 3 A current rating, and a compact design for space-constrained applications. The connectors feature an armoured and insert-moulded nail design that provides robustness and protection to the interior cover. They have an LCP UL 94 V-0 housing, copper alloy contacts, and an operating temperature range of -40°C to +85°C. Molex Quad-Row Board-to-Board Connectors are reliable and easy to operate.

Also available are the TJA115x Secure CAN Transceivers from NXP Semiconductors, which provide a seamless and cost-effective solution to secure classical CAN and CAN FD communication without cryptography.

The TJA115x belongs to a generation of automotive high-speed CAN/CAN FD trans-

ceivers, offering security functions. It interfaces a classical CAN or CAN FD protocol controller and the physical two-wire CAN bus.

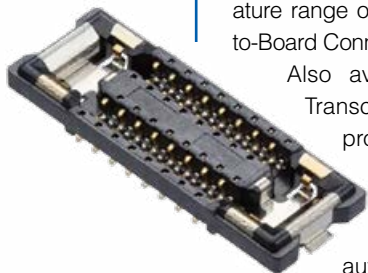
STMicroelectronics' STEVAL-PLC001V1 Industrial PLC Evaluation Board is designed for compact programmable logic controller (PLC) applications. The board features a powerful human-machine interface (HMI). A 3.5" TFT touchscreen is mounted on the PCB, which makes for easy interaction. The board implements a galvanically isolated PLC control unit with robust digital input, digital output modules, expansion connectivity options, and interfaces.

Mouser is one of the largest global distributors of semiconductors and electronic components. It specialises in supplying prototyping quantities, where no minimum order quantities apply, to support electronics engineering design and new product development.

In South Africa, electronic components from Mouser Electronics can be purchased through TRX Electronics, for delivery to South Africa, and customers benefit too from dedicated service and local support.

For more information contact TRX Electronics.
Email: info@trxe.com, visit: www.trxe.com

The Molex
Quad-Row
Board-to-Board
Connector is just
2 mm wide.



Analytics, connected devices, the edge and cloud

George Senzere, Solutions Architect: Secure Power at Schneider Electric, says in today's industrial environment, analytics is the golden thread that runs through multiple industry sectors, from consumer packaged goods to mining, minerals and metals, and more. He highlights that it provides value on an executive and plant level, bridging challenges that come with siloed information, and it benefits the value chain from maintenance personnel to facility engineers and executives.

Analytics spans timeframes from milliseconds to months – tracking and supporting a facility's resilience and efficiency. However, to unlock this value, analytics and intelligence need to run at every layer of the enterprise, from connected devices to edge applications, to the cloud.

With regard to connected devices, IIoT with the right analytics can provide the insights required to enable employees to:

- Understand how their actions and decisions impact overall profitability in real time
- Shift from a reactive to a more productive, proactive approach to addressing and, over time, preventing issues
- Establish benchmarks with easy access to operational trends and identification of process anomalies.

Data sharing and connectivity (to all process devices in the plant) are essential cogs in a machine that will deliver intelligent solutions – and generate rapid payback, support, and adaptable and scalable operations.

Edge computing is another important element. It brings information closer to plant personnel and managers. And analytics is key to gaining the most from edge computing: with its ability to analyse information seamlessly and with insight, it provides for the value accessed through edge computing to be unlocked.

The operational edge is the critical point where tra-



Across multiple industry sectors, analytics is key to extracting value from IIoT data.

ditionally siloed IT and OT systems converge to enable connected operations. The edge serves as the connection point that preserves the autonomy of local operations while unlocking the cloud and remote capabilities.

A successful edge infrastructure will support remote, connected, secure, reliable, resilient, and sustainable operations. It needs to be scaled to enable an organisation to harness its full potential. This points to the next important enabler of analytics: cloud computing.

Cloud connectivity is taking place across the operations technology landscape, just as it is in IT. The cloud facilitates the flow and connectivity of critical process and operational information to decision makers.

Importantly, the cloud securely stores and manages huge volumes of data which analytics services can convert into real-time usable information for quick decision making. Using the cloud, remote teams and service providers gain access to critical equipment performance and process data.

Overall, connected devices, the edge, the cloud and analytics feed into each other – creating, in effect, a symbiotic relationship that should be seen as essential to efficient industrial operations today, Senzere says.

For more information visit: www.se.com

Versatile converters for IO-Link networks

Data conversion just got easier. New converters from Turck Banner are compact, simple add-ons that fit seamlessly into factory applications, take various types of signals such as discrete, analogue and others and convert them to protocols like IO-link, PICK-IQ, PWM/PFM, and Modbus.

The new R45C Dual Analog IO-Link Converter enables communication between IO-Link devices and two pieces of equipment that rely on analogue signals – as it can take in two analogue inputs and drive two analogue outputs on the IO-Link communication channel.

The R45C can also be configured to mirror a signal from one port to the other and drive a PFM output via an extra pin on the IO-Link port. This allows for existing devices to be retrofitted with lighting indicators for visual

factory indication without disrupting the PLC.

The R45C Dual Analog IO-Link Converter is quick to set up, with minimal configuration, connects in-line easily with 4-pin M12 quick-disconnect connectors, and the over-moulded housing meets IP65, IP67, and IP68 standards for use in harsh and rugged environments.

The converters represent another step towards full system integration.

For more information contact Turck Banner.

Tel: +27 (0)11 453 2468

Email: sales@ruckbanner.co.za

Visit: www.turckbanner.co.za



The R45C Dual Analog IO-Link Converter enables communication between IO-Link devices and other equipment that relies on analogue signals.

Investments in renewables need more equitable distribution

The recently released report titled Global Landscape of Renewable Energy Finance 2023, reveals that global investment in energy transition technologies last year – including energy efficiency – reached USD 1.3 trillion. It set a new record-high, up 19% from 2021 investment levels, and 50% from before the pandemic in 2019.

The report, prepared jointly by the International Renewable Energy Agency (IRENA) and Climate Policy Initiative (CPI), was launched on the sidelines of the Spanish International Conference on Renewable Energy held towards the end of February in Madrid. The report also notes that, although global investment in renewable energy reached a record high of USD 0.5 trillion in 2022, this still represents less than 40% of the average investment needed each year between 2021 and 2030, according to IRENA's 1.5°C Scenario. Investments are not on track either to achieve the goals set by the 2030 Agenda for Sustainable Development.

As decentralised solutions are essential to closing the access gap – to reach universal energy access and to improve livelihoods and welfare in terms of the 2030 Agenda – investments need to be scaled up in the off-grid renewables sector.

Furthermore, investments have become concentrated in specific technologies and uses. In 2020, solar photovoltaic systems attracted 43% of the total investment in renewables, followed by onshore and offshore wind at 35% and 12% shares, respectively. Based on preliminary figures, this concentration seems to have continued through 2022. The report suggests that to best support the energy transition, more funds need to flow to less mature technologies as well as to other sectors beyond electricity, such as heating, cooling, and system integration.

Comparing renewables financing across countries and regions, the report shows that disparities have increased significantly over the past six years. About 70% of the world's population, living mostly in developing and emerging countries, received only 15% of global investments in 2020. Sub-Saharan Africa, for example, received less than 1.5% of the amount invested globally between 2000 and 2020. In 2021, investment per capita in Europe was 127 times that in sub-Saharan Africa, and 179 times more in North America.

The report emphasises how lending to developing countries looking to deploy renewables should be reformed and highlights the need for public financing to play a much stronger role, beyond mitigating investment risks. Recognising the limited public funds available in the developing world, the report calls for stronger international collaboration, including a substantial increase in financial flows from the Global North to the Global South.

Director-General of IRENA, Francesco La Camera commented, saying, "For the energy transition to improve lives and livelihoods, governments and development partners need to ensure a more equitable flow of finance, recognising different contexts and needs. This joint report underscores the need to direct public funds to regions and countries that have a lot of untapped renewables potential but find it difficult to attract investment. International cooperation should aim at directing these funds to enabling policy frameworks, the development of energy transition infrastructure, and to address persistent socio-economic gaps."

Achieving an energy transition in line with the 1.5°C Scenario also requires the redirection of USD 0.7 trillion per year from fossil fuels to energy-transition-related technologies. However, following a brief decline in 2020 due to the pandemic, fossil fuel investments are again on the rise.

In addition, the fossil fuel industry continues to benefit from subsidies, which doubled in 2021 across 51 countries. It is suggested that the phasing out of investments in fossil fuel assets should be coupled with the elimination of subsidies, to level the playing field with renewables.

This third edition of the biannual joint report compiled by IRENA and CPI looks at the period 2013 to 2020 and provides preliminary insights and figures for 2021 and 2022. □



Although investment in renewable energies continues to increase annually, there are disparities between developed and developing countries.

For more information visit: www.irena.org

Challenges and opportunities in the power utilities sector



Godfrey Marema,
Managing Director at
Eaton South Africa.

As the pressure to resolve the current crisis of heavy loadshedding in South Africa – and at the same time to reduce carbon emissions – continues to intensify, 2023 will be a pivotal year in the power utilities sector. Godfrey Marema, Plant Manager and Managing Director at Eaton South Africa, explores some of the challenges and opportunities in the country's energy industry.

At turbulent 2022 will live long in the memory for those of us who work in the power utilities sector. Loadshedding dominated local headlines – and urged greater momentum in the drive to bring more renewables into the system.

The energy transition has been high on the agenda for some time and we expect the move towards new patterns of energy generation will increase in 2023. Challenges and opportunities abound, and these are the trends that I believe will shape the year ahead.

Decentralisation of energy supply

Eskom has already warned South Africans that 2023 is set to bring intensified loadshedding as more of the national network suffers breakdowns and the utility struggles to bring new plants fully online due to construction delays, severe disruptions and design flaws.

Pressure will be on government to deregulate the energy sector further and allow for more private producers, including consumers themselves. Those traditionally described as 'behind the meter' – the households, businesses and industries that consume energy – are increasingly stepping 'in front of the meter' to generate some of their own energy from assets such as solar panels, as well as manage their own supply and demand with energy storage systems.

Referred to as prosumers, because they produce and consume energy, their increasing involvement in energy markets is recognised as the likely way forward in an energy sector that needs to move away from its heavy dependence on fossil fuels in order to mitigate climate change.

For national economies, domestically generated energy, even in small packets, reduces reliance on imports and thus boosts energy security too.

The benefits are evident, but decentralisation presents challenges to the utilities sector, primarily in terms of how to balance the variable energy inflow from prosumers and commercial renewables while maintaining steady supply, particularly at times of peak demand on the grid. What is not in doubt is that decentralisation will be a growing trend in 2023, locally and abroad.

Digitalisation

A subsidiary of S&P Global Market Intelligence – 451 Research – concluded from international research that the utility sector is at a critical transition point. It is challenged with keeping existing grid and service levels in place, despite increasing demands and

ageing legacy infrastructure, and simultaneously faces the need to change service models and apply data insights to optimise operations.

Digital technologies that increase and optimise available energy will support the acceleration of new additions to South Africa's energy mix. Energy storage opportunities will grow significantly, in line with these developments.

Digitalisation can be seen by utilities either as a key to success, or as a competitor to what they regard as more pressing challenges. The pressure to choose will be greater than ever in 2023 and beyond.

Green energy is still the key solution

The abundance of natural renewable energy sources in South Africa presents enormous untapped potential. For large South African companies in industries like mining and heavy industry, generating their own power from renewable sources such as solar and wind energy is about more than reducing carbon emissions and protecting the environment. These new sources are critical in managing fast-rising electricity costs, as well as ensuring stability of supply while the state utility, Eskom, repairs its ageing and ailing infrastructure. Alternative power sources, like green hydrogen, will also receive greater attention as continuing research unlocks the resource of water and seeks to optimise the process of electrolysis.

