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FEATURES:

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

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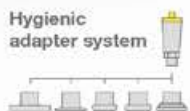
Individually selectable:

-  Measurement in progress
-  Sensor switching
-  Process malfunction

Compact design



Hygienic adapter system

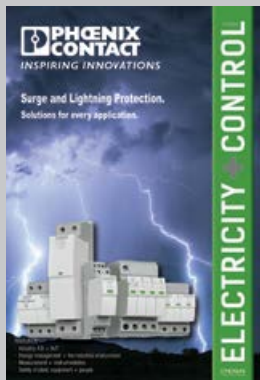


IO-Link



Adjustment via
smartphone





Due to their exposed location, solar PV installations are vulnerable to increased risk of damage by lightning and, in their design, require particular attention to be given to lightning and surge protection measures.

(Read more on page3.)

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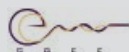
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Lightning protection in focus

Foregoing the usual nature of my comment here in *Electricity + Control*, I will note in this October issue that the 36th International Conference on Lightning Protection (ICLP) is being convened at the International Convention Centre in Cape Town (CTICC) early this month. This is the world's leading conference on lightning protection and this year will cover all aspects of the topic. A key feature – protection of renewable energy systems – will be carefully unpacked.

This is a critical element of the current energy generation sector – and renewable energy plants pose significant challenges as they often incorporate a combination of signal and energy cables and they cover large geographic areas. Unlike traditional energy generation plants, they do not usually include significant installed structure and systems that can play an important role in providing inherent protection and site-wide equipotentialisation.

It is interesting to note that current standards do not always easily describe what has to be done in the case of such complex sites. Much of the discussion, therefore, will revolve around how we deal adequately with such situations.

The reason I want to mention the ICLP 2022 is not only to acknowledge the honour of being able to host such a prestigious international conference in South Africa, but also to reflect for a moment on how it speaks to the many decades of cutting-edge research in the area that has flowed from South Africa. This work has been undertaken at the CSIR, a number of our universities, as well as at Eskom. The conference is an ideal platform to invite the world to hear our stories.

It is particularly exciting too, that this is a face-to-face conference. Given that the bid to host the conference was won in 2014,

no one anticipated the crisis that came with Covid-19. Finally that seems to be behind us – at least for now.

It is also especially heartening to note that this is the first time the conference will be convened in the southern hemisphere, the first time on the African continent, and of course the first time in South Africa. It will bring together representatives of over 40 countries, and more than 200 papers will be presented over the week.

It must be noted that this is a fully reviewed conference in that every paper that is accepted for presentation will have been reviewed by a number of international experts. As such, these will be lodged on an international database of published works.

We'd love you to join us in Cape Town!

With some of the most spectacular thunderstorms in the world, South Africa's long history of lightning research and the country's experienced protection industry, ICLP 2022 and South Africa are a natural fit. The conference is hosted by the University of the Witwatersrand (Johannesburg), and will be held in Cape Town at the Cape Town International Convention Centre. The programme will cover, among many other aspects, lightning protection of renewable energy systems, of power systems, and of infrastructure, plus earthing of transmission lines, and safety for people and infrastructure.

For more information visit:
www.iclp2022.org

Ian

Ian Jandrell

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



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Protection of DC systems in photovoltaic installations

The use of renewable energy sources has become increasingly important in recent years. In addition to wind turbine generators, hydroelectric plants or biomass systems, photovoltaic power generation systems (PV systems) supply a significant portion of renewable energy. PV systems are designed, for example, as rooftop systems on private homes and industrial buildings as well as free-standing systems. Due to their exposed location, the systems are vulnerable to increased risk of damage by the effects of lightning. To prevent such damage and the associated loss of system availability, lightning and surge protection measures need to be considered during the design phase. Standards and directives tailored specifically to PV power supply systems make it easy to plan lightning and surge protection for these systems.

Free-standing PV systems with external lightning protection

Compared to lightning protection in physical structures, other aspects become relevant for the design of effective lightning and surge protection systems for free-standing PV installations. These include:

- Equipotential bonding mesh width
- Design of the grounding system
- Use of inverter types (string or central power inverters).

Free-standing systems are generally characterised by a high intermeshed equipotential bonding system, which is normally equipped with numerous ground connections. The module frames are also connected to the equipotential bonding system. The cable lengths between the PV

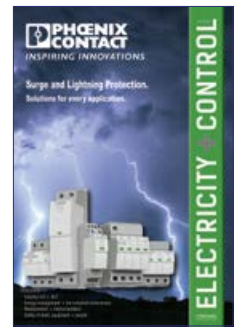
panels and the feeding point can be several hundred metres in these systems. If lightning strikes the external lightning protection system, partial lightning currents are coupled into the equipotential bonding system. Therefore, free-standing systems with central power inverters on the dc side need to be protected using type 1 SPDs (surge protection devices). The required performance for these is specified in the table below. For free-standing systems with string inverters installed near the PV panels, the following guide applies.

To protect the AC side, choose SPDs with a discharge capacity analogous to the values shown in the table below. To protect the DC side, it is sufficient to use type 2 SPDs with a discharge capacity of at least 5 kA (8/20 μ s) per mode of protection.

VALVETRAB-MB-...-DC-PV

The costs of a PV system can be significantly reduced by a high DC system voltage of up to 1 500 V. Fewer string combiner boxes are needed, and material costs for cable installation are also reduced. With the VAL-MB product range, Phoenix Contact is setting new standards with high-performance SPDs for voltages up to 1 500 V DC.

The range features a high total discharge capacity of 12.5 kA (10/350 μ s) and thus satisfies all standard requirements and conditions of the installation guideline for use in lightning protection classes III and IV. □



The VALVETRAB VAL-MB-T1/T2 1500DC-PV/2+V-FM.

Lightning protection class LPL Maximum lightning surge current (10/350 μ s)		SPDs on the DC side I_{imp} in kA (10/350 μ s), I_n in kA (8/20 μ s)							
		Voltage-limiting SPDs			Voltage-switching SPDs				
		MOV		MOV + GDT in series		GDT		MOV + GDT parallel	
		$I_{10/350}$		$I_{8/20}$		$I_{10/350}$			
		Per mode of protection	I_{total}	Per mode of protection	I_{total}	Per mode of protection	I_{total}		
III or IV	100 kA	5 kA	10 kA	15 kA	30 kA	10 kA	20 kA		

Lightning current parameters ($I_{10/350}$) and I_n ($I_{8/20}$) for SPDs on the DC side in free-standing PV systems with a central power inverter.

For more information contact Cameron Taylor at Phoenix Contact South Africa.

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Eplan Vice President
Software Portfolio,
Thomas Weichsel.

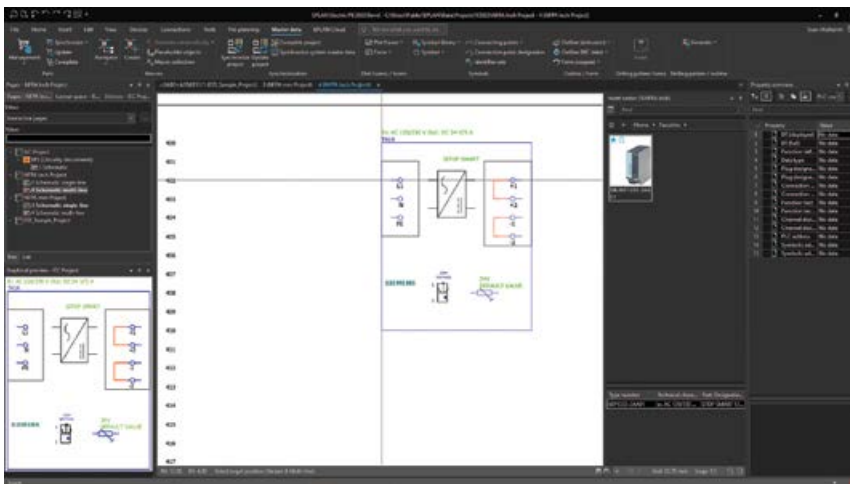
Streamlining engineering project planning, internationally

The new Eplan Platform 2023 is streamlining and accelerating project planning with new cloud-based device management and multi-standard support for schematic macros. This means users can get results more quickly – especially when working on international projects – due to the simplified device data management system, and increase overall project quality. Other features also add new performance capabilities and transparency in engineering.

The new Eplan Platform 2023 combines a number of elements that make it easier to use – and to pay off through time savings and increased performance for users. Eplan Vice President Software Portfolio, Thomas Weichsel says, “Along with the many opportunities for collaboration in engineering, the new multi-standard support for schematic macros is a key feature. On the new Eplan Platform 2023, it saves users from having to deal with device data management, which used to be quite time-consuming – particularly on international projects.”

Standards compliant – up to twenty schematic macros for devices

Company-specific standards such as guidelines, different dimension specifications and varying standards on the world market – such as NFPA or IEC – require different ways of representing devices in the schematics. Previously, just one macro could be saved per device. With the new device data management system, up to twenty different schematic macros can be assigned to each device. The advantage for users is that the software now automatically assigns the correct macro after the relevant standard has been selected, and it can then be easily transferred into the schematics via drag and drop. This simplifies how devices are handled, provides a better project overview and reduces the administrative effort required.



Company-specific standards, and different international standards, can be easily depicted with the new device management system.

Component manufacturers that provide device data for the Eplan Data Portal, according to the Eplan Data Standard, also benefit, as Weichsel explains. “In future, a driver – for example – can be stored and maintained as one data set with different schematic macros on the Eplan Data Portal. This considerably reduces the amount of effort required of manufacturers in providing and maintaining their data.”

Cloud-based device management

Using Eplan eStock, the new device data management means device data can be maintained in the Eplan cloud. This makes collaboration easier and reduces coordination times and media disruptions. Accessing Eplan eStock works independently of company location; project participants can access the device data in the cloud easily and securely, whether they are working from home, at another company location internationally, or are data sharing with business partners. Companies thus save time as well as the costs of setting up and maintaining their own extra IT infrastructure.

3D graphics engine

Machines and plant systems are becoming increasingly automated and the digital twin is becoming an integral part of control cabinet and switchgear engineering processes. This is accompanied by increasing complexity and higher demands for the 3D structuring of control cabinet layouts. The amounts of data and information that must be managed are increasing exponentially. Users previously needed a lot of patience, especially for renderings of large 3D models. With the new Engine Direct3D graphics core, Eplan has sped up project processes. The 3D rendering is faster, and actions such as zooming or rotating are much smoother and easier.

Optimised cable management

Eplan Platform 2023 also simplifies the field cabling of control cabinets that may be distributed throughout a plant system in a decentralised way. For instance, the new cable editor makes it easier to manage and visualise a cable on the Eplan Platform – no matter the

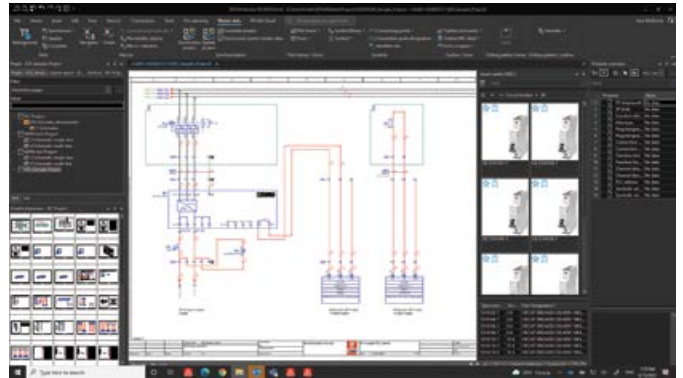


The new 3D graphics engine makes actions such as zooming or rotating smoother and easier.

number of wires. Device and type number, source and destination, and the shielding and connection are graphically displayed in a single dialogue box. The new cable editor thus also lays the foundation for virtual machine cabling and easy cable-length determination in Eplan Harness proD. Cable information is visible at a glance – from the source to the destination.

Improved project overview

The expanded Insert Centre in the Eplan Platform 2023 allows for symbols, macros and devices all to be displayed in a more focused way, as a table in a dialogue box. This provides a better project overview. Users can also intuitively search for devices –



The expanded Insert Centre provides a better project overview and allows users to search for devices intuitively.

even in external or linked documents. Which components use which current strength? When clicking in the table, the logic information is made visible directly. And the new tagging function makes navigation easier: logical selection paths and better project structures accelerate searching and project planning overall. The new interface to Microsoft Excel also simplifies work for users: they no longer need to install the software themselves to output data in that format, making the outputting of lists and tables more efficient. □

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



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Software toolkit for Industry 4.0



moneo is a modular IIoT software platform, adaptable and scalable to suit users' needs.

As an IIoT platform, ifm moneo provides for the combination of operational technology with information technology. The sensor data generated in production plants can be read and processed easily and used as a basis for corporate decisions.

moneo has a modular structure and consists of basic software as well as applications, for condition monitoring or for IO-Link sensor parameter setting, for example. This makes it possible to put together a tailor-made software package for individual requirements.

Key advantages

- *Open technology platform simplifies integration*

moneo is designed to enable simple and fast implementation of the modules and provide user-friendly interfaces. Thus, an IIoT project will be immediately ready to go and staff will quickly appreciate the digital support. moneo is an industry-independent, manufacturer-independent IIoT platform, which enables the user to integrate a wide range of existing devices and use the data more efficiently.

- *Increased efficiency of the plant*

moneo converts sensor data into digital information, evaluates it, and transmits it to the IT world. There, the data is available to provide a reliable basis for decision-

making. With moneo, machines can be maintained predictively, unplanned downtime can be avoided and plant efficiency can be increased.

- *Early detection of damage*

moneo analyses the sensor data and detects deviations. If a machine is running differently to the way it usually does, this indicates wear, or changes in the process that could lead to failure. There is often enough time between the occurrence of the first deviations and a standstill – to schedule predictive maintenance.

- *Customisable system solutions*

The modular approach of the moneo platform makes it particularly flexible in adapting to the requirements of an IIoT project. In a digital toolbox, it offers the right modules for different applications and industries. The modules can be booked as required. This makes the kit convenient to use, with low investment costs and high flexibility.

- *moneo grows to suit the user's requirements*

The function modules are scalable for all machines. The starter kit provides a basic start to digitisation. If the user is ready for the next steps, an extension by further modules or device connections is easy. With the info-point licences, the costs depend on the number of data points in use. moneo is a growing system – and can grow in line with each user's requirements.

For more information contact ifm SA.

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Visit: www.ifm.com



Michele McCann, Head of Interconnection and Peering at Teraco.

LINX / NAPAfrica collaboration supports internet access

The London Internet Exchange (LINX) has announced a strategic collaboration with African Internet Exchange Point, NAPAfrica. Both Internet Exchanges are similarly run, not for profit, putting their membership communities first. Located within Teraco data centre facilities in Cape Town, Durban and Johannesburg, NAPAfrica aims to help make internet access more universal across Africa. Now ten years' old, it has become the largest internet exchange on the continent.

The partnership will mean networks currently connected and peering at NAPAfrica or LINX can access either of the exchanges via trusted and mutually available carriers.

Michele McCann, Head of Interconnection and Peering at Teraco, says: "Our founding goal at NAPAfrica is to help make internet access more pervasive for the African continent. We are excited to be collaborating with LINX to provide clients with a more direct and improved internet experience to any LINX location. The immediate benefit to carriers, cloud providers and content delivery networks, connected or peering at either NAPAfrica or LINX in London, is a more streamlined end-user experience.

"Our relationship with LINX is the first of what we anticipate will be more, similar, collaborative partnerships

with internet exchanges seeking to provide a world-class internet experience for all users across the African continent," she says.

LINX has provided interconnection services for networks for over 25 years, with more than 850 networks connected to its London platforms alone. The partnership with NAPAfrica will make reaching London and peering at LINX a reality for African networks.

Nurani Nimpuno, Head of Global Engagement for LINX, says: "We have always worked closely with our friends at NAPAfrica, sharing technical knowledge and insights. Announcing a more strategic partnership will open doors and optimal routes to Europe for the African networks that may not have been able to reach us before."

Peering has been the telecommunications community's primary data transfer method for years. By peering, networks benefit from low latency, and a more direct and controlled route for their data. A single connection into an Internet Exchange Point (IXP) can mean multiple peering opportunities with global networks. Many networks peer at multiple IXPs to keep their traffic local for end users in the respective geographical area.

For more information visit: www.napafrika.net

Cables for repetitive movement and robotics

One of the world's leading manufacturers of flexible cables and energy chains that protect moving cables, igus®, is extending its product range in South Africa to cater for increasing demand. The local company has also increased its stockholding of all its fast-moving products in order to shorten lead times for customers with regular requirements for its cables and accessories.

igus energy chains are used in various applications in the country, particularly where cables are required to flex and follow a linear path such as in cranes, heavy equipment, robotics and other applications.

Despite the protection offered by the company's specially designed all-polymer energy chain construction, traditional types of cables are less suited to the stresses and strains of repetitive movement and provide considerably shorter lifespans than igus' Chainflex® product.

According to igus South Africa Managing Director, Ian Hewat, the German company is best known for its development of special polymers for its range of energy chains, as well as long-lasting polymer bearings and bushes that can extend the lifespan of machines and equipment up to 10 times. The introduction of its specially designed cables has proven to be ground-breaking with Chainflex® cables significantly outlasting alternatives, in

the laboratory and in the field. As a result, many of the country's ports and other equipment intensive industries have specified igus cable and energy chain solutions.

Chainflex® cables are unharnessed cables for moving applications in energy chains, or for robot applications and are supplied with a fail-safe 36-month guarantee. The cables meet the requirements for EMC safety as well as industry standards and guidelines such as UL, CSA, EAC, Interbus and Profibus.

The product portfolio ranges from control cables, servo cables, motor cables and robot cables to bus cables, data cables, encoder cables and fibre optic cables, and all are available with a selection of various jacket materials.

"The growing popularity of igus' cables and energy chains in South Africa is a result of well documented successes. Our customers are confident that our cables for energy chains work flawlessly over long periods, even with many cycles, high speeds and accelerations as well as in extreme ambient conditions," says Hewat.

**For more information contact igus South Africa.
Tel: +27 (0)11 312 1848
Email: ihewat@igus.net, visit: www.igus.co.za**



igus energy chains are widely used in applications where cables need to flex and follow a linear path.



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Digitalising production lines for all-electric vehicles



Siemens continues to support Nissan in digitalising and electrifying its production facilities, to realise the Intelligent Factory.

Leading automation and industrial software supplier, Siemens, is working with Nissan to build production lines for the new all-electric crossover Nissan Ariya at the company's plant in Tochigi, Japan. Together the companies are building on their longstanding collaboration. Nissan already uses the Siemens Digital Industries software portfolio to optimise design and production. End-to-

end digital threads enable the automotive manufacturer to connect various sources of information across product lifecycle management (PLM) platforms.

"The successful launch of the new production lines marks a milestone in the collaboration between the two companies," says Cedrik Neike, Member of the Managing Board of Siemens AG and CEO of Digital Industries. "Climate change and stringent environmental regulations are strong drivers for the development of electrified powertrains. We will bring all our cutting-edge technologies to this collaboration to enable highly flexible, efficient and sustainable automotive production."

Teiji Hirata, Corporate Vice President, Vehicle Production Engineering and Development Division at Nissan Motor Co. Ltd., says, "At our Nissan Intelligent Factory in Tochigi, we are building the future of mobility. The facility will enable us to improve the work environment and to realise a zero-emissions production system. To digitalise our new electric vehicle production line, we chose to work with Siemens, our innovation partner and one of the leading companies in industrial

automation and digitalisation, because they have the necessary expertise in this area."

The system architecture of Nissan's newly developed electric powertrain aims to standardise the processing and assembly of the powertrain. It includes Siemens' safety PLC Simatic S7-1500, ET200SP distributed I/O module as Siemens' 'one single solution' (OSS). PROFINET creates end-to-end communication from the field to the management level, and the engineering framework, TIA Portal, integrates all automation devices. This enables access to the entire digitalised automation process, from digital planning to integrated engineering and transparent operation.