Ending the use of SF6 switchgear

While the intended move away from coal-fired power generation is positive, the choice of materials used in electrical systems for new power stations must also be considered. The European Union and other European countries, including the UK, are set to ban the use of global warming SF6 (sulphur hexafluoride) gas in medium voltage switchgear from the mid-2020s. In South Africa, large data centres, some utilities and other facilities have already implemented SF6-free switchgear, although the gas is still widely used in electrical switchgear as it provides high voltage insulation. SF6-free medium voltage switchgear technology is widely available in South Africa in the range up to 24 kV. Going forward, this makes the decision to move to SF6-free switchgear easier, and will support a more sustainable future – for the benefit of us all. □

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

Accelerating the mission to net zero

Graham Abrahams, Senior Vice President, Electrification Products Division, ABB South Africa

Achieving net zero emissions by 2050 will require a complete transformation of the energy landscape. The world wants an energy revolution, a quick transition to a smarter, brighter, more sustainable future. At ABB we understand the urgency of this need, but we also know the transition cannot happen overnight.

Real progress will take a balanced approach with a journey mindset: strategic investments scaled over time to reduce carbon emissions, energy waste and cost. In the transition, businesses and organisations need partners that enable the pathway with efficient ROI, today and in the future; partners that offer real solutions and are willing to invest in innovation for our low carbon future.

ABB works as a partner with organisations, enabling safe, smart and sustainable investment to create a low carbon future. Combining the capabilities of its integrated automation, electrification and digitalisation solutions, it helps customers meet their commitments and maximise the value of their operational investments, and at the same time reduce carbon emissions, waste and costs through the energy transition journey.

Like ABB, our customers want to contribute to a low carbon society. This requires a willingness to relinquish our collective dependency on the forms of energy that result in the slow poisoning of the planet.

As we see it, there are five key steps to achieving carbon neutrality.

- Firstly, to deploy digital solutions for smart green buildings and energy management, such as monitoring, control and optimisation, which is the core of ABB's Mission to Zero offering
- Next, to increase energy efficiency by using building management systems and, for example, installing new, highly efficient motors and drives
- Maximising electrification is also important, using heat pumps and establishing a charging infrastructure for electric vehicles, for example
- The installation of energy management solutions for photovoltaic technology and wind turbines, battery energy storage systems and thermal energy storage
- And fifthly, procuring renewable energy from the grid and offsetting remaining emissions.

In summary, the 'smartification, digitalisation and electrification of everything', coupled with energy efficiency and renewable electricity, is proving to be the solution to eliminating most carbon emissions. Nonetheless, some hurdles still exist.

With regard to technology, excessive consumption of electricity resulting from the use of inefficient equipment (for example, legacy HVAC systems, drives, pumps, or such-like) or simply due to poor asset or occupancy management, can cause significant energy wastage. This presents the potential for the use of smart building energy management systems, coupled with more efficient variable speed drives, purpose built and configured for the application.

Moreover, the electrification of heating in buildings with inadequate insulation can be inefficient. This creates a need for carbon-free high-temperature heating from bio-oil, biogas or hydrogen, for example. However, few building owners can afford deep energy efficiency retrofits – and this is creating a need for OPEX-based financing models like leasing or X-as-a-service. Building owners are looking for direct, integrated end-to-end solutions and this led ABB to develop its Mission to Zero offering.

Products and solutions

In terms of what we describe as our 'Technology Blueprint', a typical smart building – or industrial facility – will use interconnected technologies to improve comfort and performance across energy management, water use, air conditioning, access, automation, lighting, remote monitoring, and communication networks.

With the ABB Ability Building Ecosystem, building operators and facility managers can have digital control of all these elements, to create smart buildings that are more environmentally friendly – contributing to reducing carbon emissions through efficiency gains in heating and cooling equipment, for example, and in the running of the building.

ABB digital solutions enable constant surveillance and control of energy production, consumption and storage. Largely autonomous, this learning system calculates the optimum energy flow based on predictive data and compensates for deviations in real time. In a Mission to Zero site, these technologies are combined for a holistic approach that can be scaled according to the requirements of the facility.

The digitalisation of buildings and facilities through connected technologies and building automation also has a key role to play in helping to manage grid resilience and



Industrial facilities are a key part of ABB's 'Mission to Zero'.

reliability as well as in reducing energy costs and increasing energy efficiency. It is an important step towards the energy transition, as it enables the building to provide value-adding services to support the modern energy grid and potentially, the shift from 'consumer' to 'prosumer' – facilitating concepts such as virtual power plants and maximising the value of distributed energy resources (photovoltaic systems, energy storage batteries) on a broader scale.

Within that context, ABB Ability™ Energy and Asset Manager for monitoring, optimisation and predictive maintenance using big data and artificial intelligence, also plays a role.

The typical scope for a Mission to Zero project includes the following solutions:

- Distributed energy resources, such as on-site photovoltaic technology, EV chargers, energy storage, motors and drives, power supply and protection, as well as digital solutions for energy management, including monitoring, control and multipurpose optimisation
- Building automation and HVAC controls, such as digital integration platforms, building automation and control, HVAC control and optimisation, space management and wellness and productivity, lighting and shading control and presence detection.

Although it is driven from ABB's Electrification Business Area,

Mission to Zero spans the whole organisation and many products and solution sets, combined with third-party technology through our partnership ecosystem.

These include: Building control and automation; Metering, monitoring and optimisation of electrical power and energy flows; Power distribution equipment/low voltage switchgear; EV charging systems for fast (dc) and slow (ac) charging applications; Efficient electric motors and variable speed drives; Battery energy storage systems (BESS) to optimise use of embedded generation; and photovoltaic energy generation systems provided by our partners.

ABB is working towards enabling a low-carbon society, working with customers and suppliers to implement sustainable practices across its value chain and the lifecycle of its products and solutions. The company is equally committed to driving social progress, together with its suppliers and the communities with which it interacts. Aiming to reduce emissions and achieve carbon neutrality in its own operations, ABB's greenhouse gas emissions reduction targets have been validated by the Science Based Targets initiative as being in line with the 1.5°C scenario of the Paris Agreement. □

For more information visit:

new.abb.com/process-automation/energy-industries/

ENERGY MANAGEMENT + THE INDUSTRIAL ENVIRONMENT : PRODUCTS + SERVICES

Another 260 MW of renewable energy for Secunda site

Air Liquide and Sasol have signed a new set of Power Purchase Agreements (PPAs) – with TotalEnergies and its partner Mulilo – for the long-term supply of 260 MW of renewable power to Sasol's Secunda site in South Africa, where Air Liquide operates the biggest oxygen production site in the world. This is the second set of PPAs signed by Air Liquide and Sasol, after the PPAs signed with Enel Green Power, as announced in January, for the supply of 220 MW of renewable energy. Together, the PPAs represent a total of 480 MW of the joint commitment by Air Liquide and Sasol to pursue the procurement of a total capacity of 900 MW of renewable energy. This will contribute significantly to the decarbonisation of the Secunda site.

Within the framework of these agreements with Air Liquide and Sasol, TotalEnergies and Mulilo will create one locally majority owned wind project with a capacity of 140 MW and one locally majority owned solar project with a capacity of 120 MW. The projects are scheduled to be operational in 2025. The PPAs are subject to regulatory and financial approvals.

Ronnie Chalmers, Vice President and Executive Committee Member of the Air Liquide Group, in charge of Africa Middle East & India, said: "As well as contributing to the decarbonisation of our operations at Secunda this additional renewable energy capacity will support the development of renewable energies in South Africa, for the benefit of the South African electrical power system

and, in turn, South African society. In line with Air Liquide's ADVANCE strategic plan, which includes reducing its absolute CO₂ emissions by 33% by 2035, the PPAs also demonstrate the group's capacity to collaborate with its customers to provide solutions which contribute to the decarbonisation of its assets as well as those of its clients."

In April 2021, Air Liquide and Sasol launched a joint initiative to procure a total of 900 MW of renewable energy for their operations in Secunda, with an allocation of 500 MW to Sasol and 400 MW to Air Liquide. The two companies are negotiating additional PPAs to complete the balance of the renewable energy requested.

Air Liquide acquired Sasol's 16 oxygen production units in Secunda and has been operating them since June 2021, in the framework of a long-term supply contract with its long-term partner. Including another Air Separation Unit (ASU) it already operated for Sasol, Air Liquide now operates 17 ASUs in Secunda, with a total capacity of 47 000 tons per day of oxygen. Air Liquide plans to reduce the CO₂ emissions (Scope 2) arising from its operations on the Secunda site by 30% to 40% through a multi-year investment and modernisation plan and a steep increase in the procurement of renewable energies for the site.

For more information visit:

www.airliquide.com or www.sasol.com



Air Liquide and Sasol have signed further long-term contracts to source another 260 MW of wind and solar energy for the Secunda site.

Excess heat – the world's largest untapped source of energy

A new white paper from Danfoss, the Danish family-controlled engineering group, highlights the vast untapped potential of excess heat as a source of energy. Using innovative technologies to harness this wasted energy could save energy costs in the EU significantly – and offer a route for new energy generation in sub-Saharan Africa, and other regions, to catalyse substantial economic growth and social development.



Emil Berning,
Danfoss Country
Manager, Sub-
Saharan Africa.

Recently released data shows that in the EU alone, excess heat amounts to some 2 860 TWh per year, corresponding closely to the EU's total energy demand for heat and hot water in residential and service sector buildings such as schools, hospitals, hotels, restaurants, offices and shopping centres.

The full implementation of technologies that tap into synergies between different sectors and enable the use of excess heat as an energy source reportedly has the potential to save EUR 67.4 billion a year by 2050.

Danfoss President and CEO, Kim Fausing says it is remarkable that the EU has so very few initiatives that push for more efficient use of the vast amounts of wasted energy in the form of excess heat. "The new white paper details that it would provide a productivity boost to the economy, lower energy prices for consumers and businesses and accelerate the green transition."

Every time an engine runs, it generates heat. Anyone who has felt the warmth behind their fridge can confirm this. The same is true on a larger scale in supermarkets, data centres, factories, wastewater facilities and commercial buildings. Excess heat can be reused to supply a factory with heat and warm water or reused by neighbouring homes and industries through a district energy system.

Emil Berning, Danfoss Country Manager, Sub-Saharan Africa, says, "Catalysing sustainable growth in sub-Saharan Africa is crucial for the region's economic and social development. The latest Danfoss white paper on excess heat offers a roadmap for Africa to harness the untapped potential in energy recovery and pave the way for a cleaner, more efficient future. By prioritising the implementation of innovative solutions outlined in this paper, Africa can lead the charge in reducing energy waste, improving industrial competitiveness, and creating new opportunities for economic growth."

Using this energy that would otherwise go to waste can boost economic productivity and lower energy prices for consumers. And the use of excess heat can replace significant amounts of fossil fuels that are otherwise used to produce heat. In this way, excess heat can be used to help stabilise the future electricity grid and thus ease the transition to a green energy system.

The research indicates that in some countries, excess heat can match the entire heat demand. In the Netherlands,

for example, excess heat amounts to 156 TWh/y and the heating demand is only 152 TWh/y.

Yet it seems that the potential of excess heat is not even close to being used and is politically ignored.

According to Fausing, recycling heat is a measure that has been overlooked in the current energy crisis, and he sees it as the next frontier of the green transition:

"Excess heat is the world's largest untapped source of energy. Still, very few initiatives have pushed for more efficient use of the vast amounts of wasted energy in the form of excess heat, even though we already have the solutions available. We urgently need policy measures to accelerate the use of excess heat across sectors, so that citizens and businesses can benefit from lower energy costs and to ensure we step up progress in the green transition."

"Energy demand is set to grow substantially in the years to come, due to population growth and rising incomes. Without urgent action to tackle the demand side of the green equation – using every single unit of energy more efficiently – we will not get on track to meet global climate goals," Fausing adds.

Maximising energy efficiency

The white paper, titled: *The world's largest untapped energy source: Excess heat*, assesses the potential of excess heat as an efficient energy source.