More intelligent automobiles require more and high-performing electronic control units (ECUs) in the vehicle – as is the case in the new Nissan Ariya. The Siemens diagnostic commissioning system Sidis Pro, which has already been deployed in many automobile companies around the world, is implemented at Nissan's new production line for data writing into the ECUs and verifying automotive electric components. Sidis Pro is the advanced vehicle diagnosis and inspection data management system that provides optimal support for inspection processes to enable quality in car production. Sidis Pro manages a wide range of data with server functions, contributing to the digitisation of production lines. It enables a high level of flexibility in automotive production as it is easily modifiable, depending on the production plan, and the changes can be adapted quickly. The same software can be used for different applications, enabling system standardisation and ensuring fewer resources are needed to perform more tasks, at other production sites as well.

For more information visit: www.siemens.com

Updated RFID interfaces serve new IIoT functions

A free firmware update makes Turck Banner's IP67 RFID interfaces fit for barrier-free communication in IIoT applications, such as for simple product identification and tracking. While the OPC UA server with the AutoID Companion Specification V. 1.01 ensures smooth, direct communication with MES, PLC, ERP or cloud systems, Turck Banner's HF bus mode offers cost benefits for applications with many read points. Users also benefit from the minimal effort required to integrate HF and UHF systems.

The firmware update makes the TBEN-L5-4RFID-8DXP-OPC-UA the first RFID module with an integrated OPC UA server to support Turck Banner's HF bus mode. This allows the connection of up to 32 HF read/write devices to each individual RFID input. With four RFID channels

per module, this means up to 128 read points can be captured and parameterised centrally.

The new firmware also enables the continuous reading of UID/EPC or RFID user data. In this way, an MES or SAP system can, for example, receive or process data at any time as an event message without executing a method. It is activated by setting a variable, which remains active after a power reset, so the RFID system can continue to supply data reliably even after a power failure.

The new web server with optimised user guidance and intuitive design enables the web-based configuration of the OPC UA server, including the UHF parameters, and supplies UHF tools for testing the reading of tags.

**For more information contact Turck Banner.
Tel: +27 (0)11 453 2468
Email: Hennie.Blignaut@turckbanner.co.za
Visit: www.turckbanner.co.za**

The OPC UA server with AutoID Companion Specification V. 1.01 enables direct communication with MES, PLC, ERP or cloud systems.



It all hinges on renewables

Earlier this year, the Boston Consulting Group (BCG) released its integrated energy report, which pulls together findings from research on South Africa's energy sector, undertaken over the past two years by The National Business Initiative (NBI), Business Unity South Africa (BUSA), and BCG. The research reinforces the now growing recognition that South Africa urgently needs to transform its energy system in order to reach net zero by 2050 and ensure a Just Transition. It confirms too that the long-term cost of inaction would be high.



Lucas Chaumontet,
MD and Partner at
BCG, Johannesburg.

For South Africa, as the most carbon-intensive economy among the G20 countries, almost 50% of the country's exports are at risk as key trade partners prioritise imports from low-carbon economies instead. Combined with stalled GDP growth, extremely high unemployment, rising inequality, and the increasing severity of climate impacts, a Just Transition to a net-zero economy by 2050 is seen as imperative. Decarbonising South Africa's electricity system, by ramping up renewable energy deployment, is the catalyst for driving that change.

Through the Climate Pathways and Just Transition study the NBI, BUSA and BCG have explored pathways to achieve a net-zero economy within a fair share carbon budget, and to drive economic growth that will lift people of the country out of poverty, inequality, and unemployment.

The study is regarded as one of the most robust, transparent, and inclusive climate studies in South Africa, and is championed by a cross-sector group of more than 30 CEOs. The research was conducted in consultation with over four hundred stakeholders from across business, government, civil society, and labour through two hundred plus hours of technical workshops and one-on-one engagements. This work, led by business, has been recognised locally and internationally, positioning the private sector as instrumental in achieving a just transition to a net-zero economy.

The integrated energy report, which draws on the series of six earlier sector research reports published through 2021, was released by BCG on 21 July 2022. (That was a few days prior to President Ramaphosa addressing the nation on the energy crisis and announcing the key steps that would be taken to alleviate the country's energy deficit – now formally recognised as the National Energy Plan.) The integrated energy report states that South Africa can solve its current energy crisis and realise a just transition to a competitive, net-zero economy, if it can unlock the country's high-potential wind and solar energy resources at scale and at an unprecedented pace. This energy transition would improve the availability and reliability of South Africa's power supply and, at the same time, enable new green industries to build the foundation of a globally competitive economy that is resilient to trade risks from a transition to net zero.

The report further highlights:

- The urgent need to drive decarbonisation and transformation of the energy sector in South Africa immediately

- The need for renewables to be elevated as a national priority going forward
- The need for a coordinated approach to incubate new green industries, drive economic diversification and create opportunities for skills development, job creation and improved livelihoods in order to build an inclusive future economy.

The Climate Pathways study is an ongoing project. All the reports, including the detailed analytical and model-based sector-level reports, can be accessed from the NBI website.

Five key findings

- Large-scale renewable energy deployment is the backbone of a just transition. It can result in net-positive job creation. Unlocking South Africa's renewable energy resources – in combination with the country's access to crucial mining commodities, expertise in key industries such as synthetic fuels production, existing trade relationships, and a young, growing population – positions South Africa well to win in new, green markets and to drive job creation further.
- Decarbonising South Africa's energy supply requires an unprecedented rollout of renewables. By 2050, at least 190 GW of renewables need to be deployed to decarbonise the power sector fully. Furthermore, capturing the opportunity presented by the green hydrogen (H₂) economy requires an additional 170 to 200 GW of dedicated renewables capacity.



The research confirms that an accelerated transition to renewable energy at scale would improve South Africa's power supply and enable new green industries to grow.



A critical enabler for the large scale and rapid pace of renewables deployment is the modernisation, expansion and strengthening of the national power grid.

- South Africa will need to build ~6 to 7 GW of renewables every year for the next three decades for the power

system alone, doubling when the green H₂ requirements are considered. To put that in perspective: South Africa has an installed capacity of ~5 GW of renewables today – which has taken over 10 years to build.

- A critical enabler for the large scale and rapid pace of renewables deployment is the modernisation, expansion and strengthening of the national power grid. This is a challenge the rest of the world also faces, so fast-tracking grid strengthening, and modernisation efforts can be a global competitive advantage for South Africa as it enables the fast scale up of new green industries.
- South Africa's transition to net-zero will require massive investments. It is estimated that, over the next three decades, more than ZAR 6 trillion is needed to decarbonise the economy – more than half of which is needed in the power sector. □

For more information visit: www.nbi.org.za/climate-pathways-and-a-just-transition-for-south-africa.

Centre for Climate & Just Transition in Africa

At the same time as the integrated energy report was released, Boston Consulting Group launched the Centre for Climate & Just Transition in Africa as part of its global focus on helping companies and governments accelerate their climate and sustainability journeys.

Lucas Chaumontet, Managing Director and Partner at BCG, Johannesburg said at the launch, “Both Climate and Africa are priorities for BCG globally. This is why we are launching our Centre for Climate & Just Transition in Africa. The aim is to unlock the full potential of Africa to advance climate action and a just transition.”

Africa – including South Africa – is disproportionately exposed to the risks presented by climate change. Increased climate extremes, rising water scarcity and the occurrence of severe events such as droughts and floods will have a devastating effect on local livelihoods and regional food systems. South Africa has witnessed this already in KwaZulu-Natal and the Eastern Cape.

The centre will work to address the impact of climate change, accelerate progress towards net zero, and at the same time support a just transition, by focusing on three key priorities:

- Co-creating an aligned national and continental climate fact base to help alignment, decision making, and cooperation among key stakeholders
- Mobilising forces to build and scale globally competitive green industries to improve the economic context, which is critical to achieve a just transition
- Developing critical capabilities within the public and private sectors to drive local leadership and ownership in African countries on this journey.

“The centre will bring together global and local experts from the public and private sectors and across the sustainability spectrum to engage and share knowledge. They will have access to a library of relevant tools to achieve the centre’s aims.

Developing a suite of mitigation, adaptation and just transition capabilities for a broad set of industries and governments across the continent, we will be able to accelerate impact in the climate space,” says Chaumontet.

“The centre already has more than 50 core members across Africa, and is led by a team with responsibilities across countries and topics. The leadership team is all based in Africa and most members of it are Africans, consistent with our ambition to unlock the full potential of Africa.

“Achieving the objectives of the centre will require creativity, innovation, and collaboration, and we will continue to partner with governments, leading companies and civil society to help reach these climate and sustainability goals.”

Partnerships are key

In South Africa, for example, BCG has partnered with the NBI to develop decarbonisation and just transition pathways for key sectors of the economy. In the rest of Africa, BCG has partnered with the United Nations Global Compact (UNGC) to establish the African Business Leaders Coalition to advance sustainable growth, uphold the UNGC’s Ten Principles and promote ESG principles.

This year again, BCG has been chosen as the exclusive consultancy partner to the Conference of Parties (COP), supporting the Egyptian Presidency, as the official host of COP27, to deliver this important global event. BCG’s support for COP27 complements its longstanding support for the global climate agenda through partnerships with the World Economic Forum, UN High Level Climate Champions, successive COP Presidencies, the SBTi (Science Based Targets Initiative), CDP (Carbon Disclosure Project), Breakthrough Energy Catalyst (where BCG is a founding partner), and the First Movers Coalition.

For more information visit: www.bcg.com

Options in alternative power sources

As the reality of ongoing load shedding continues, South African households and businesses, in particular smaller businesses that do not have the means or space to invest in large generators in an office or warehouse environment, are looking for alternative power sources to keep the lights on. Gregor Küpper, Managing Director of SOLARWORLD Africa, says there has been a marked uptake in renewable energy solutions as energy users seek ways to see them through those load shedding hours.



Gregor Küpper,
Managing Director,
SOLARWORLD Africa.

“Solar used to be a solution only for large scale businesses, or organisations with adequate space to house enough panels to support their electricity consumption,” Küpper says. “Thanks to innovations in this space, people working from home and small businesses now have several options available to them, to provide temporary support when there is a power cut and, potentially, long-term relief as the preferred ongoing power source.”

The SOLARWORLD Africa team has almost 40 years’ experience and a proven track record in sub-Saharan Africa. Küpper explains some of the solutions that will keep the lights on – or the kettle boiling – and machines running during load shedding, enabling homeowners and small businesses to become more self-sufficient or grid independent.

There are different types of energy systems: on-grid (grid-tied), off-grid, and on-grid with backup. “Grid-tied solar photovoltaic systems are most common in South Africa, as these are the most affordable and offer the best business case. However, grid-tied solar PV systems will generally be programmed to switch off during load shedding.” Küpper says this is primarily due to international safety standards.