According to the International Energy Agency (IEA), a global push for more efficient use of energy can reduce CO₂ emissions by an additional five gigatons per year by 2030, compared with current policy settings. A third of the reduction needed in energy-related CO₂ emissions this decade, according to the IEA net zero scenario, must come from improvements in energy efficiency.

In terms of energy security, these energy savings can help avoid consumption of almost 30 million barrels of oil per day and 650 billion cubic metres (bcm) of natural gas per year (around four times what the EU imported from Russia in 2021).

"The potential in reusing excess heat is staggering. We need to change our perspective on it and begin to consider excess heat as an energy resource instead of waste to be disposed of," says Fausing. □

For more information visit: www.danfoss.com

ACCELERATE YOUR SUCCESS

THROUGH POWERFUL PARTNERSHIPS

SEW-EURODRIVE is proud to welcome its phenomenal new, state-of-the-art headquarters in Johannesburg. The 26 000m² building is a major achievement for the South African and African engineering sphere. Gear units and motors from SEW-EURODRIVE have always set the trend and established a new standard in drive technology, and this building allows us to not only continue to supply quality products developed and assembled in-house but also gives SEW-EURODRIVE the opportunity to train and upskill staff and customers.

Our powerful partnerships with customers and suppliers allow us to offer customized solutions that meet the unique needs of each business. With our expertise and resources, we can help accelerate your success and drive you forward towards greater profitability and growth.



Alliance to bolster power generation technology in SA

South Africa-based Babcock Ntuthuko Engineering Pty Ltd (Babcock Ntuthuko), a subsidiary of Babcock International, and US-based The Babcock & Wilcox Company (Babcock & Wilcox), a subsidiary of Babcock & Wilcox Enterprises, Inc., have formed a strategic alliance to bring advanced, world class power generation and environmental technology solutions to utility and industrial customers in the South African market.

Although unaffiliated with each other, the two companies have well over a century of experience in delivering cutting-edge solutions to the steam generation markets they serve.

Founded in 1867 by George Babcock and Stephen Wilcox, Babcock & Wilcox set the industry standard for inherently safe and reliable water-tube boilers. It is today a global leader in steam generation, emissions reduction, carbon capture, decarbonisation and hydrogen generation technologies for utilities, manufacturers and other industries around the world.

In 1891, Babcock Ntuthuko's parent company supplied the first boiler to South Africa's gold mining industry and subsequently designed and supplied many steam boilers used in the utility and industrial sectors in the region. Today, as an original equipment manufacturer, Babcock Ntuthuko has the expertise to design, build, operate, maintain and manage complex steam-generating infrastructure to meet the critical requirements of its customers.

Babcock Ntuthuko and Babcock & Wilcox support sustainable development and are committed to helping customers optimise their operations, reduce their impact on the environment and meet global decarbonisation and climate change objectives.

"Through this alliance, our customers in the power and industrial sectors will have access to a wealth of proven international technologies that can be applied to address local challenges such as emissions reduction, power reliability and renewable energy," said Thava Govender, Chief Executive Officer of Babcock Ntuthuko.

"Some of these technologies have already been successfully implemented in South Africa, including a nitrogen oxide (NOx) abatement solution that Babcock Ntuthuko and Babcock & Wilcox provided for a large industrial petrochemical plant," Govender added.



The new alliance was announced at a recent Power Technology Day hosted by the two companies.

In that case, the project scope required an optimised NOx abatement solution for 12 boilers to comply with the National Environmental Management: Air Quality Act, which calls for NOx levels to be reduced to 750 mg/Nm³ for each combustion installation with a thermal rating of more than 50 MW. After an extensive technology selection process, the compact Babcock & Wilcox DRB-XCL® low-NOx burner was found to be the most suitable for the given site constraints.

The NOx abatement installation project achieved levels of 651 mg/Nm³, and subsequent boiler installations at the petrochemical plant have reached emission levels almost 40% lower than the legal requirement.

David Milner, Babcock & Wilcox Director of Sales and Business Development for Sub-Saharan Africa, said, "We look forward to collaborating with Babcock Ntuthuko to customise engineering solutions for complex steam generation challenges. This is an exciting opportunity for our companies to work together to provide steam generation and environmental solutions for our customers in the region."

Govender added, "We manage the combustion value chain, from engineering to execution. Together with our technology partners and suppliers, we can identify opportunities to implement environmental and optimisation solutions through the various stages of the life cycle, from analysing how a boiler manages a specific type of coal, to how emissions can be reduced."

**For more information contact Babcock Ntuthuko.
Visit: www.babcock.co.za**

LPG trucks and tankers change hands

Petregaz, a subsidiary of the Petredec Group, has concluded an agreement to acquire 35 LPG trucks and tankers and truck horses from OneLogix. The OneLogix Group will retain its other assets and businesses. The Sale Agreement took effect from 1 April 2023 with all suspensive conditions having been met.

With the acquisition of these assets, Petregaz will be able to expand its supply chain capabilities, provide primary logistics services to a larger client base and work



Petregaz's acquisition of LPG trucks and tankers and truck horses from OneLogix will enable it to extend its supply chain.

more closely with its existing and potential new key clients across the LPG (liquid petroleum gas) industry.

Continued on page 15

Smart PV and energy storage can safeguard uptime

Gregor Küpper, Managing Director of SOLARWORLD Africa, says Huawei FusionSolar smart photovoltaic (PV) and energy storage system (ESS) solutions are an ideal option for sub-Saharan African mining operations looking to prevent production losses resulting from energy disruptions.

"Used as backup power or an off-grid solution, in terms of cost per kilowatt-hour, the combination of PV and battery storage outperforms diesel-driven generators, which are widely used to supplement energy needs in the mining industry. It also eliminates the impact of increasingly common diesel supply constraints and price hikes on profitability," says Küpper.

The FusionSolar ESS solution proves competitive, especially when considering the rising price of grid-based power – and the struggling national power utility Eskom is set to implement approved tariff increases from April 2023 as it battles loadshedding.

Küpper says, "The FusionSolar product range offers the best containerised solution for utility-scale storage that I have seen up to now on the market. The range is reliable and easy to implement, and it offers attractive efficiencies."

SOLARWORLD became the first company to introduce FusionSolar Smart PV solutions in South Africa in 2014. Today these solutions include the LUNA2000 smart string ESS.

Equipped with lithium-ion batteries, the LUNA2000 is a compact, space-optimised solution in a 20-foot container that provides 2 MWh storage capacity. Generation capability can be increased in 200 kW increments following a minimum 1 MW installed capacity.

"SOLARWORLD just made the latest version available. We went from a 0.5C battery C-rate, which is equal to a 120-minute charge and discharge rate, to a 1C battery C-rate, which is equal to 60 minutes. Many projects under development are now reconsidering the use of 1C-rated batteries," says Küpper.

To ensure the longevity of its batteries, the LUNA2000 makes use of a temperature-controlled environment to prevent battery degradation when operating in hot conditions, typical in Africa. It is also designed to ensure that the entire capacity of the 2 MWh storage container is not

lost while a battery pack is being replaced.

Küpper adds that another important aspect to consider when investing in an ESS is whether the inverter, battery and management system come from the same source. He says performance issues with small- and large-scale storage systems always arise when products from different brands are combined, even when manufacturers guarantee they are compatible with other solutions and their protocols.

Equipped with artificial intelligence, FusionSolar's utility-scale, commercial and residential solutions offer reduced operation and maintenance (O&M) costs, especially on projects in remote locations. Using cloud-based monitoring software, users can check the status of battery cells to identify problems remotely and reduce on-site working hours by conducting automatic calibrations.

FusionSolar Regional Manager, Quintin Zeeman says, "It's about cost effectiveness. In terms of energy storage, a traditional 100 MW battery ESS with 50 battery systems may require up to 300 man-days dedicated to manual battery pack calibrations across the plant. Huawei eliminates the need for manual calibration completely by incorporating pack optimisers to achieve automatic state-of-charge calibration, without needing to shut down the system to do so.

"Further, deploying teams to conduct O&M on site, especially at remote sites, is challenging as there is a certain period in which you need to react to faults. As well as using AI to reduce the cost of performing general maintenance, automatic state-of-charge calibration saves the cost of having a technician travel to site to conduct that maintenance."

For more information contact SOLARWORLD Africa.
Visit: www.solarworldafrica.co.za



Smart PV and containerised ESS offer a competitive solution for off-grid or backup power, especially in remote locations.

Continued from page 14

Managing Director at Petregaz, Matthew Costello said, "The addition of these assets to our business, together with a focus on a high standard of service delivery will enhance our logistical capabilities which are key to the reliable supply of LPG in southern Africa. We will build on focus areas, including security of supply of LPG in southern Africa as well as providing supply chain excellence to Petregaz's existing and potential new clients."

The OneLogix Group is a niche logistics provider with over 30 years of operational experience. The group offers a range

of logistics solutions and related services to the southern African region. Cameron McCulloch, CEO at OneLogix said, "OneLogix believes that the sale of our LPG division to Petregaz will result in enhanced service delivery, given Petregaz's extensive experience, infrastructure and customer base. The transaction also reduces OneLogix's risk profile following its recent delisting. We wish Petregaz well with its future expansion and development in the LPG industry."

For more information contact Petregaz South Africa.
Visit: <https://petregaz.com>

Successful testing of gas engine with pure hydrogen

Rolls-Royce reported earlier this year that it has conducted successful tests on a 12-cylinder gas variant of the mtu Series 4000 L64 engine running on 100% hydrogen fuel. The tests, carried out by the Power Systems business unit, showed good characteristics in terms of efficiency, performance, emissions and combustion. The tests mark another important step towards the commercial introduction of hydrogen solutions to meet the demand from customers for more sustainable energy supply.

Tobias Ostermaier, President - Stationary Power Solutions, Rolls-Royce Power Systems business unit, said: "This engine will serve the market demand for hydrogen solutions in the energy transition and will be available to our customers as a reliable and clean power source for gensets and combined heat and power plants."

The first installation of mtu engines running on 100% hydrogen is already planned for the enerPort II lighthouse project in the German inland port of Duisburg, as part of the development of a climate-neutral energy supply for a new container terminal.

Dr Jörg Stratmann, CEO - Rolls-Royce Power Systems, added: "We see hydrogen as one of the central elements of the energy transition. It can be used both for storage of excess energy and as a fuel, not only for engines but also for fuel cells and cogeneration plants to generate climate-neutral electricity and heat."

In times of low demand and high renewable energy generation from wind or solar, for example, the excess energy can be channelled through an electrolyser to convert water to hydrogen, which can later be used as fuel in any number of applications.

Progress in efficiency, performance

For several months, the mtu gas engine has been undergoing bench testing and continuous improvement in terms of efficiency, performance, emissions and combustion using 100% hydrogen as fuel. With green hydrogen, the mtu engines can be operated in future in a CO₂-neutral manner. For gas engines already installed, Rolls-Royce offers a conversion solution. Andrea Prospero, an engineer at Rolls-Royce responsible for the development of the hydrogen engine, said: "We are



Rolls Royce has successfully tested an mtu Series 4000 12-cylinder gas engine using 100% hydrogen.

very pleased with the rapid progress. The low engine emissions are well below the strict EU limits; no exhaust gas aftertreatment is required."

Due to the different combustion behaviour of hydrogen compared to natural gas, some engine components, including fuel injection, turbocharging, piston design and control, were modified in the test engine. However, by using proven technologies within the Power Systems' portfolio, such as mtu turbochargers, injection valves, and engine electronics and control, the development of the engine to use hydrogen was advanced quickly and efficiently.

First deployment for CO₂-neutral power supply

Duisport, one of the world's largest inland ports, is working with several partners to build a hydrogen-based supply network for its new terminal, due to become operational in 2024. In future, most of the electricity required by the port will be generated directly on site from hydrogen in a CO₂-neutral way. This will be achieved by two combined heat and power plants with mtu Series 4000 hydrogen engines (with a total installed capacity of 2 MW) as well as three mtu fuel cell systems (with a total installed capacity 1.5 MW).

As part of its sustainability programme, Rolls-Royce is realigning the product portfolio of Power Systems towards more sustainable fuels and new technologies that can further reduce greenhouse gas emissions.

For more information visit:

<https://www.mtu-solutions.com>



Measuring energy usage is the first step towards saving energy costs.

Smart energy approach delivers cost savings

Most South African businesses face significant challenges in ensuring energy security for their operations in the face of ongoing loadshedding. Too often they go to what is seen as the quickest solution and invest in backup power or alternative energy sources without first investigating how much energy they use and how to optimise that energy usage.

Furthermore, according to John Considine, Business Development Executive at managed business services provider Itec, up to 60% of all energy bills received by lo-

cal businesses are incorrect, and up to 43% of all energy sold is wasted.

"The first step to sustainable power management is to measure and monitor the energy usage of your operations in fine detail. How much energy is used every hour? What's contributing to the power usage? How much power does each asset in the operation use? Once you understand this better, you can ensure your business has uninterrupted power for always-on operations, and dramatically reduce

Continued on page 17

Business mobilises to support Energy Action Plan

Business for South Africa has launched the Resource Mobilisation Fund (RMF) (9 March 2023) in response to a request from the President Ramaphosa for the business sector to help capacitate the National Energy Crisis Committee (NECOM). NECOM aims to reduce the severity and frequency of loadshedding in the short term and achieve a secure and sustainable supply of energy for South Africa in the long term.

Martin Kingston, Chairperson of the RMF and Business for South Africa (B4SA) said: "Following the president's announcement of the Energy Action Plan in July 2022, various individuals and private sector organisations came together to establish the RMF as a mechanism for business in South Africa to support the implementation of the plan. The RMF was set up to source private sector funding to procure and donate expertise to the government, and specifically NECOM, on an expedited basis. It is envisaged that this will happen over a period of one to two years, depending on the pace of progress that NECOM makes in its mission."

The RMF performs its functions independently of government, including NECOM, and business advocacy structures. Donors include South African corporates as well as philanthropic donors. In terms of an agreement with the Presidency, the RMF receives written requests for experts from NECOM, and then facilitates an independent procurement process to source the required expertise.

Dr Kgosisentso Ramokgopa, Minister in the Presidency for Electricity said at the launch: "The Presidency is very supportive of the establishment of the RMF, which we believe will help accelerate the achievement of the goals of the President's Energy Action Plan by providing expertise and relevant capacity. Through the efforts of collaborative partnerships between businesses in South Africa and government, we know that together we can make a meaningful difference in resolving the energy crisis and many other macro-economic challenges that face us as a country."

The RMF is a Public Benefit Organisation and an autonomous legal entity formed to support NECOM. The RMF will be accountable to its donors, the business

community, and the public at large, and will administer and disburse the funds raised by providing donations in kind to capacitate the government's efforts in relation to NECOM.

Expertise to be donated to NECOM includes a Project Management Office, together with specialist legal, energy modelling, and engineering expertise over a one-to-two-year period.

In line with its constitution, the RMF Board will execute its objectives in a fair, equitable, transparent, competitive and cost-effective manner, ensuring that integrity is always maintained and that the activities of the RMF are conducted to the highest standards of corporate governance and ethics.

"The RMF Board is responsible for all final procurement decisions and is advised by a procurement advisory panel, made up of public and private sector procurement experts. Once the appropriate expertise is selected, service providers are contracted by the RMF and then donated to NECOM as experts. Certain operational functions of the RMF, including day-to-day procurement and reporting functions, have been outsourced to external service providers, although only the RMF Board has the authority to make procurement and deployment decisions. In particular, the RMF has contracted the National Business Initiative (NBI) to provide procurement, monitoring and evaluation and reporting functions to the RMF. The NBI has experience with the deployment of capacity and expertise into government. The RMF exists only to receive and raise donations, procure capacity and skillsets, donate these to NECOM and then report back appropriately. Unlike the Energy Council and other bodies, the RMF does not undertake any policy advocacy and, other than its sole focus of capacitating government, is not involved in addressing the energy crisis." Kingston said.



*Martin Kingston,
Chairman B4SA and
Chairman of the RMF.*

For more information visit:

<https://www.businessforsa.org/the-rmf/>

Continued from page 16
energy costs," says Considine.

Itec recently launched an energy services offering, Itec Energy, which is already helping local businesses save money, ensure energy security for their operations, and accelerate their journey to becoming sustainable 'green' businesses. One client in the textiles industry has nearly halved its monthly energy bills, and has gained key insights into which areas of the business are the most power-hungry, and the least profitable.

Considine also cites the example of a Gauteng-based food processing business which currently spends nearly

R1 million a month to keep its diesel generators running through loadshedding, over and above an existing power bill of over R5 million a month. He says the business will be able to reduce its energy usage – and spend – significantly, through process and plant optimisation and effective energy monitoring and management.

"That's why it is critical first to determine baseline usage and integrate practical energy-saving measures, before investing, often at high cost, in 'stop-gap' solutions," he says.

For more information contact Itec.

Visit: <https://itecgroup.co.za/>

The basics of earth grounding systems – and the importance of testing

Poor grounding not only increases the risk of equipment failure, it is also dangerous. Facilities need to have adequately grounded electrical systems so that in the event of a lightning strike, or utility overvoltage, current will find a safe path to earth.

A simple grounding system may consist of a single ground electrode driven into the ground. This is the most common form of grounding and can be found outside homes or places of business. Complex grounding systems may consist of multiple ground rods, connected mesh or grid networks, ground plates, and ground loops. These systems are typically installed to protect facilities where the electrical infrastructure is critical and more complex, such as power distribution substations, central offices, and cellular networks tower sites.

Locations of resistances

When installing grounding systems, it's important to consider the locations of resistance and to look at ways to reduce the ground resistance.

- *The ground electrode and its connection*
The resistance of the ground electrode and its connection is generally very low. Ground rods are generally made of highly conductive/low-resistance material such as steel or copper.
- *The contact resistance of the surrounding earth to the electrode*
The National Institute of Standards (a government agency in the US Department of Commerce) has shown this resistance to be almost negligible, provided that the ground electrode is free of paint, grease, or other contaminating residues, and that it is in firm contact with the earth.
- *The resistance of the surrounding body of earth*
The ground electrode is surrounded by earth which, conceptually, is made up of concentric 'shells' all

of the same thickness. Those shells closest to the ground electrode cover the smallest area resulting in the greatest degree of resistance. Each subsequent shell incorporates a greater area resulting in lower resistance. This finally reaches a point where the additional shells offer little resistance to the ground surrounding the ground electrode

Factors that affect grounding resistance

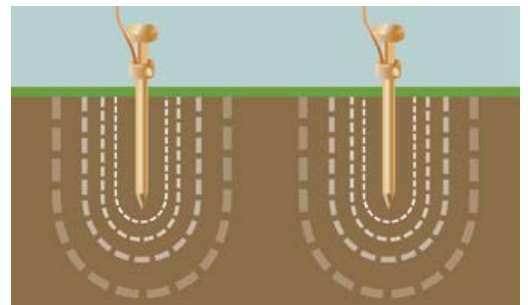
The NEC ((the US National Fire Protection Association's National Electrical Code) (1987, 250-83-3) requires that a minimum ground electrode length of 2.5 metres (8.0 feet) be in contact with soil. However, there are four variables that affect the resistance of a ground system:

- Length/depth of the ground electrode
- Diameter of the ground electrode
- Number of ground electrodes
- Design of the grounding system.

Length/depth of the ground electrode

One effective way of lowering ground resistance is to drive ground electrodes deeper. Soil is not consistent in its resistivity, which can be highly unpredictable. When installing a ground electrode, it is critical that it must be below the frost line. This is to ensure that the resistance to the ground will not be significantly influenced by the freezing of the surrounding soil.

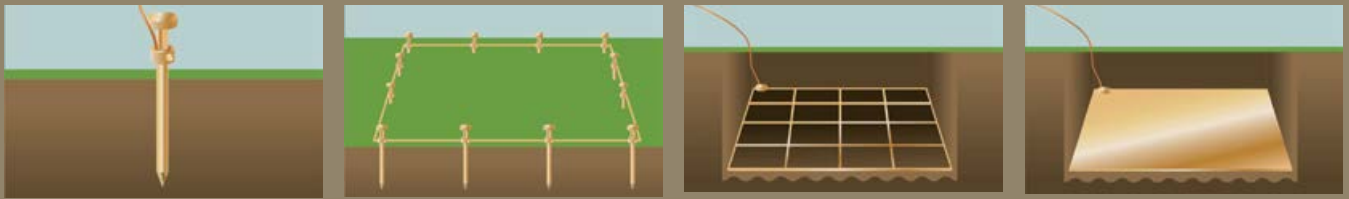
Generally, by doubling the length of the ground electrode, the resistance level can be reduced by an additional 40%. In some instances, it may be physically impossible to drive ground rods deeper – in areas of rock, for example –



In a system comprising a number of ground electrodes, each ground electrode has its own 'sphere of influence'.

Comtest offers various Fluke testing tools for safe testing of earthing systems.

Ground systems



Ground systems can range from simple to more complex, comprising: a single ground electrode, multiple ground electrodes connected, a mesh network, and ground plate.

and in such situations alternative methods, including grounding cement, can be used.

Diameter of the ground electrode

Increasing the diameter of the ground electrode has little effect in lowering the resistance. For example, even doubling the diameter of a ground electrode will reduce the resistance by just 10%.

Number of ground electrodes

Another way to lower ground resistance is to use multiple ground electrodes. In such a grounding system, more than one electrode is driven into the ground and connected to others, in parallel, to lower the resistance. For additional electrodes to be effective, the spacing of additional rods needs to be at least equal to the depth of the driven rod. Without proper spacing of the ground electrodes, their spheres of influence will intersect and the resistance will not be lowered.

When determining the ground rods/grounding systems to meet specific resistance requirements, it must be noted that the soil differs in different areas, it is layered and rarely homogeneous, and the resistance values will vary substantially.

Design of the grounding system

As noted above, a simple grounding system using a single ground electrode driven into the ground is usually adequate for residential and commercial installations. More complex grounding systems consisting of multiple ground rods, connected, mesh or grid networks, ground plates, and ground loops, increase the extent of contact with the surrounding earth and lower ground resistances significantly.

Why test?

Over time, corrosive soils with high moisture content, high salt content, and high temperatures can degrade ground rods and their connections. So, although the grounding system when initially installed had low earth ground resistance values, the resistance of the system can increase if the ground rods are eaten away. It is recommended that all ground rods and ground connections be checked annually as a part of a standard predictive maintenance plan. If an increase in resistance of more than 20% is found, the source of the problem needs to be investigated and the grounding system corrected to lower the resistance.

What is a good ground resistance value?

Some confusion exists around what constitutes a good ground resistance value and what the resistance value needs to be.

Ideally, the ground should have a resistance value of zero ohms. There is no single standard ground resistance threshold recognised by all agencies, but a ground resistance value of 5.0 ohms or less is recommended. It is important to ensure that the system impedance to the ground is less than 25 ohms. In facilities with sensitive equipment, it should be 5.0 ohms or less. This is the resistance value adopted by the telecommunications industry, for example, as the resistance value limit for grounding and bonding. The aim should be to achieve the lowest ground resistance value that makes sense economically and practically.

Testing methods

Several methods of earth ground testing are available.

Soil resistivity testing, which uses stakes, is most needed when determining the design of the grounding system for new installations (green field applications) to meet ground resistance requirements.