The different solutions available are outlined below.

Grid-tied photovoltaic system

A solar photovoltaic system is an electric power system designed to supply usable solar power by means of photovoltaics. The two main components are PV panels (supplying dc power) and a grid-tied PV inverter (converting dc to ac power).

The grid-tied PV inverter converts the varying dc power, from the PV panels, into ac power and feeds it to the household/business equipment, and possibly into the grid.

Importantly, a grid-tied inverter synchronises the frequency and the output voltage to its connected grid. If solar energy supply is insufficient, a grid-tied inverter switches and starts drawing power from the grid into the home or business premises. It ensures there is a seamless power supply.

“This option saves electricity in the long run, no backup required. The pure PV inverters are grid-tied, which means they require the grid to switch on and convert the direct current (PV) into alternating current, which is required to power the appliances in a home or business.”

On-grid with backup

- PV and battery

This is a backup and later self-consumption optimisation (SCO) option. Self-consumption contributes to the stability of the distribution grid by avoiding voltage rise during peak PV generation periods, such as the middle of the day, and helps to reach higher shares of installed PV in the electricity mix.

“A PV and battery system can be served by either a hybrid (PV and battery) inverter, or separate battery and PV inverter. The batteries act as backup power when the grid has failed – that is – during load shedding or a power outage. During a normal day, PV can provide power to a house and charge the batteries. The stored power can then be used during the night, which is what is referred to as SCO.”

- Battery backup

This is purely a backup solution and usually sized to make sure that the essential loads are up and running during load shedding or a power failure. Battery backup constitutes various options: a UPS (uninterruptible power supply), battery together with a charge controller, and then of course the battery and battery inverter. Of these, a battery with a good and reliable battery inverter is the most reliable solution.

- Battery and hybrid inverter

This is the same as the battery and battery inverter option except that it allows the user the opportunity to install PV panels at a later stage, without having to add the extra cost of a PV inverter, as it would be ‘PV-ready’.

Off-grid

In the current South African energy environment, the off-grid option sounds very attractive. It does however require careful planning and sizing of the system. The user would require a large enough PV array to serve daily loads and charge the batteries for use at night. And in turn, a large enough battery bank to serve the loads during the evenings and possibly during daytime, when there is not enough PV energy generation. There is, otherwise, the option to add a generator or to use the grid as backup.

Küpper advises that a tailored approach will see various renewable energy solutions and products being recommended and made available. “Households and business

owners should consult the experts, weigh up the options, and find a solution that meets their electricity consumption needs and that is financially viable." He adds, "Always consider the long-term benefits as certain products are designed to go the extra mile."

Based in Cape Town, SOLARWORLD Africa has an extensive network of installer partners across South Africa. □

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

Choosing solar PV technology to last

As a leading importer and distributor of solar products in southern and sub-Saharan Africa, SOLARWORLD Africa (Pty) Ltd has partnered with Meyer Burger Technology AG, a European manufacturer of high-performance solar cells and modules. Together, they deliver products that are designed to perform best under hot conditions and that can offer up to 20% higher energy yields than standard solar modules.

Gregor Küpper, Managing Director of SOLARWORLD Africa, says, "Where solar modules and solar cells are sourced from, and the technology they are fitted with, are important factors to know." He advises customers to look for high-performance heterojunction solar modules fitted with SmartWire Connection Technology (SWCT™), such as those supplied by SOLARWORLD Africa. The Meyer Burrger/SolarWorld Africa modules are designed in Switzerland and produced in Germany, two countries where the standard of workmanship and quality is highly respected, Küpper says. "You need to know it's going to last."

Durability and profitability

"South Africa has mostly a hot climate, and because the solar cells of solar panels are going to be exposed to the sun daily, their durability will continuously be tested." For customers to gain the best return from investing in solar, the yield of the solar cells should be able to withstand intense heat and to generate more power over the same area despite high temperatures. Above average cell stability, maximum resilience and high breakage resistance are all important factors.

"Solar not only helps to reduce energy costs, it also enables users to play a role in curbing global warming. Therefore, the solar modules must be made with materials that offer the highest social and ecological standards along the supply chain. Customers should look out for consciously made products that do not contain lead and are produced using 100% renewable energy."

Meyer Burger's modules are designed for performance,



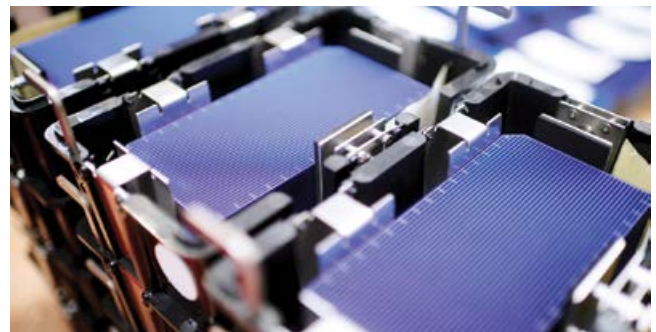
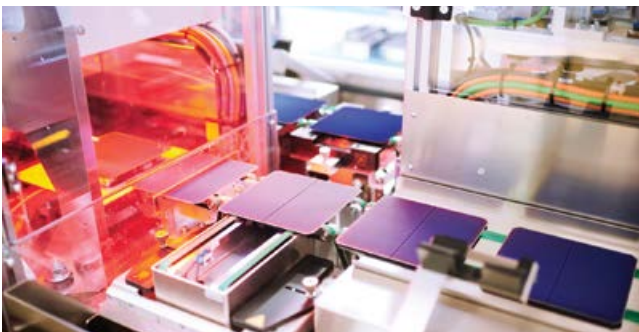
Meyer Burger solar modules in production.

with an elegant Swiss aesthetic, and are suitable for all roof shapes. They are enhanced with proprietary heterojunction technology (HJT) to make the system more efficient.

"This is done by combining layers of silicon to create a cell structure that enables the HJT cells to absorb much more solar energy than conventional cells and for the converted electrical power to flow through the module with less resistance, even under low-light conditions, such as when it's cloudy," Küpper explains.

The energy yields are even higher when the cells connect with SmartWire technology (SWCT™). The thin connecting wires reduce the shading on the solar cells and thus allow the modules to absorb more energy and produce electricity for longer, delivering more power for the same amount of roof space. SWCT™ also improves cell stability, making the modules less susceptible to so-called micro-cracks, one of the most common reasons for energy losses in solar modules.

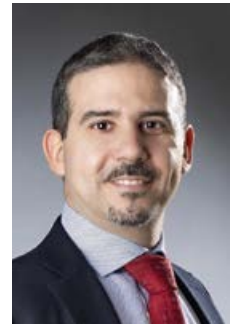
"Solar is a sure way to save money in the long run and will alleviate the business risk of losing production time due to load shedding – a challenge so many businesses currently face," Küpper says. □



The PV modules are designed and produced to the highest standards, to ensure long-lasting performance.

The energy transition in focus at Key Energy 2022

Key Energy is the main international event presented by the Italian Exhibition Group addressing the energy transition in Southern Europe, the Mediterranean, the Balkans and the Middle East. It will be held this year in Rimini, in northern Italy, from 8 to 11 November, with some notable new features compared to previous editions. Electricity + Control put a few questions to Christian Previati, Exhibition Manager at the Italian Exhibition Group, about the event and the opportunities it presents for organisations involved in the energy sector in Africa and Italy. His response is presented here.



Christian Previati,
Exhibition Manager at
the Italian Exhibition
Group.

Setting out the format of the expo, Previati says, “Key Energy will provide a meeting point for all players involved in the energy sector and serve as a discussion hub for new opportunities across the entire spectrum of renewables. The traditional in-person format of the event will again be enriched this year with the innovative digital platform, which increases business and meeting opportunities significantly.”

Key trends on show

“The renewable energy sector is expanding rapidly, globally and in Europe, with continuous growth even in the last two years,” Previati continues. “This is a clear sign that the energy transition is not just a plan, but a reality, and – I would add, in light of recent international events – a necessity, which is changing the energy market. Europe is on track to achieve the goal it has set itself of complete decarbonisation by 2050. This goal can only be achieved if the deployment of renewable energies is accelerated and, in this context, the Key Energy event will drive the energy transition.”

“In parallel with the focus on renewable energy sources and technologies, highlights of this year’s edition will address mobility, energy efficiency, and the sustainable city, and include an international focus on challenges and opportunities in the sector in Africa, Canada and Mexico.”

Green growth in Africa

“Among the most eagerly awaited events of the 2022 edition is the Africa Green Growth forum, organised in cooperation with ITA – the Italian Trade Agency, which will directly involve African institutional representatives and associations from the energy sector. We are honoured that countries such as Egypt, Algeria, Morocco, Tunisia, Rwanda, Kenya, and others, have confirmed their participation; countries where there are interesting growth opportunities for the renewable energy sector. This is also why we wanted to set up an authentic discussion and business platform at Key Energy 2022, which will be extended to the countries of the Mediterranean basin and on the African shore, and enriched with one-to-one meetings between delegations and companies.”



The energy sector on show at a previous edition of Key Energy.

The Africa Green Growth forum is a born out of the collaboration between Res4Africa and the Technical Scientific Committee of Ecomondo and Key Energy. Embassies in Italy and participating countries, representatives of African governments, associations, qualified institutions and media, and trade delegations will work to establish links between the industrial and institutional sectors, supported by the Italian Trade Agency, the Ministry of Foreign Affairs and International Cooperation, the Ministry of Ecological Transition and the Ministry of Universities and Research.

A wide spectrum of leading technologies

“The next decade will be decisive in the national and international context for the development of an energy mix that is increasingly oriented towards renewable sources. Therefore, the Solar and Storage area at Key Energy will see a wide range of technologies, solutions and best practices on display. Wind energy as well as hydrogen will see the development of projects and actions for integrating production and storage technologies.”

“Looking at the sustainable city, the focus will be on technologies and services available for upgrading efficiency and the redevelopment of real estate and cities, efficient lighting, efficient utilities, ICT solutions and products for smart services and buildings, the smart grid, sustainable mobility, electric and hybrid cars, car and bike sharing, smart parking, electric public transport, apps for integrated

transport, digital solutions and the electric city. And, with regard to electric mobility, charging infrastructure, electrification of company fleets, the transformation of the automotive ecosystem, batteries, and more.”