The Fall-of-Potential test method is used to measure the ability of an earth ground system or an individual electrode to dissipate energy from a site. For the 3-pole Fall-of-Potential test, two earth stakes are placed in the soil in a direct line – away from the earth electrode.

Selective testing is similar to the Fall-of-Potential method, providing all the same measurements, but in a much safer and easier way. With selective testing, the earth electrode in focus does not need to be disconnected from its connection to the site.

Stakeless measurement can be done by measuring earth ground loop resistances for multi-grounded systems using only current clamps. This test technique eliminates the dangerous and time-consuming activity of disconnecting parallel grounds and finding suitable locations for auxiliary ground stakes. It also allows for earth ground tests to be performed in places not considered before: inside buildings, on power pylons, or wherever there is no soil.

In situations where driving ground stakes is neither practical nor possible, a two-pole ground resistance/continuity measurement can be done. To perform this test the technician must have access to a good, known ground such as an all-metal water pipe.

Comtest supplies safe testing tools for earthing systems and offers CPD-accredited seminars on earth, ground and installation testing, for professional electricians. □

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

The benefits of simple pressure reducing valves

Peter Telle of Ultra Control Valves says, for most people involved in the water industry, a 'pressure reducing valve' is usually understood to be the complex pilot-operated valve, as is typically used in the industry. Telle argues rather for the use of simple ratio reducing valves to manage water flow in pipelines effectively and consistently.

Pilot-operated pressure reducing valves allow for the bolting on of controls for remote operation, automatic flow rate limitation and sustaining upstream pressure. With these various add-on devices, they can become complex configurations.

"In my experience, these complex installations don't work as expected in the long term," Telle says. "They're too complicated."

"Often the operators won't have been trained on how the instruments are supposed to work, and preventive maintenance does not always get done on schedule. I have seen incidents of broken pipes, huge water losses and areas being without water, as a result of field technicians tinkering with controls."

Ratio reducing valves

Telle argues for simple, ratio reducing valves as a more appropriate solution for most pressure reducing requirements in water pipelines. A ratio reducing valve has no pilots and consists simply of a piston with different inlet and outlet areas.

"Some engineers point out that ratio reducing valves are not adjustable. That is true, but in most cases, it does not matter," according to Telle.

"For instance, a 4:1 ratio reducing valve can be used to reduce pressure from 12 bar to 3 bar. If the upstream pressure rises to 16 bar (say, at night) the downstream pressure would go from 3 bar to 4 bar. That is not likely to be a problem except in a handful of very specific scenarios," he says.

He suggests that the advantages of the ratio reducing valve outweigh the lack of adjustability.

- They are tamper-proof. There are no settings, and nothing can be stolen.
- They can act in series without instability. This compares well with pilot-operated pressure reducing valves which have to be carefully tuned during commissioning and are vulnerable to instability from changes in demand or pressure.
- They are inherently failure-proof. Pilot controlled valves can fail when any part of the pilot circuit is damaged – and they generally fail into the open position, often with serious results. This cannot happen with a ratio reducing valve as it contains no parts to fail. If the main seal is damaged, water will leak through a breather hole, but the valve will continue to reduce pressure, although it will not be drop-tight.
- The axial flow path provides good resistance to cavitation. This enables high pressure drop ratios: generally up to 5:1, but specialist valves can go as high as 12:1.
- They are not vulnerable to dirt particles.

Telle says ratio reducing valves have been used with good effect in a range of installations. He cites several examples.

In high-rise buildings where pressure reducing valves often have to act in series – this is something which cannot be done easily with pilot-operated valves.

For water-saving projects – "I recently worked with a team of consultants in the Eastern Cape on a successful water-saving project where we used simple ratio reducing valves instead of the more sophisticated electronic 'smart PRV' for all the above reasons." Another advantage of ratio reducing valves for water-saving projects is that no complicated valve sizing is required to ensure stable operation. Simply, a ratio reducing valve of the same size as the line is fitted.

For pump bypass control – Demand can be variable in many pumping applications. This means a bypass is needed from the delivery side back to the suction side (usually the reservoir). But the downstream pressure is usually close to atmospheric pressure. This leads to the risk of cavitation.

Pilot-operated pressure sustaining valves are normal-



A standard pilot-operated valve, as typically used in the water industry.

Standard pilot operated pressure reducing valves can become complex configurations.



A simple ratio reducing valve.

ly used in these applications and most of them can handle a maximum of 4:1 pressure drop ratio. So, anything above a pump delivery pressure of 4 bar would need a pressure sustaining valve to handle this, in order to prevent cavitation.

Here, a ratio reducing valve provides an ideal solution. If the pressure is anything up to 20 bar, a 5:1 valve can be installed upstream of the pressure sustaining valve. If the pressure is above 20 bar, two ratio reducing valves can be installed upstream.

Pressure reducing stations for critical applications –

There are certain applications where pressure reducing valve failure would cause disastrous results. For example, in the offtake from a high-pressure supply line into a low-pressure pipeline; and in place of break pressure tanks/reservoirs. Break pressure tanks are expensive and vulnerable to tampering/malfunction. They also need space on the surface which might not be easy to secure. □

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

MEASUREMENT + INSTRUMENTATION : PRODUCTS + SERVICES

Non-stop transmission of sensor signals via fieldbus

Decentralised Digital Input (DI) modules from ifm serve as a gateway between binary sensors and the fieldbus. This means that binary switching signals in the field can be transmitted directly via the fieldbus using PROFINET, EtherNet/IP or Modbus TCP. No further transmission systems are needed in the fieldbus topology.

The robust ifm modules are suitable for use in wide ranging environments, including demanding environments where washdown cleaning requirements must be met. The materials and production methods employed are identical to those used for the ifm jumper cables of the tried-and-tested EVC and EVF product series. The ecolink technology guarantees reliable, permanently ingress-resistant M12 connections of the connection cables.

Key benefits

The Ethernet modules extend ifm's IO-Link master family. They feature the same design, port configuration and standardised M12 connections.

The integrated high-frequency counter function can be activated via the PLC. The pulses transmitted by the sensor are counted within the module and are cyclically transmitted to the PLC as a counter packet. This ensures accurate counting that is not affected by the cycle time of the PLC.

The Ethernet modules offer different connection options for the voltage supply: an A-coded M12 connector with 1 x 4 A and an L-coded M12 connector with 2 x 16 A. The latter can be daisy-chained to other modules of the product family.



The digital input modules expand ifm's IO-Link master family.

For more information contact ifm South Africa.

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The advantages of networking safety

When designing a safety solution for a machine or application, a fundamental consideration is whether to implement it as a standalone or network safety solution. According to Omron Automation, network safety offers a number of advantages compared to standalone safety.

Standalone safety involves wiring safety devices point-to-point to a safety relay or controller, which in turn is wired to a contactor or a device that disconnects primary power to a machine. Network safety, by contrast, collects the safety devices and connects them to a network safety system via a fieldbus using a communications gateway, a safety CPU (central processing unit), and safety I/O.

Network safety offers a number of advantages. Firstly, it is a highly effective way to mitigate risk. In addition to this, due to its ability to improve automation efficiency and boost throughput, network safety can become a key factor for a high-performing, future-ready manufacturing facility.

Industrial networking protocols

As there are different manufacturers, there are also several unique, independent solutions to solve communications networking issues. These particular industrial problems brought networking into focus. Specifically, manufacturers needed their operations to be:

- Capable of responding in real time
- Deterministic
- Reliable/redundant
- Secure
- Safe, and
- Ruggedised.

The process of converging protocols motivated the drive to bring together best practices and standardise communications. The cornerstone of interoperability is a

standard communications protocol. EtherCAT (ECAT) is an example of a higher-level networking protocol that uses a multiple-layer model to interact with various fieldbus protocols.

Choosing the right configuration

While there are various configurations that can address network safety, choosing the appropriate one is essential to optimising automation efficiency and reducing safety risks. A safety risk assessment is the primary way to establish the specific safety needs and the most appropriate configuration.

Automation architecture is required to provide control, configuration capabilities, and data collection. The two leading network safety architectures are Fail Safe over EtherCAT (FSoE) and Common Interface Protocol Safety (CIP Safety). EtherCAT technology allows for interoperability between participating vendor devices. It is faster, has a wider bandwidth, and supports processing on the move. CIP Safety provides failsafe communication between nodes and enables interoperability between various automation and safety vendors.

For effective functional safety communications, eight types of potential network errors must be mitigated. These are:

- Corruption of the signal
- Unintended repetition of the message
- Incorrect sequence of the message
- Loss of the message
- Unacceptable delay of the message
- Insertion of another unintended message
- Masquerade of the message
- Not addressing the message as intended.

Functional elements of a networked safety system

A networked safety system consists of several key functional elements. The following examples illustrate some possible choices. The appropriate solution depends on the preferred configuration and/or respective application.

- *EIP Network Slave Terminal (NX-EIC202 & NX-SL3300)*

In this solution the EIC202 is the communications coupler, and the NX-SL3300 is the safety CPU. This is for status information only, fed back over EIP (EtherNet Industrial Protocol) to a control system. It does not take any control information but only sends it to the safety system to control or influence it. The purpose of this is to be able to inform



Networked safety is an effective way to mitigate risk – as well as providing for improved automation efficiency and greater throughput.

safety status via EIP to a third-party controller such as a Rockwell Automation PLC. EtherNet/IP has the advantage that it is the most widely used application layer manufacturing protocol in North America. It is the protocol used by Rockwell controllers, for example, to connect field devices. The solution noted in this example is the primary configuration that allows Omron to be able to connect to a specified Rockwell control system.

- *ECAT Network Slave Terminal (NX-ECC201, 202, 203 & NX-SL3300, 3500)*

In this solution the ECC201-3 is the communications coupler, and the SL3300-3500 is the safety CPU. The exact model is dependent on program capacity and the number of safety master connections required. The purpose of this is to be able to operate as an ECAT (EtherCAT) slave and connect multiple safety devices over an ECAT network. The safety monitoring and reporting would run with FSoE. ECAT slave devices need to embed an application specific integrated circuit (ASIC) in the hardware to implement EtherCAT.

- *ECAT Master (NX102 & NX-SL3300, 3500).*

In this solution the NX102 Machine Automation Controller serves as the database connection CPU, and the SL3300-3500 functions as the independent safety CPU. The exact model is dependent on program capacity and the number of safety master connections required. The purpose of this is to operate as a cornerstone ECAT network arrangement. The safety monitoring and reporting would run with FSoE. Master devices simply issue the message and receive the response: single message in – single message out.

- *ECAT & CIP Safety (NX102 & NX-SL5500, 5700).*

Here, the NX102 Machine Automation Controller serves as the database connection CPU, and the SL5500-5700 functions as the independent safety CPU. Again, the exact model is dependent on program capacity and several safe-

ty master connections. The purpose of this configuration is that it allows both FSoE and CIP Safety protocols to operate simultaneously. ECAT-equipped devices, non-ECAT devices, and even non-Omron devices can be connected by ECAT and/or CIP Safety network protocols.

- *CIP Safety Only (NX-CSG320 & NX-SL5500, 5700 & GI-SMD1624, GI-SID1224 Modules).*

In this example, the NX-CSG320 model is the safety gateway for CIP Safety, and the SL5500-5700 functions as the independent safety CPU. The GIs function as safety I/O terminals for CIP Safety. The exact model of each is dependent on program capacity, the number of safety master connections, and whether inputs only or both inputs and outputs are required. This configuration provides the ability to connect with third-party products via the CIP safety protocol. It offers the best safety solution package to connect to non-ECAT community devices.

By networking safety rather than using the point-to-point connection of safety devices, users can ensure maximum efficiency and safety in their manufacturing lines. Industry 4.0-level performance can be realised: delivering flexibility, ease of use, human-machine collaboration, and interoperability between vendors.

Summary

Networking the safety system helps to make it more robust. It provides for maximised safety risk mitigation, improved automation efficiency, and increased factory output. Omron's safety solutions support Industry 4.0 level performance of industrial automation. Whereas safety was once considered a mandatory compliance issue, it has become integral to high-level performance. □

For more information visit: www.industrial.omron.co.za

SAFETY OF PLANT, EQUIPMENT + PEOPLE : PRODUCTS + SERVICES

Steadily improving mine safety

Ongoing developments in proximity detection systems (PDS) are assisting in improving health and safety on mines. The power of PDS to gather operational data, for instance, takes the technologies beyond prevention of collisions between moving machines, or mobile machines and people. By providing insights into the traffic patterns and risks in a particular operation, PDS paves the way to creating safer workplaces.

Proximity detection systems started out as a valuable mechanism to warn machine operators and pedestrians of imminent danger, and today they play a more powerful role in health and safety.

Gathering and analysing site-specific data, they provide for management to plan safe and efficient traffic flows. Anton Lourens, CEO of leading PDS developer Booyco Electronics, highlights that the rapid development of digital communication and sensor technology is



There is growing use of advanced sensor technology in PDS to enhance its role in improving health and safety on mines.

opening doors to higher safety levels.

"PDS can locate vehicles and personnel in real time, giving mines the ability to recognise patterns in traffic movement," says Lourens. "From this starting point, traf-

Continued on page 25



Eldon Kruger,
Marketing Director
at Pratley.

Sourcing the right adapters and reducers

In the scope of electrical equipment, adapters and reducers are designed to allow for cable glands, or other electrical apparatus, to adapt to threaded entries of different types or different sizes to their connecting threads. Instead of having to drill and tap new entries or buy new cable glands, an adapter or reducer can be used to accommodate the difference in size or thread type. Leigh Darroll, Editor of Electricity + Control, spoke to Eldon Kruger, Marketing Director at Pratley, about these small but often critical products that save time and costs for end users in the field.

As a long established and well-known manufacturer of electrical apparatus, Pratley has a range of more than 1 000 different adapters and reducers, and it keeps ex-store stock of most of them to ensure it can deliver promptly to customers as needed.

Kruger explains that the main issue with electrical equipment imported into South Africa is that it sometimes has a different thread type to the standard metric conduit thread used for electrical equipment locally. For example, electrical equipment such as a motor, or electrical instrument, imported from the United States (US) has the US standard NPT (National Pipe Taper) thread – and needs to be adapted to accommodate the standard metric conduit thread with 1.5 mm pitch of the cable glands used in South Africa. The standard metric conduit thread with 1.5 mm pitch derives from the British standard electrical conduit thread used historically and is widely used in South African industry.

In the example of a motor imported from the US, which will have an NPT tapered thread, an adapter is required – with an NPT male thread on one side and a standard metric conduit female thread on the other – to enable a quick and secure connection of the cable gland/cable or electrical conduit pipe for the application.

Similarly, equipment imported from Europe, and particularly from Germany, is often supplied with the standard PG thread (*Stahlpanzerrohrgewinde* or 'steel conduit thread').



A Pratley adapter for a Size 2 cable gland to be fitted to a Size 4 junction box.

Again, an adapter is needed to provide a PG male thread and a standard metric conduit female thread, to enable a quick and secure connection of the South African standard metric thread cable gland or conduit pipe.

"There are other thread variations too, but these are the two that are most common," Kruger adds.

Adapters can also be used to adapt a metric female entry thread which is too small for the specific cable gland or entry device, allowing for a larger size gland to be installed.

Reducers are used where the threaded entries on equipment are too large for the connecting cable threads. As the name explains, they serve to adjust the size to suit the required connection.

Multiple variations

Considering the diversity of electrical equipment and the range of cable and conduit pipe sizes in use, it is easy to understand why Pratley has developed such an extensive range of adapters and reducers. Further variations come into play in respect of the materials used, which may be nickel-plated brass, or stainless steel as is typically specified for applications in the food and beverage industry. There are also variations in respect of ingress protection ratings and Ex certifications that may be required for products to be used in hazardous areas.

Pratley's adapters and reducers are supplied complete with a waterproofing gasket on the male threaded part (on non-tapered thread versions, that is, Metric, PG and Imperial Conduit) to maintain an ingress protection rating of IP66 or IP68 (350 m continuous).

The products are supplied in a general purpose version or an Ex version for use in explosive atmospheres and are specified to SANS and IECEx standards for use in Group I, IIC and IIIC for Ex d/e/nR and t enclosures, which makes them suitable for use in hazardous areas accordingly. The explosive atmospheres version is usually specified for use in the petrochemical industry, offshore and mining applications and the general purpose version for construction, manufacturing and other industrial applications.

Kruger says Pratley has the flexibility to produce this extensive range of adapters and reducers with quick turnaround times because it handles production in-house.

"Where a specific product is required for an uncommon application and therefore not kept in stock, we can usually schedule production to deliver to the customer within three working days from order."

He says the products are of course used in established plants, particularly when new equipment is introduced, but most of the demand comes from new projects – where there are typically contract timelines in place and the fittings need to be supplied quickly. They may be used, for example, in new mining projects where equipment is brought in from the US, or petrochemical installations where specialised instruments are imported, and they have different thread types.

Even with the extensive range it carries, Pratley is from time to time faced with unique requirements from customers. One example may be to match a custom-made thread on a particular piece of equipment. "In such instances we can custom make the adapter to suit the specific requirement, and with our in-house capacity and expertise, we can do this quickly," Kruger says.

He adds that in some cases, where imported equipment is supplied with fitted cable glands, Pratley will supply its

junction boxes with adapters to allow for the apparatus to be connected directly to the junction box.

He notes too that Pratley supplies its adapters, reducers, cable glands and junction boxes to projects and plants not only in South Africa but also throughout Africa and around the world – via its well-established distributor network.

"To assist customers in the correct selection of adapters and reducers we have also recently added a selection tool application to our website. This makes the sourcing and selection process very simple," Kruger says.

Celebrating its 75th anniversary this year, Pratley continues to grow and to introduce innovative products that respond to industry needs, driven by a strong foundation in research and development. □



Pratley carries a range of more than 1 000 adapters and reducers.

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

SAFETY OF PLANT, EQUIPMENT + PEOPLE : PRODUCTS + SERVICES

Continued from page 23

fic management strategies can be developed to keep people away from trackless mining machinery (TMM)."

Importantly, the data collected can identify 'hot spots' where potential collisions could occur. This makes a systemic contribution to the mine's safety, as management can adapt traffic management plans to separate people from equipment, and keep trackless machines on a safe path. This can also feed into the mine's ongoing risk assessment responsibilities and support strong risk mitigation methods.

"These developments position PDS to play an important role in each mine's code of practice (COP), to make the interventions specific rather than generalised," he says. "Every mine has its own traffic conditions and operational requirements, and PDS helps provide insight into those conditions so that the COP can be kept relevant and effective."

He points to the Booyco Electronics Asset Management System (BEAMS) software suite as an example. This is essentially a central information hub that gives mines the insight they need into operational interactions.

"BEAMS analyses a huge amount of data from vehicles, uncovering aspects such as unsafe patterns of behaviour," says Lourens. "It gives management the basis for responding with strategies that mitigate risk and enhance safety."

Using advanced sensor technology, PDS now include a close-up and more accurate sensing approach in addition to the traditional long-distance detection technology.

"We have designed our CXS range of PDS solutions so we can readily augment the system architecture with



All Booyco PDS systems are tested rigorously to ensure they meet the required standards.

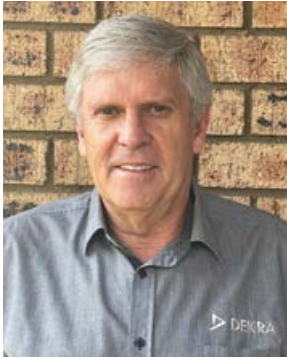
sensors," he says. "By combining various sensing technologies, we develop flexible solutions that make for safer working environments – as they are specific to the customer's operational requirements."

Lourens emphasises that the use of PDS technology can only be effective when based on a thorough risk assessment. This, he says, will ensure that the solution is designed to meet the particular mine's needs and conditions.

"It also calls for a well-planned process that includes careful change management and engagement with all involved," he explains. "By taking the required steps, PDS can play a significant role in enhancing health and safety – and providing long-term benefits in mining productivity."

**For more information contact Booyco Electronics.
Visit: www.booyco-electronics.com**

Non-destructive testing in the oil and gas sector



Johan Gerber, Managing Director, Dekra Industrial.



Johann Dorfling, Western Cape Branch Manager.



MC Liebenberg, NDT Level 3 Technician.

Dekra Industrial SA has been involved in non-destructive testing (NDT) and inspection in the oil and gas sector – locally and pan-Africa – for about five years, and the company continues to grow its presence in this critical area of the energy arena. According to global management consulting firm McKinsey in its *Global Energy Perspective 2022*, released in April last year, the peak in fossil fuels demand continues to move forward, with oil projected to peak in the next five years and gas remaining the most resilient fossil fuel.

This trend is evident in the high level of activity off the coast Africa, for example in TotalEnergies' liquid natural gas project offshore of northern Mozambique.

Dekra Industrial Managing Director, Johan Gerber says, "Offshore oil and gas rigs present hazardous working conditions for crew members carrying out the required drilling. Rig teams are dealing with highly combustible materials, on an ocean-based platform where cranes are swinging heavy equipment overhead, and other large-scale moving parts are a constant presence in the immediate environment."

Johann Dorfling, Dekra Industrial's Western Cape Branch Manager says, "We are active in the oil and gas and maritime sectors, both on- and offshore, and have carried out 'before and after' NDT welding integrity inspections around Africa, in places such as Las Palmas in the Canary Islands, as well as Ghana, Angola and in Mozambique."

"On oil rigs, we do crane and slew bolt inspections and work extensively on drilling risers, which form the connection between the subsea field developments and production and drilling facilities. A particularly high level of welding is required to ensure that the structural integrity and longevity of the components, structure and pipe-work on the risers are maintained, as many of these items are subjected to extreme pressure during their service. NDT and inspection help to prevent the failure of these critically important elements."

NDT and inspection on drilling risers

MC Liebenberg, NDT Level 3 Technician at Dekra Industrial, adds: "Similar to pipelines or flowlines, risers

act as conduits to transport produced hydrocarbons as well as production materials, such as injection fluids, control fluids and gas lift. The cost of a marine drilling riser system can be tens of millions of dollars, but the cost of operational downtime associated with a riser loss or failure can exceed one hundred million and therefore needs to be prevented.

"In non-destructive testing, there is not one method superior to another; the methods complement each other. In offshore inspection, we most commonly see

the use of magnetic particle (MT) and visual inspection (VT), as well as thickness gauging."

Dorfling notes further: "We have performed eddy current, MT and VT inspections, liquid penetrant testing (PT), volumetric and ultrasonic testing (UT) and phased array ultrasonic testing (PAUT) welding inspections on drilling risers. It is critically important to ensure the risers are in class and do not fail in service, as the result of a leak can be catastrophic for the environment and general safety."

In or out of class

Liebenberg says, "Depending on the acceptance criteria of the inspection, NDT can determine if all areas of inspection are in or out of class, reporting on these with details of the extent of wear, corrosion, or defects discovered."

"Dekra Industrial does not determine if a vessel is out of class or not – this is determined by the results of our NDT inspection," Liebenberg clarifies. "The results are presented to the client, who then makes the decision on whether to replace the component, or repair it to conform to class standards."

Rope access inspections

Dorfling adds that Dekra Industrial offers rope access inspection across multiple NDT methodologies, including advanced disciplines such as PAUT. "Dekra's capabilities in performing NDT offshore with rope access give us a competitive edge in this sector and are of value in the industry – as is our offering of diverse services. Building scaffolding on a rig is not a viable option and we are proud to be able to perform advanced inspection using rope access."