Identifying common ground between the EU and Africa

“In our view, Africa is a continent of particular interest. Considerable investments have been made in solar and wind energy: these are two resources that South Africa has in abundance. Italy and Africa have seen the exchange of trade grow significantly in recent years, and Key Energy can certainly be a useful and profitable moment for interaction with regard to the energy transition, as well as an opportunity for business development with the major players in the Euro-Mediterranean basin.

“There are many opportunities for cooperation, collab-

oration and possible partnerships. The acceleration of the energy transition is driven by a multitude of processes and it makes sense to involve different players and international partners. In this respect, Key Energy will act as a lab and reference point for the Mediterranean basin and North Africa.

“In closing I would like to add that, at Key Energy, international investors in the renewable energy sector and looking at Africa, Italy and the Mediterranean basin generally, will find an excellent business platform that favours meetings and discussions between key players and market stakeholders, dialogue between economic sectors, and an opportunity for all professional energy operators to learn and update themselves on new developments in the sector.” □

For more information visit: <https://en.keyenergy.it>

An alliance for industry decarbonisation

The International Renewable Energy Agency (IRENA), co-founding partner Siemens Energy, and 13 companies across all industry sectors have launched the global Alliance for Industry Decarbonisation. The new alliance aims to accelerate net-zero ambitions and the decarbonisation of industrial value chains in pursuit of the climate goals of the Paris Agreement.

of global industry to act on decarbonisation and unlock opportunities that come with green industrialisation through renewables and other transition-related technologies, like green hydrogen. By standing together we send a clear signal of solidarity ahead of COP27 and we invite new partners to join our common vision.”

Karim Amin said, “We need to slash greenhouse gas emissions urgently if we are going to tackle climate change effectively. Accounting for more than a quarter of global emissions, the industrial sector is the second largest emitter and requires rapid decarbonisation. In this endeavour, partnerships are crucial. With our technologies, at Siemens Energy, we constantly seek to create value with our partners moving towards a low-carbon future. The alliance will accelerate decarbonisation by establishing a first-class exchange forum for industry, technology, and knowledge partners.”

The Alliance for Industry Decarbonisation was created to achieve country-specific net-zero goals faster, encourage action in decarbonising industrial value chains, and enhance understanding of renewables-based solutions and their adoption by industry. The alliance will also strengthen dialogue and coordinate action by industrial stakeholders from across the public and private sectors.

IRENA will coordinate and facilitate the activities of the alliance based on its extensive experience in hosting similar multi-stakeholder platforms.

Membership of the Alliance for Industry Decarbonisation is open to public and private firms and stakeholders operating in energy-intensive sectors that aim to decarbonise activities along their value chains, and companies that have knowledge and expertise in the deployment of energy transition technologies.

For more information visit: www.irena.org



The Alliance for Industry Decarbonisation was launched at IRENA's G20 Investment Forum on Energy Transitions.

The new coalition was officially launched with the adoption of the Bali Declaration, in the presence of IRENA's Director-General Francesco La Camera and the Executive Board Member of Siemens Energy, Karim Amin, during IRENA's G20 Investment Forum on Energy Transitions in Bali, Indonesia in September. Co-founder Siemens Energy has been a major driver for the creation of the alliance and will co-chair the alliance leadership. The first alliance meeting is planned to take place at COP27 in Sharm El Sheikh, Egypt, in November.

The participation of leading industries can benefit business opportunities for green industrialisation and highlights the importance of collaboration in developing strategies and sharing best practices to cut industry emissions. About 25% of global GDP is produced by the industrial sector, and the sector emits around 28% of GHG emissions. Partnerships based on dialogue and actions are valuable for industrial stakeholders to best address the challenges and opportunities of a clean energy transition. A multi-stakeholder platform enabling such exchanges and collaboration can accelerate global climate action.

Climate action needs industry leaders,” said La Camera. “This alliance stands for the growing commitment

Increased wind energy allocation in Bid Window 6

Bid Window 6 of the Renewable Energy Independent Power Producer Procurement Programme's (REIPPPP) request for proposals (RFP), which was released two months ago (7 July 2022), has been amended by the Department of Mineral Resources and Energy (DMRE).

The South African Wind Energy Association (SAWEA) notes that the wind energy allocation has been doubled to 3 200 MW for this bid window, making up most of the increased allocation of 4 200 MW across all technologies.

The association has welcomed this increase as well as the extended bid submission date, which is now set for 3 October 2022. This opens the process to new bidders and will help ensure more participation by the wind sector.

"Furthermore, we urge NERSA to concur with the Minister of Mineral Resources and Energy, to determine the remainder of the IRP2019 allocation with urgency, as this will ensure that the President's directive on new generation is met," said Niveshen Govender, CEO of SAWEA.

Speaking on behalf of its members, SAWEA says it

is certain the wind sector will respond effectively to the call for this additional generation capacity. It will enable the sector to play a key role in the country's energy mix, creating economic value and impact.

In line with the NDP, the REIPPPP Programme continues to deliver more than clean power generation, as it is designed to stimulate investment and deliver economic and socio-economic benefits for the country at the same time.

SAWEA confirms that the industry remains confident in its ability to build new renewable energy generation capacity while meeting economic development objectives, and reiterates its confidence that the sector will respond positively. Through its engagements with the DMRE, DTIC and other key sector stakeholders, SAWEA has contributed to mapping the way forward to deliver on the just energy transition.

For more information visit: www.sawea.org



As well as delivering clean power generation, the REIPPPP stimulates investment, driving economic and socio-economic benefits.

Newer technology to support wind energy development

An optimistic wind power procurement environment, underpinned by two government bid windows for renewable energy in close succession – and Bid Window 6 doubling its wind energy allocation, as well as the soon to be released Request for Proposals (RFP) for 513 MW energy storage, will require original equipment manufacturers (OEMs) to gear up to meet burgeoning market needs. Added to this is the latest REIPPPP Programme directive that substantially changes the wind project capacity range to a maximum of 240 MW, from the previous 140 MW ceiling.

Compton Saunders, Managing Director of Nordex Energy South Africa, says, "This changing energy landscape, defined by the accelerated uptake of renewable energy for the foreseeable future, requires technology that delivers increased power capacity. This follows global trends, which demonstrate that as markets have matured, wind turbine generators with greater unitary power are required, to deliver not only better output but also relatively improved cost."

In preparing to meet market needs, Nordex Energy South Africa has decided to introduce newer generation technology and to standardise this technology across its new wind farms going forward. Over and above an improved cost of energy, the increase in unitary power of wind turbines has the advantages of reducing land usage and visual impact, as wind farms require fewer wind turbines.

"The Delta 4000 platform incorporates products with a power capacity starting from 4.5 MW up to 6 MW+ with the N163/6X, which is significantly higher than the previous AW platform that had a range of power from 3 MW to 3.4 MW.

Furthermore, the platform incorporates different products that share certain sub-components between them and this standardisation eases the operations and maintenance of those wind turbines," Saunders explains.

To deliver on this shift, Nordex Energy South Africa's core local construction operations team is currently in Spain for training on the newer wind turbine technology. The expected growth of South Africa's wind sector will demand robust construction expertise.

Local OEMs like Nordex play a key role in stimulating local job creation and skills development. The company sees Bid Windows 5 and 6 as an important link in driving the local value chain, which will directly stimulate the domestic job market.

With the Delta 4000 platform, the Nordex Group was the first company to launch a turbine platform with a flexible rating. This design approach, combined with a variety of operating modes, enables the turbine to adapt to the grid operator's changing requirements and local wind conditions. This also means it is possible to optimise the overall yield of a wind farm via the different maximum output of individual turbines, always exploiting the full potential of each turbine position within each wind farm.

The technical concept of the Delta 4000 series minimises service requirements over the service life of a turbine. Each component has been rigorously designed to secure lower maintenance needs, and provide a suitable mobile crane solution.

For more information visit: www.nordex.com



Delta 4000 turbine technology supports turbine generators with greater unitary power.

Financial close on 200 MW solar PV

After the landmark legislation was passed in August 2021 to raise the licensing limit on independent power plants from 1 to 100 MW, the first two registered 100 MW renewable energy projects have reached financial close. This is less than six months after the power purchase agreement was signed in mid-March 2022. Construction of the projects will now begin.

The solar photovoltaic plants will be constructed in line with the bilateral electricity sales agreement between SOLA Group and Tronox Mineral Sands. The plants will supply electricity, through wheeling arrangements with Eskom, to five Tronox facilities in the Western Cape and KwaZulu-Natal for their own use. Tronox's operations are highly energy intensive, and the renewable energy project will ensure Tronox's economic viability and long-term affordability of electricity supply.

Melissa Zona, Tronox Holdings plc's Senior Vice President, Chief Human Resources and Sustainability Officer said, "This renewable energy project with SOLA Group will reduce our global carbon emissions by about 13% compared to our 2019 baseline. It is another example of Tronox's commitment to being a leader in terms of corporate sustainability and protection of the environment. Switching from coal-based to renewable power in South Africa is one of the many ways Tronox is implementing technology and best practices at its sites to protect land, water, air and ecosystems and operate more sustainably," she said.

Tronox and SOLA signed a power purchase agreement in March 2022. SOLA's in-house engineering, finance and project development capabilities have helped to accelerate the conclusion of the deal.

Dom Wills, CEO of the SOLA Group notes, "There are significant firsts here for the renewable energy industry. These are the first projects of this scale in SA that are based on pure private bilateral trade. It's also a great

plus for the country that these projects are 100% South African owned, financed, constructed, operated and managed."

Renewable projects are capital intensive and long term. This project needed to raise a total of R4 billion in funding for construction and development of the two PV facilities. For this to happen, SOLA reached agreement with funding partner and shareholder, African Rainbow Energy.

"African Rainbow Energy is a leading renewable energy platform, the largest shareholder in the SOLA Group and the funder of the two projects," says Brian Dames, CEO, African Rainbow Energy. "This is a clear demonstration of African Rainbow Energy's and partners' – Absa, DBSA, Nedbank and Standard Bank – commitment to our country, the economy, and our customers. This investment brings hope."