Gerber says, "Dekra Industrial SA has played a role in the fields of NDT and inspection locally – across a wide range of industry sectors – for the past 40 years and we are pleased to include NDT and inspections in the oil and gas arena in our field of expertise. We anticipate more maritime-related work in the future."

For more information contact Dekra Industrial SA.

Visit: www.dekraindustrial.co.za

Video surveillance can improve miners' safety

South Africa's mining sector is working towards achieving 'zero harm', ensuring the safety of workers in the country's mines. In 2022, the industry reported the lowest-yet number of fatalities, with the largest contributor to safety performance that year being a 70% decrease in the fall-of-ground (FOG) fatalities. During the 2023 Mining Indaba, the Minerals Council of South Africa and its members reaffirmed their commitment to achieving zero harm and to continue working with labour and the Department of Mineral Resources and Energy to develop realisable plans to reach this goal.

Recognising that workers' safety in mines has long been a challenge due to the hazardous conditions in the industry, Marcel Bruyns, Sales Manager for Africa at Axis Communications says it is in South Africa's national interest, as well as that of the public and private sectors, that all possibilities to ensure the safety of workers are considered and implemented where appropriate. Although unforeseen accidents will always be a reality, mine operators can mitigate as many hazards as possible by installing solutions that help protect workers' safety.

The role of video

In any mining outfit, operators need to have adequate oversight of their staff, assets, and facilities. Any small issue has the potential to turn into a major, costly incident. Whether it's equipment failure, staff injury, environmental challenges, or criminal activity, operators need to be positioned to see everything happening on their sites. Video surveillance allows them to do that.

It offers much more than a CCTV camera sending a live feed to a backroom somewhere. Innovations in video technology have opened the way to advanced cameras and sensors that provide extensive coverage from different standpoints. For example, cameras enabled with infrared sensors can provide coverage in low-light conditions, such as mine shafts. On-board cameras placed on machinery and vehicles can improve operators' awareness and, when equipped with thermal imaging capabilities, can improve drivers' visibility when they are faced with obstructions or dust clouds. Image stabilisation technology ensures that the devices are not impacted by vibrations and will provide consistently clear video quality.

Video surveillance can also be applied for individual mine workers. With body-worn cameras, operators will be able to monitor activity in real time and, in the event of a safety incident, footage can be used for post-incident investigations. However, the goal is to prevent incidents and with the right equipment appropriately deployed, operators can protect people by making sure they and other assets are where they're supposed to be, and alerting supervisors when they're not.

Advances in video analytics and intelligence now also make it possible to identify and monitor behaviour patterns and trends. By capturing data and learning

more about the operation, cameras and sensors can help operations managers make quicker and better-informed decisions related to personnel safety.

From the perimeter inwards

Keeping mine workers safe also entails keeping the mine itself safe and secure. Strategically positioned along a fence or perimeter barrier, fixed thermal cameras can provide long-range coverage no matter the lighting conditions. Those equipped with pan, tilt and zoom capabilities offer an increased level of coverage and can focus on any unauthorised individuals or vehicles on or near the site. And when paired with audio speakers and other devices, systems can trigger automatic responses to alert and deter unauthorised parties.

A mine can have multiple entry points with hundreds if not thousands of staff members and vehicles passing in and out daily. Operators need to control access and can do that with solutions such as cameras equipped with licence plate verification software, and intercoms and card readers installed on doors and gates. Access can further be centrally controlled with the use of software entry management solutions both on- and offsite. Systems such as these are built to be scalable, so they can grow as the operation and its safety requirements grow.

Safety infrastructure and advances in technology can support mining companies and operators to make worthwhile changes and improvements. A trusted vendor can assist in selecting the optimum solution and ensuring proper installation of these systems and devices. With the right tools and know-how, mines can protect their workers with industry-leading solutions and measures and continue to contribute to one of SA's most significant sectors.

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



Marcel Bruyns, Axis Communications.



Mining companies in South Africa have reaffirmed their commitment to achieving the goal of zero harm in the industry.

Upgrading safety-critical alarm annunciators

Businesses in the nuclear, petrochemical and oil and gas sectors generally follow best practice guidelines, like the EEMUA 191 standard, with respect to safety-critical alarm systems. However, as regulations increasingly require data acquisition and sequence-of-events capabilities for critical alarm systems, it can be difficult for plant managers to find a cost-effective way of keeping up. Gary Bradshaw, Director of remote monitoring specialist Omniflex, says installing a distributed alarm annunciator system can provide the solution.

In high-consequence risk environments like the nuclear, petrochemical and oil and gas industries, the use of safety, health and environmental (SHE) alarms is a key part of best practice guidelines like the EEMUA (Engineering Equipment and Materials Users Association) 191 standard. One of the key requirements of the EEMUA 191 standard is that critical alarms must be easy to understand, promoting quick and effective operator responses. This is where traditional hardwired alarm annunciators play a role as they promote ease of use and rapid responses.

Alarm annunciators are panel-based alarms that are hardwired directly into relevant safety-critical processes, where each window relates to a fixed alarm point from the sensor. If an abnormal event is detected, the relevant window on the panel lights up and the alarm emits a sound, immediately giving operators the necessary information to act.

Bradshaw says it is common to still see in use alarm annunciators that were first installed in the 1980s and 1990s. Some of these are no longer manufactured or supported and most do not meet the current safety requirements. As a result, many sites face obsolescence and support issues and now need to upgrade critical alarm systems.

Updating alarm systems

He says there are three key considerations that plant managers need to take into account when updating alarm annunciators in their facilities. Firstly, it is crucial that they determine which alarms are classified as SHE alarms and ensure that these are directly hardwired into the processes. This is essential because networked alarms can be susceptible to outages, which means, if the network goes down, the plant loses all the alarms on that network. If alarms are individually hardwired and one wire is lost, only one alarm is lost, and if this alarm is detected from a normally closed alarm contact, then a wire break would still be seen as an alarm on the annunciator window.

The second consideration is the importance of having each of the alarm windows on the annunciator panel permanently dedicated to a specific process. This facilitates pattern recognition and familiarity for the operators and improves operator response times, an important aspect of safety standards.



Distributed alarm annunciator systems, like the Maxiflex system, can help safety-critical facilities meet strict safety standards.

Thirdly, all alarms should be appropriately prioritised using an easy-to-understand system, such as colour coding each window to match the severity of the alarm it represents. This gives operators a clear order of priority in situations where multiple alarms go off and further supports them to respond quickly and effectively.

Maximum flexibility

Omniflex's Maxalarm alarm annunciator system offers a complete distributed modular alarm management system for safety-critical plants. It incorporates features such as sub-millisecond time stamping at source, integrated analogue logging and remote Omni X LED alarm fascias, to meet EEMUA 191 guidelines. The Maxalarm system provides a dependable layer of plant protection and early diagnostics of faults in real time.

The system can be configured using standard 24 Vdc and 48 Vdc input modules and has specialist sequence-of-event digital input modules. These ensure all the digital inputs are time stamped in real time to a resolution of less than one millisecond. It is ideal in facilities where the potential for multiple simultaneous alarms is high and it is important for operators to know the chronological order of alarm alerts. It also improves data auditing and event analysis capabilities.

For more information contact Omniflex.

Email: gary@omniflex.com

Visit: www.omniflex.com

Manufacturing clean energy technologies

The future of clean energy technology manufacturing is the subject of a new report released earlier this year by the International Energy Agency (IEA). The report sees the energy world positioned at the dawn of a new industrial age – the age of clean energy technology manufacturing – which is creating major new markets and millions of jobs, but also raising new risks, prompting countries around the globe to devise industrial strategies to secure their place in the new global energy economy.

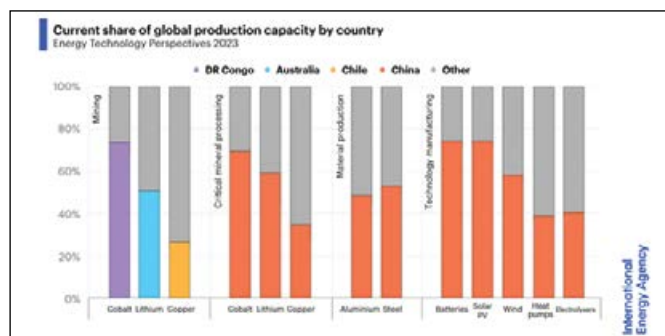
Energy Technology Perspectives 2023 (ETP 2023), the latest instalment in one of the IEA's flagship series, serves as the world's first global guidebook for the clean technology industries of the future. It provides a comprehensive analysis of global manufacturing of clean energy technologies today – such as solar panels, wind turbines, electric vehicle (EV) batteries, electrolyzers for hydrogen and heat pumps – and their supply chains around the world, as well as mapping out how they are likely to evolve as the clean energy transition advances in the years ahead.

The analysis shows the global market for key mass-manufactured clean energy technologies will be worth around USD 650 billion a year by 2030 – more than three times today's level – if countries worldwide fully meet their announced energy and climate pledges. The related clean energy manufacturing jobs would more than double from 6 million today to nearly 14 million by 2030 – and further rapid industrial and employment growth is expected in the following decades as transitions progress.

However, the current supply chains of clean energy technologies present risks in the form of high geographic concentrations of resource mining and processing as well as technology manufacturing. For technologies like solar panels, wind turbines, EV batteries, electrolyzers and heat pumps, the three largest producer countries account for at least 70% of manufacturing capacity for each technology – with China dominant in all of them. Furthermore, much of the mining for critical minerals is concentrated in a small number of countries. For example, the Democratic Republic of Congo produces over 70% of the world's cobalt, and just three countries – Australia, Chile and China – account for more than 90% of global lithium production.

The world is already seeing the risks of tight supply chains, which have pushed up clean energy technology prices in recent years, making countries' clean energy transitions more difficult and costly. Increasing prices for cobalt, lithium and nickel led to the first ever rise in EV battery prices, which jumped by nearly 10% globally in 2022. The cost of wind turbines outside China has also been rising after years of declines, and similar trends can be seen in solar PV.

IEA Executive Director Fatih Birol said: "The IEA highlighted almost two years ago that a new global energy economy was emerging rapidly. Today, it has become a central pillar of economic strategy and every country needs to identify how it can benefit from the opportunities and navigate the challenges. We are talking about new clean energy technology markets worth hundreds of billions of dollars as well as millions of new jobs. The encouraging news is the global project pipeline for clean energy technology manufacturing is large and growing. If everything announced as of today gets built, the investment flowing into manufacturing



The share of production in materials and technology for renewable energy tends to be concentrated in a few countries.

clean energy technologies would provide two-thirds of what is needed in a pathway to net zero emissions. The current momentum is moving us closer to meeting our international energy and climate goals – and there is almost certainly more to come.

"At the same time, the world would benefit from more diversified clean technology supply chains," Dr Birol added. "As we have seen with Europe's reliance on Russian gas, when you depend too much on one company, one country or one trade route – you risk paying a heavy price if there is disruption. So, I'm pleased to see many economies around the world competing today to be leaders in the new energy economy and drive an expansion of clean technology manufacturing in the journey to net zero. It's important, though, that this competition is fair – and that there is a healthy degree of international collaboration, since no country is an energy island and energy transitions will be more costly and slow if countries do not work together."

The report notes that major economies are acting to combine their climate, energy security and industrial policies into broader strategies for their economies. The Inflation Reduction Act in the United States is a clear example of this, but there is also the Fit for 55 package and REPowerEU plan in the European Union, Japan's Green Transformation programme, and the Production Linked Incentive scheme in India that encourages manufacturing of solar PV and batteries – and China is working to meet and even exceed the goals of its latest Five-Year Plan.

Clean energy project developers and investors are watching closely for the policies that can give them a competitive edge. Relatively short lead times of around one to three years on average to bring manufacturing facilities online, mean the project pipeline can expand rapidly in an environment conducive to investment.