The debt arrangement was led by PepperTree Capital, and senior lenders included three of the big banks in South Africa and the DBSA, which provided a total of R3.1 billion of debt to the project. The legal advisors on the transaction were Pinsent Masons, Hogan Lovells, Faskens, Allen & Overy and ENS.

SOLA also entered into a Joint Venture Agreement with WBHO, for the design and construction of the project, where SOLA performs the engineering services and WBHO will perform the construction. The project will include the installation of 387 000 solar panels mounted on single axis trackers that track the sun's position as it moves across the sky. It will be one of the first projects to feed directly into Eskom's high voltage transmission network.

"We are very pleased to be part of the first major utility-scale energy project in South Africa for a private off-taker," says Derek Wallace, Managing Director, Projects, at WBHO. "We look forward to delivering a world class project."

This project is seen as a potential breakthrough for the private energy market and has paved the way for more projects like it. The options for developing projects for private buyers will only increase as government finalises its plans to establish a trading market on the national grid.

"Looking ahead, we hope the model of supplying private power through bilateral agreements continues to be more widely adopted," says Wills. "The benefits for the end user are competition, choice and a more diverse contribution to the power system."

The SOLA Group is a vertically integrated independent power producer and a leader in the supply of clean energy solutions to private companies in Africa.



Both the new 100 MW solar PV plants will be 100% South African owned, financed, constructed, operated and managed.

For more information visit:
<https://solagroup.co.za>

Eco-efficient switchgear supports the energy transition

At CIGRE Session 2022, Hitachi Energy launched the world's first eco-efficient 420 kV circuit breaker. This is the first SF₆-free 420 kV circuit breaker fully tested in terms of the IEC and IEEE standards for 63 kA, 5 000 A, 50 and 60 Hz. The breakthrough technology marks a significant milestone in Hitachi Energy's accelerated EconIQ™ high voltage portfolio roadmap, which was announced at CIGRE Session 2021.

For over two decades, the company has been investing in eco-efficient alternative solutions to sulphur hexafluoride (SF₆) including the world's first 170 kV eco-efficient gas-insulated switchgear (GIS). It uses this game-changing technology in its EconIQ high voltage portfolio, to eliminate SF₆, which is a greenhouse gas. Over time, it has successfully increased the voltage levels of the EconIQ high voltage portfolio.

The launch of the EconIQ 420 kV circuit breaker also marks a key milestone in the industry – enabling the transmission of large amounts of electricity over long distances while eliminating significant volumes of SF₆.

This innovation is the key enabler to achieving a wide range of EconIQ switchgear applications, and will be used in both dead tank breaker (DTB) and gas-insulated switchgear (GIS). The EconIQ DTB and GIS are expect-

ed to be released at the end of 2022, on track with the company's roadmap.

Markus Heimbach, Managing Director, High Voltage Products at Hitachi Energy, says, "This 420 kV breakthrough is a demonstration of our technology, which is reliable and scalable to reach ultra-high-voltage levels with the lowest carbon footprint. We are enabling our customers and the industry as a whole to transition more rapidly to eco-efficient solutions to advance a sustainable energy future for all."

EconIQ is Hitachi Energy's eco-efficient portfolio for sustainability, where products, services and solutions are proven to deliver exceptional environmental performance. Hitachi Energy has placed sustainability at the core of its purpose and is advancing a sustainable energy future for all. Its high voltage portfolio also includes EconIQ Retrofit, another world first in replacing SF₆ in existing high voltage equipment, and EconIQ gas-insulated current transformers. The EconIQ high voltage technologies are being widely adopted by key customers in Europe.

For more information visit: www.hitachienergy.com



Hitachi Energy has launched its EconIQ SF₆-free 420 kV circuit breaker.



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15kVA 400V AVR

Engineered solutions for power efficiency and quality

Diesel Electric Services (Pty) Ltd has been active in the power industry for more than 29 years. Over this time it has seen a shift in the industry, with growing emphasis now on power efficiency and quality.

In support of this focus, the company implements in-house development on an ongoing basis to enhance product delivery that meets clients' specific site requirements.

Diesel Electric Services' range of products and services specifically supporting power efficiency and quality includes power factor correction, harmonic filters and voltage stabilisers.

Power factor correction

Clients often pay more for electricity than necessary, due to a bad power factor. Diesel Electric Services assists clients to improve this, first by monitoring the load on site using a network analyser. From the data obtained, it determines the load power factor and then designs a suitable solution – offering the client real savings.

Diesel Electric Services' automatic power factor correction systems are modular and expandable. Its solutions include rugged capacitor racks as well as detuned anti-harmonic reactors and filters.

Harmonic filters

Harmonic filters are series or parallel resonant circuits designed to shunt or block harmonic currents. They reduce the harmonic currents flowing in the power

system from the source and thus reduce harmonic voltage distortion in the system.

Voltage stabilisers

In voltage stabilisation solutions, the power supply is connected to an input protection circuit breaker and onto a delta-wound primary coil of an isolation transformer. The primary winding of the transformer is screened from the secondary winding of the transformer.

This screen is earthed to the main incoming earth. From the star-connected secondary side, each phase is passed through a 'buck/boost' transformer and then out to a load protection circuit breaker. The buck/boost transformer has a pair of primary windings wound over the main winding.

When applying voltage to these windings, the output of the unit can be controlled: if the input voltage is high, the voltage is reduced; if the input voltage is low, the voltage is amplified. Each phase is monitored and adjusted independently, with adjustments made at a rate of one every 300 mS and carried out by a PIC16 microprocessor.

The units are manufactured such that if any of the electronic control cards fail, that unit will revert to zero effect – that is – input is equal to output.

For more information contact Diesel Electric Services.

Tel: +27 (0)11 493 7079

Visit: www.dieselectricservices.co.za



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Leader, Cummins
Southern Africa.

A power ecosystem for IPPs

While Cummins has traditionally focused on diesel technology, it continually incorporates innovative solutions. This makes it a valuable partner for independent power producers (IPPs) focusing on renewable energy but still relying on diesel power. Warrick Gibbens, Power Generation Leader, Cummins Southern Africa, says: "We supply fully fledged hybrid systems integrated with our diesel gensets, which work with other power sources in the energy mix to ensure reliable backup power. Our holistic solutions help customers to minimise downtime and optimise reliability."

Cummins can provide a complete power ecosystem. Gibbens adds, "Our 'emissionised' gensets offer green energy solutions. For example, while solar power and battery backup can offset carbon emissions to a certain extent, Cummins has developed emissionised genset technology to reduce gas emissions, enabling its customers to reduce their carbon footprints and work towards cleaner solutions.

"Cummins' sophisticated technologies can also support integrated microgrid solutions, from off-grid and remote locations to urban and mission-critical applications.

Our solutions can integrate all components of a microgrid, including diesel and natural gas gensets, hydrogen technologies, renewable energy sources, battery storage systems, system level controls, transfer switches, and remote monitoring capabilities."

Gibbens describes microgrids as locally controlled power sources that can integrate multiple energy resources such as diesel, gas, wind, or solar power. They provide independent power so that when the traditional power supply fails, or when load shedding is implemented, a microgrid can immediately switch to backup generators and batteries.

The microgrid control allows the components to function as a seamlessly integrated power source so that weather, utility prices, and performance data can be monitored – to enable well-informed decisions, assist in keeping costs low, and keep the power on.

The advantages of microgrids are: resilience, decarbonisation, efficiency, and flexibility.

For more information contact Cummins Southern Africa.

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Visit: www.cummins.com

Acquisition supports EIMS Africa's growth strategy

EIMS Africa's growth strategy, which anticipates a generation capacity of around 1 500 MW from more than 20 renewable energy Independent Power Producers by late 2022, led to its acquisition of REESCO. This marks a key step in facilitating the company's expansion.

Already one of South Africa's largest renewable energy platforms, with a portfolio of 13 utility-scale renewable energy projects providing a combined generation capacity of over 850 MW, EIMS Africa's bullish plans are in line with the country's accelerated move to renewable energy. The successful acquisition of Renewable Energy Empowerment Management Services (Pty) Ltd, known as REESCO in the local renewable energy market, will see REESCO's team joining EIMS Africa to bolster capacity and capabilities.

Ryan Hammond, CEO of EIMS Africa, explained the motivation for the transaction. "We are in a significant growth phase, having started with just three projects in 2018 and having grown the platform to 13 projects to date. We have several other secured projects at various stages of the financial close process and, by the end of this year, we expect that number to almost double, along with our platform's generation capacity. This growth is not possible without a dedicated team of experienced individuals who know what it takes to deliver and oper-

ate these projects. The REESCO acquisition is a key step in facilitating our growth as it increases the depth and experience of our team."

REESCO's team adds its experience as an expert management services company that specialises in technical, administrative and compliance competencies related specifically to the regulatory environment of South Africa's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP).

Dr Tamuka Kaseke, Founder and CEO of REESCO, said, "We believe this is a win-win transaction for both parties. EIMS Africa gets to take on a solid and seasoned team with over eight years' experience, and the REESCO staff get an opportunity to diversify their knowledge and experience base in terms of renewable energy asset management. We wish them well in their new growth path."

For more information visit: <https://eimsafrica.com>



South African-owned renewable energy company, EIMS Africa, has a portfolio of 13 utility-scale renewable energy projects.

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The process industry steps closer to Industry 4.0

There is a lot of talk about Industry 4.0, the Internet of Things (IoT), Big Data, the cloud, mobile communications and Internet everywhere. However, the global process industry has not fully embraced the digital revolution thus far, and there are good reasons for this. Nonetheless, it's time for a rethink, because Ethernet-APL has triggered a new era for the industry. Instrumentation specialists in process automation, Pepperl+Fuchs and Endress+Hauser together introduced new Ethernet-APL supported solutions at Electra Mining Africa 2022 – and shared some of the key benefits of the technology.

Process plants generally have a life cycle of several decades. They are often large plants with a considerable geographical spread. Hence the communication infrastructure needs to bridge large distances and is exposed to all kinds of weather conditions and must therefore be designed to be particularly robust. In addition, there are often high electromagnetic influences and/or potentially explosive areas in the plant environment, which place particular demands on all infrastructure components. Furthermore, the routing of both data and power supply of individual field devices via one and the same cable, has proven to be the best solution in process plants. Plant operators therefore have good reason to stick to proven technologies, backed by many years of experience.