Amid the regional ambitions for scaling up manufacturing, *ETP-2023* underscores the important role of international trade in clean energy technology supply chains. It also highlights the specific challenges related to the critical minerals needed for many clean energy technologies, noting the long lead times for developing new mines and the need for strong environmental, social and governance standards. Given the uneven geographic distribution of critical mineral resources, international collaboration and strategic partnerships will be crucial for ensuring security of supply.

For more information visit: www.iea.org



Professor Kumar Venayagamoorthy – winner of the SAIEE President's Award.

Celebrating excellence in electrical engineering

The South African Institute of Electrical Engineers (SAIEE) recently hosted its 2022 Annual Awards evening at a celebratory event in Johannesburg. SAIEE President, Mr Prince Moyo welcomed all the guests. Here we celebrate the award winners and share their respective achievements.

Winner of the SAIEE President's Award: Professor Kumar Venayagamoorthy

This prestigious award, sponsored by Revive Electrical Transformers, recognises significant contributions in any sector of electrical, electronic, telecommunications and computer engineering in South Africa. Prof Kumar Venayagamoorthy is an Honorary Professor of the University of KwaZulu-Natal (UKZN) in Durban, South Africa, since 2014, and the Duke Energy Distinguished Professor of Power Engineering and Professor of Electrical and Computer Engineering at Clemson University, South Carolina, USA, since January 2012.

Over the past 25 years his contributions have primarily emphasised the development and implementation of advanced computational methods and artificial intelligence-based algorithms for smart grid applications (such as nonlinear modelling and control of power systems, power system optimisation, predictions and forecasting of wind and solar energies, energy management systems, wide area monitoring and control systems, dynamic optimal power flow, electric vehicles, micro-grid systems, demand-response management). He works on developing synchrophasor applications and situational awareness and intelligence systems for electric power control centre operations and management.

Prof Venayagamoorthy has received several awards for faculty, research and teaching excellence from universities, professional societies and organisations, including the 2005 South African Institute of Electrical Engineers Young Achiever's Award presented by ABB PowerTech Transformers. He is a Fellow of the South African Institute of Electrical Engineers (SAIEE), IEEE, IET (UK), and Asia-Pacific Artificial Intelligence Association (AAIA), and a Senior Member of the INNS.

Winner of the SAIEE Engineer of the Year Award: Professor Fulufhelo Nelwamondo

This award, sponsored by ACTOM (Pty) Ltd, recognises an SAIEE member who has energetically and voluntarily worked towards promoting electrical science and its applications for the benefit of members of the SAIEE and the Southern African community.

Prof Nelwamondo is an electrical engineer by training and holds a Bachelor of Science degree and a PhD in Electrical Engineering in Computational Intelligence, both from

the University of the Witwatersrand in South Africa. He is a registered Professional Engineer, a Member of the SAIEE and a Council member. He is a senior member of the IEEE. He served as Executive Director for the CSIR Modelling and Digital Science Unit and a visiting professor of Electrical Engineering at the University of Johannesburg. He previously was a post-doctoral fellow at the Graduate School of Arts and Sciences of Harvard University.



From left: Lee Mbenge, ACTOM, Prof Fulufhelo Nelwamondo – winner of the SAIEE Engineer of the Year Award, and Prince Moyo, SAIEE President.

Prof Nelwamondo, currently CEO of the NRF, has research and practical experience in software engineering, computational intelligence and optimisation in various applications. He is the youngest South African to receive the Harvard-South Africa fellowship. He has been awarded many national and international research accolades, the latest being the Order of Mapungubwe in Silver, which he received in 2017. He has received other accolades from organisations such as the IEEE, SAIEE, National Science and Technology Forum, and Springer, among others.

SAIEE Keith Plowden Young Achiever's Award: Bongumsa Mendu

This award is dedicated to the most outstanding young achiever of the year in electrical/electronic engineering. What counts in the winner's favour is their spirit of achievement, creativity and leadership in the workplace. In addition, innovative, entrepreneurial actions and infectious enthusiasm for success are among the qualities exhibited by young achievers.

Bongumsa Mendu started practising as an electrical technician in 2013 at Eskom Holdings SoC Limited. Since 2016, he has been the Chairperson of Power System Technical Investigations of Eskom Northern Cape. Currently, he is a Power System Plant Data Analyst and



Bongumsa Mendu, SAIEE Young Achiever Award winner.

Special Investigator and acting as a line Manager for Plant Sector Engineering & Specialised Investigations in Plant Management, Maintenance and Operations in Eskom Northern Cape.

In collaboration with the University of South Africa, under the Department of Electrical and Mining Engineering, he successfully supervised ten students for Design Project III and Industrial Project (EIP3701) during the 2022 academic year. In addition, he is currently a judge for Eskom Expo for Young Scientists in the Northern Cape.

SAIEE Engineering Excellence Award: **Zwelandile Mbebe**

The SAIEE Engineering Excellence Award is awarded to a person who has excelled in electrical engineering and in their personal capacity, someone who supports and mentors those with whom they interact in the workplace.

Zwelandile Mbebe has been a superb performer in each role he has played at the office and within the workgroups at fraternal organisations (such as SAIEE, UTC, Cigre, SABS) and has far exceeded any expectations for efficiency and productivity. He stands out as one of the very best. He is loyal and flies the Eskom flag high, despite the current challenges facing Eskom.



From left: Leanetse Matutoane, SAIEE CEO, and Zwelandile Mbebe – winner of the SAIEE Engineering Excellence Award.

His unique talent and skill-set in utility telecoms make him a sought-after asset who also plays an ambassadorial role in promoting Eskom within our fraternity and pays credence to Eskom's engineering prowess. He has served on the SAIEE Council for a number of years.

SAIEE Women in Engineering Award: **Sy Gourrah**

The SAIEE Women in Engineering Award, sponsored by Schneider Electric, recognises a woman who is active in the profession, an SAIEE Member, Senior Member, Fellow or Council Member who has excelled in electrical engineering. She demonstrates above average involvement in supporting the SAIEE with her aims and objectives and her capacity to support and mentor colleagues. Her peers and competitive counterparts have high regard for her integrity in all her engineering business dealings. This award winner is a role model of the highest calibre.

Ms Gourrah has been part of the energy industry in South Africa for over 25 years. She holds several qualifications, including a Bachelor's Degree in Engineering (Electrical & Electronics), a Master's in Business Administration and a Government Certificate of Competency. She served as the President of the Association of Municipal Utilities (AMEU) and on the AMEU executive council. She was the first woman to serve as President of the AMEU and she was instrumental in changing the AMEU constitution to include more women on the executive, thus paving the way for the next female president.

She has served as the SAIEE President and chaired and participated in various SAIEE committees. She recently launched



From left: Leanetse Matutoane, SAIEE CEO, Sy Gourrah – winner of the SAIEE Women in Engineering Award, and Vladimir Milovanovic, Schneider Electric.

the SAIEE Women in Engineering Chapter, which will strive to promote women's interests and champion empowerment programmes within the SAIEE and the broader electrical engineering profession.

She is registered with the Engineering Council of South Africa (ECSA) as a professional engineer. She was also part of the advisory team formed to advise the Deputy President on the Eskom turnaround strategy.

SAIEE Centre of the Year Award: **Central Gauteng Centre**



SAIEE Central Gauteng Centre – winner of the 2022 SAIEE Centre of the Year Award.

SAIEE Centres are evaluated against a set of agreed KPIs, including events organised, membership increase, centre membership activity as gauged by the attendance at events organised, monthly reporting to head office, and corporate social investment initiatives. This centre submitted reports to head office on time for 7 out of 12 months, hosted several CSI initiatives, among them a Career Day, Spelling Bee and a collection of second-hand clothing for donation to schools. It scored a total of 22 points on the KPIs, with the next nearest centre scoring 17. It is one of the most vibrant SAIEE Centres with a clear agenda to make things happen.

The sponsors

The SAIEE acknowledges all the sponsors that make the Annual Awards possible. They are: Revive Electric Transformers, Actom, Schneider Electric, Proconics, and LEDVANCE.

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



Minister of Forestry
Fisheries & Environment,
Barbara Creecy.

Balancing climate transition with energy security

Minister of Forestry, Fisheries and the Environment, Barbara Creecy expresses a refreshingly clear perspective on South Africa's Just Energy Transition. Addressing the Mining Indaba in Cape Town in February, the minister emphasised the importance of solutions that will balance energy security in the context of the climate transition to ease the physical and economic risks posed by climate change.

"If we fail to tackle the energy crisis, we know we will not meet our development targets. We will undermine our gross domestic product (GDP), and exacerbate our already high levels of poverty, inequality and unemployment.

"If we fail to mitigate greenhouse gas emissions and build domestic resilience to extreme weather events, we risk damage to human health and wellbeing, built infrastructure, food and water security," she said.

The minister said the issues of energy security and the just transition require collective efforts and decisive action.

"Equally significant will be ensuring that as our major trading partners transition to greener forms of energy generation and industrial production, South African goods and services, all of which have a high carbon footprint, remain competitive. The European Union, a major trade partner, is already introducing carbon border tariffs to protect investments in greener production from goods and services produced in carbon intensive economies.

"So, understanding the physical and economic risks posed by the climate transition is essential as we position ourselves to approach the complex question of balancing energy security in the context of the climate transition," the minister said.

Building a low carbon economy

As the country negotiates its way through this complexity, a number of issues should be considered. They include building a low carbon economy; new opportunities for investment, employment and prosperity; regulations; finance and climate justice.

"Our government has never advocated a sudden or precipitous move away from either coal-fired generation or towards a low carbon economy. The National Development Plan and Eskom talk of attaining net zero emissions by mid-century, nearly thirty years from now," Creecy said. "Building a low carbon economy and a climate resilient society will not happen overnight. It requires wide-reaching technological, economic and societal changes. Changes that will build new forms of power generation, attract new investment in our productive processes, prioritise the needs of vulnerable workers, communities and social groupings. It is the task of a generation.

"This means, as many commentators have said, coal will remain part of our energy mix into the 2040s, and improving the energy availability factor of our current power stations is

a pressing imperative. But this doesn't mean we can just sit back and wait," Creecy said.

Investing in renewables

She noted that (fellow BRICS countries) India and China are already developing the biggest renewable energy generation programmes in the world.

"Yes, they are currently using coal. However, their renewable build tells us they fully understand the economic transition risks that lie ahead, and they have no intention of being cut out of future trade markets," the minister said.

"Addressing the issues of energy security and the just transition will bring in new opportunities for investment, employment and prosperity in the climate transition.

"For the mining sector, these have to be in the so-called 'minerals of the future' and include rare earth minerals, lithium for battery storage and the platinum value chain, where South Africa already has an established advantage.

"Mining houses such as Seriti and Anglo Gold have signalled their commitment to renewable energy by investing in solar and wind powered projects. Last year President Cyril Ramaphosa participated in the launch of the world's largest hydrogen-powered mining haul truck at Anglo American's Mogalakwena platinum mine," the minister said.

Accordingly, from an energy security perspective, there are also significant opportunities in wind and solar generation, the development of new green liquid fuels, and the development of new forms of mining equipment using cutting edge technology in the green hydrogen value chain.

"Finance was one of the most heavily contested issues at COP27 (the Conference of Parties of the United Nations Framework Convention on Climate Change) in November last year, with developing countries putting up a significant battle to attract international support for both mitigation and adaptation.

"In our case, outside of the formal United Nations Framework, an initial amount of USD \$8.5 billion has been offered by a number of developed countries through a combination of financial instruments including grants and concessional loans, as a first small step to help finance the country's just transition," the minister said. She added that prudent use of this initial investment could attract further investment as there is interest and appetite amongst investors.

Climate Change Bill

To create the certainty necessary to attract investment, and manage competing interests and stakeholders, a clear regulatory framework is required. In this regard, the minister noted the Climate Change Bill, currently before Parliament for approval, and the Just Transition Framework adopted by government last year, as key guiding policies.

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

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