However, technical development has not stood still in the process area either. As a result, the automation system of a plant often consists of several systems that operate according to different standards and communicate with each other via gateways. Engineering, operation and maintenance of such heterogeneous systems are correspondingly complex and numerous restrictions on data communication arise. For example, different data formats are repeatedly the reason field devices can communicate only imperfectly with the system, and existing information thus remains unused.

This often historically determined situation typically re-



Based on the worldwide Ethernet standard, Ethernet-APL incorporates an advanced physical layer for the transmission of data and electrical energy via two-wire cables.

quires numerous time-consuming manual processes in the design, implementation, modification and expansion of a process plant. Technical problems can often only be assessed directly on site. The replacement of defective devices requires time-consuming calibration and parameterisation and preventive maintenance is difficult to realise. The implementation of more efficient maintenance concepts is hard to conceive under such conditions.

Data must be available at all times

Big Data is often considered the key to greater efficiency and profitability of a plant. This makes it all the more alarming that around 60% of the time currently spent on Big Data analysis does not actually bring any benefit, but is required solely for acquisition, preparation and processing of the data. In today's digital world, however, data should actually be readily available.

The prerequisite for this is that the process data continuously generated by individual sensors, actuators and measuring devices in the field is seamlessly recorded and made available centrally at one point. Modern field devices provide such data in abundance. In today's system environments, however, it usually requires a lot of technical effort to access them. At times it can be impossible.

Ethernet-APL is the key to a new type of flat communication infrastructure in the process area. It stands in contrast to the traditionally, hierarchically structured sys-



Ethernet-APL is the key to a new type of flat communication infrastructure in the process area.

tem environments of plants and allows unhindered access to all process data, down to each individual field device. In addition, Ethernet-APL field devices and other infrastructure components allow data access independently of the running process and can communicate directly with each other. Process data is therefore available without restriction. Big Data applications can draw on the full potential and need no longer fail due to insufficient availability of data.

Vendors and users interact

The impetus for the development of Ethernet-APL was driven essentially by two organisations. The Open Process Automation Forum was focused on a completely new system architecture for the process industry. The Namur Open Architecture (NOA), on the other hand, was looking for ways to make process data from automation systems usable for the purposes of plant maintenance and optimisation, without affecting the ongoing process flow.

The vision of both initiatives included a solution that would not require any gateways between individual networks or fieldbuses. In addition, the process and status data provided by the individual field devices should be openly accessible at all times. This meant a new generation of field devices should enable the use of different protocols to suit the respective application. And the solution for data transmission was about creating transmission paths with high bandwidths that would allow fast access to the field devices, thus opening up completely new applications.

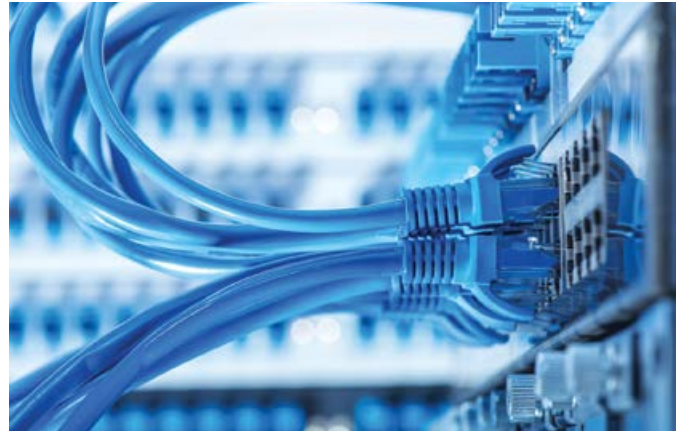
The path to Ethernet-APL began in 2011 with a conference of leading suppliers of components and systems for the process industry. It soon became clear that all participants were driven by the same vision. The declared goal was an open solution that guaranteed full interoperability and put an end to the complexity and limitations of the existing system environments. Nothing less than a new standard was needed, one that offered unrestricted transparency and enabled high transmission rates. In addition, Intrinsic Safety ignition protection for hazardous areas was required and the proven principle of transmitting both data and the energy for operating the field devices over long distances was to be retained.

A first demonstrator was presented in 2015. With this setup it was proven that Ethernet-APL was indeed capable of transmitting data and electrical energy over two-wire cables and long distances.

In 2018, the three leading user organisations in the process sector demonstrated that they were fully behind Ethernet-APL. Together, Profibus International, ODVA and the FieldComm Group presented practical solutions to demonstrate the capabilities of Ethernet-APL and position the new technology as the future standard in process automation. Migration paths that enabled an easy transition from the current heterogeneous system world to the digital future were set out.

Part of the omnipresent network standard

As the name suggests, Ethernet-APL is based on the absolute world standard in data transmission. Ethernet was introduced as early as 1973, and has since developed into the ubiquitous transmission technology found in the private sector as well as in the administrative areas of organisations worldwide. Today's



Building on the long-established Ethernet and Industrial Ethernet data transmission systems, Ethernet-APL now allows unhindered access to process data from field devices.

information technology is unimaginable without Ethernet and, in the form of Industrial Ethernet, the standard has long since found its way into factory automation.

Until now, process plants have operated more or less in isolation, offering only a few interfaces to the information technology of the company that operates them. This results in numerous restrictions – but these are removed by Ethernet-APL, which is based on the worldwide Ethernet standard. The suffix APL stands for Advanced Physical Layer and describes a physical layer for the transmission of data and electrical energy via two-wire cables and over distances of up to 1 000 metres.

Ethernet-APL will thus become an integrated component of a uniform and universal communication landscape, making the principles of Industry 4.0 a reality for the process industry as well. Ethernet is just as much behind the Internet of Things as it is behind Big Data, the cloud, ubiquitous mobile communications and the Internet.

New field devices for new possibilities

The vision of the organisations driving Ethernet-APL also includes concrete requirements for Ethernet APL-capable field devices and infrastructure components. The principle is based on self-contained field devices that can be integrated easily into any system environment without a high degree of adaptation effort. Such devices can be automatically integrated by the system controller, where the configuration made when the system was commissioned is automatically transferred to the replacement device.

The devices are integrated into the network and can be put into operation and easily replaced in case of failure, without the need for time-consuming manual configuration.

Since Ethernet APL-capable field devices do not require a gateway to communicate with the automation system, there are no longer any restrictions on data transmission. Instead, there is unrestricted access to all process and status data provided by the respective device. The data can be used for efficient process control, and is also available for maintenance tasks and Big Data applications.

Another new feature is that the device description and full technical documentation of the field device are embedded



The data restrictions that have kept process plants largely isolated from the companies that operate them are removed by Ethernet-APL.

directly in the device itself. This eliminates the need to search for and download drivers and device information from the Internet, and thus significantly speeds up the development and commissioning of an automation system.

With Ethernet-compliant data transmission completely independent of the running process control, direct access to field device data is now possible from any location. This speeds up maintenance and troubleshooting and allows for preventive maintenance, which can be critical for plant availability. It also enables a wealth of new applications that will give the process industry a completely new impetus. □

For more information visit: <https://www.pepperl-fuchs.com/southafrica/en/> and <https://www.endress.com>

About Ethernet-APL

Process plants operate for 20+ years and are required to be safe for people, the product, and the environment. Explosion potential in hazardous areas and harsh conditions require that any deployment of new technology is thoroughly tested and provides added business benefits. Technology should be kept simple in handling and in the training required.

Ethernet is the de-facto communication standard across most enterprises, but it does not meet the requirements in the field of process automation without modification. Ethernet with an Advanced Physical Layer (Ethernet-APL™) will enable long cable lengths and explosion protection via intrinsic safety, with communication and power over two wires. Based on IEEE and IEC standards, Ethernet-APL supports any Ethernet-based automation protocol and will become the long-term stable technology for the process automation community. A new white paper on Ethernet-APL presents the business environment,

technical specifications, implications for different user types, and the development status of Ethernet-APL.

In simple terms, the technology provides a two-wire Ethernet for process automation and hazardous locations, based on IEEE and IEC standards.

It offers the benefits of

- Enhancing the value generated in a process plant by bringing Ethernet technology and high-speed communication out into the field
- Simplifying installation, configuration and maintenance of instruments and automation technology
- And it is designed for a workforce trained in IP technology.

A number of leading suppliers in the field of process automation are involved in the development and rollout of Ethernet APL. They include, among others, P+F, E+H, ABB, Phoenix Contact, Rockwell Automation, Siemens, Krohne, and VEGA.

For more information visit: <https://www.ethernet-apl.org/>

MEASUREMENT + INSTRUMENTATION : PRODUCTS + SERVICES

New ball valve: safety in high-pressure applications

In the process industry, machine building or automation – the new HPBV ball valve from WIKA, for high-pressure applications up to 20 000 psi (1 379 bar), is designed for use in a wide range of applications.

The new model HPBV is available with various bores and enables bidirectional flow. Its robust design, with floating ball, blow-out-proof valve spindle and high-



The new HPBV from Wika is designed for safety in high-pressure applications.

quality PTFE sealing packing, offers maximum safety and a long service life for the instrument. The valve seat made of PEEK withstands chemicals, heat and wear.

The new valve is available with two connection types: NPT or cone/thread (for nominal pressure 20 000 psi/1 379 bar). Operation is smooth, even under high loads – the ball valve can be closed and opened with just a quarter turn. In addition to the standard version, there is an optional oil- and grease-free variant for oxygen applications, in line with ASTM G93 Level C requirements.

For the HPBV, WIKA offers an application-specific assembly with a high-pressure gauge. Such an instrument 'hook-up' is delivered ready to install and leak tested.

For more information contact WIKA Instruments.

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Email: sales.za@wika.com, visit: www.wika.co.za

Radar – a better measurement option

VEGA is well known as a pioneer in radar measurement technology, having been at the forefront of this field for the past thirty years. More recently the company introduced a new series of sensors to serve a wider range of applications. Jürgen Skowaisa, Product Manager Radar at VEGA Grieshaber KG in Schiltach, Germany, outlines some of the benefits of new standardised radar technology.



Jürgen Skowaisa,
VEGA.

Radar used to be a special technology for complex applications where other technologies failed. Radar sensors are designed for wide pressure and temperature ranges, and this is what makes them expensive. In a lot of applications, however, there are no high temperatures or pressures, but radar would still be the ideal technology. These are the applications VEGA is focusing on with its new radar devices.

The main focus currently is the water and wastewater industry, where ultrasonic technology is still most commonly used. There are many other applications too, in which radar has often proved to be the best choice: in power plants, for example, and in small chemical tanks as well as in applications in the food and beverage industry in areas that have lower demands on hygienic design.

There is also great potential in the bulk solids industry, from building materials to various applications in pet food production. The main advantage of radar, in comparison to other measuring principles, is that it is not affected by the process conditions and the measured product. This makes radar a universal technology.

A new radar microchip

The development of VEGA's new series of sensors began with the design of a completely new radar microchip. Radar is being used increasingly in the automotive industry. There are now radar modules for use in simple distance measuring systems. However, these modules are not suitable for radar level sensors that have to meet the high demands of industrial process automation. Their power consumption is too high and their frequency ranges don't fit. That's why VEGA decided to design its own radar chip optimised for level measurement. Working with a microwave semiconductor design company and a semiconductor manufacturer with broad experience in high-frequency technology, it took three years to create the final version of the VEGA radar chip – designed for a new generation of radar sensors. During its development, the main focus was on low power consumption, an optimised frequency range for level measurement as well as high accuracy.

Technological advantages in standardised form

The new sensors are competitively priced compared to ultrasonic sensors and offer a number of technological advantages.

When comparing sound waves with electromagnetic waves, there are many differences. Sound waves are strongly influenced by temperature, pressure and different gases; this can cause significant inaccuracy as it is not easy to compensate for these effects. If an ultrasonic sensor is mounted outdoors, it needs a sun shield



With its new standardised radar devices, VEGA is focusing mainly on applications in the water and wastewater industry.

or an external temperature sensor to compensate for the heat generated by sunlight. In bulk solids applications, dust and filling noise cause huge problems for ultrasonic measurement because dust absorbs the sound waves and the intense noise makes it difficult to detect the echoes. Radar signals, on the other hand, are not influenced at all by such conditions. This makes radar sensors widely applicable, highly reliable and particularly accurate.

The radar sensors VEGA has always produced are customised to meet the requirements of the respective application and industrial sector, with regard to process fittings, for example, and to meet the specific needs of customers. The sensors are supplied with the certifications and approvals required by the particular industry. They are available with standard plastic housings as well as metal housings of aluminium or stainless steel, but until the newer range of sensors was introduced, VEGA did not stock 'standard sensors'.

The new radar devices are made for standard applications with standard process conditions. For these applications, no sensor variety is required and a process fitting made of chemically resistant PVDF fits them all. This enables the company to offer radar technology at a competitive price.

Sensors for Ex areas

Explosion protection and communication interfaces are important criteria for customers deciding on which sensor will best suit an application. Even in simple applications, it is sometimes necessary to use an Ex-approved sensor. VEGA provides all essential approvals for use of its sensors in hazardous areas, for applications in gas and dust Ex areas.

The encapsulated sensor for gas Ex applications in Zone 1 or 2 is completely new. With this version, it is not necessary to provide an intrinsically safe power supply. The sensor can be



Established as a specialised technology for wide pressure and temperature ranges, radar sensors also offer an ideal option for other applications.

connected directly to a PLC without any barriers, which makes it especially easy to use. A loop-powered analogue signal of 4 ... 20 mA is suitable for more than 90% of all applications. VEGA also provides Modbus and the SDI-12 standard protocol for the hydrological market.

technologies enable VEGA to design instruments for applications never previously considered. Together with high capacity batteries and new wireless communication standards, such as LORA, the company now has the technology to design wireless radar sensors for totally new areas of use. Radar is ideal for Industry 4.0 and related, cutting-edge applications. □

Acknowledgements: This article is edited and abridged from an interview with Jürgen Skowaisa, conducted by and first published in *Processing & Control News – PCN Europe*.

Wider applications

Whereas radar measurement used to be considered a 'last resort' for niche industries, level measurement with radar technology is now widely attractive. The new microwave

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

Simple cost-effective level switches

"High quality and the option for customisation to specifications, plus a fast manufacturing base for large quantity orders are key features of the S1 and M2 level switches from Val.Co, a leader in the supply of process instrumentation," says Jan Grobler, Managing Director of GHM Messtechnik South Africa.

"The level switches offer exceptional quality, incorporate internal temperature measurement devices and are cost-effective. They are specifically designed for industries where hydraulic oil tanks are used, such as the yellow metal industry, mechanicals and automotive industries," Grobler adds.

The simple S1 switch offers level controls with one electrical contact. Reliable, compact and easy to install, it is designed to offer a range of level switches to meet the need for monitoring levels in small tanks.

It is available with a flanged or threaded process connection and can operate in ambient temperatures from -30 to +55°C – 90% RH. Connections are

in brass, aluminium and PVC with a closed cell float.

The simple M2 switch offers level controls with two electrical contacts. The operation of the M2 is based on the drive of two reed contacts, located inside the measuring rod, by a magnetic float.

It is also available with a flanged or threaded process connection and has the same operating temperature range of -30 to +55°C – 90% RH. Connections are brass, aluminium and PVC with a closed float cell. The only moving elements are the floats that move for hydrostatic thrust along the measuring rod, so the switches are rugged and there is limited need for maintenance.

The switches are fitted with a SPST or normal closed contact, and an operating float of 180°C, which can also be opened normally. Up to six switches can be supplied from one sensor. The instruments can be tailored to meet specific customer requirements.

For more information contact GHM Messtechnik South Africa.

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The level switches can be tailored to meet specific customer requirements.

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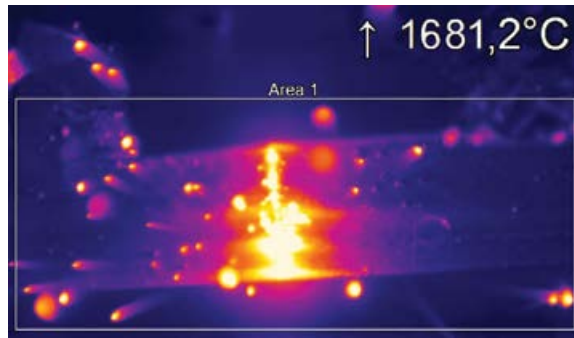


Compact infrared camera for laser machining processes

Temperature measurement in processes where lasers are used presents major challenges for infrared measurement technology. For example, the camera needs to be insensitive to the laser's scattered light. Instrotech, local representative for Optris, which is a leading manufacturer of non-contact temperature measurement devices, has launched the Optris PI 08M compact infrared camera – ideally suited to these kinds of applications. It has a very narrow-band spectral sensitivity of 800 nm. Most industrial machining lasers, such as NIR or CO₂ lasers, work outside this range, so that the detector is protected against scattered laser light without additional filters.

Precise temperature measurement

With the wavelength range of 800 nm, the PI 08M has an additional advantage as the measurement error is minimal with unknown or changing emissivity. At high temperatures it is only 1.5% of the measuring value; below 1 500°C it is just 1%. It has a measuring range from 575°C to 1 900°C. The interior of the IR camera holds a dynamic CMOS detector with an optical resolution of up to 764 x 480 pixels, which can be operated with a maximum frame rate of 1 kHz, making it especially suitable for fast processes. A real-time analogue output provides an output signal of 0 to 10 V. Here, the temperature is



The Optris PI 08M IR camera is suitable for use in high-temperature, fast, laser machining processes.

averaged over an area of 8 x 8 pixels – the position of the area can be selected freely.

The new PI 08M can be integrated easily into a range of applications, such as laser welding, laser soldering or laser hardening processes, where temperature plays a key role. The PI 08M is supplied with a Software Development Kit.

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Marcus Denker, Telecommunications Application Specialist, Business Unit Trabtech, Phoenix Contact GmbH & Co. KG, Blomberg, Germany

Oliver Tananow, Senior Specialist Electrical Engineering Core Site, Telefónica Deutschland GmbH & Co. OHG

Robert Krüger, Senior Specialist IT Core Site, Telefónica Deutschland GmbH & Co. OHG



Oliver Tananow,
Telefónica
Deutschland.

State-of-the art communication technology places high demands on reliability and availability. Looking to the future in this regard, network operator Telefónica Deutschland / O₂ is equipping its systems and digitalising its locations accordingly. An all-encompassing lightning and surge protection concept, plus monitoring, control, and automation of key system parameters at all system-related locations play an important role. With ImpulseCheck, the digital assistance system from Phoenix Contact, previously unmonitored system parameters are transparent and can be processed further.



Robert Krüger,
Telefónica
Deutschland.

Prioritising system availability

Telefónica Deutschland is one of the largest telecommunications network operators in Germany.

"In view of the current requirements associated with considerations such as digital Industry 4.0 and production in real time, cellular communication is becoming a particularly significant aspect of critical infrastructure. What's important here is the permanently high availability of key central system areas, which we are constantly reviewing and steadily increasing with the help of new technologies," says Oliver Tananow, who is responsible for system planning and implementation at Telefónica Deutschland.

The comprehensive use of lightning and surge protection components is a key building block for increasing availability. When creating a lightning protection concept, it is essential to safeguard the power supply. Power supply failure caused by transient events can be avoided through the consistent use of lightning and surge protective devices.

Surge protection and lightning protection zones

Protecting a telecommunications system (whether a cellular system or data centre) from the effects of lightning strikes



Requirements relating to Industry 4.0 and the need for real-time communications make cellular communication an increasingly important aspect of critical infrastructure.

and overvoltages requires multiple, coordinated protective measures and devices. It is important to establish a comprehensive, coordinated system of lightning and surge protective devices (SPDs).

A coordinated SPD system is a multi-stage system of lightning and surge protective devices. The installation locations of SPDs within a system are determined using a lightning protection zone concept based on lightning protection standard IEC 62305-4. The system is divided into lightning protection zones (LPZ) from the outside to the inside, with decreasing lightning protection levels. In this context, the following key areas requiring protection have been identified and equipped with lightning and surge protective devices.

- **Grid feed-in point for power supply:**

The transfer point from the power provider to the data centre is the first critical interface where high lightning currents need to be taken into consideration. A high-performance type 1+2 combined lightning current and surge arrester provides the necessary protection here.

- **AC main distribution:**

The cables from the feed-in and the emergency power supply come together in the main distribution. As lightning currents and overvoltages can also be expected in this part of the system, a compact type 1+2 device combination provides the required lightning and surge protection.

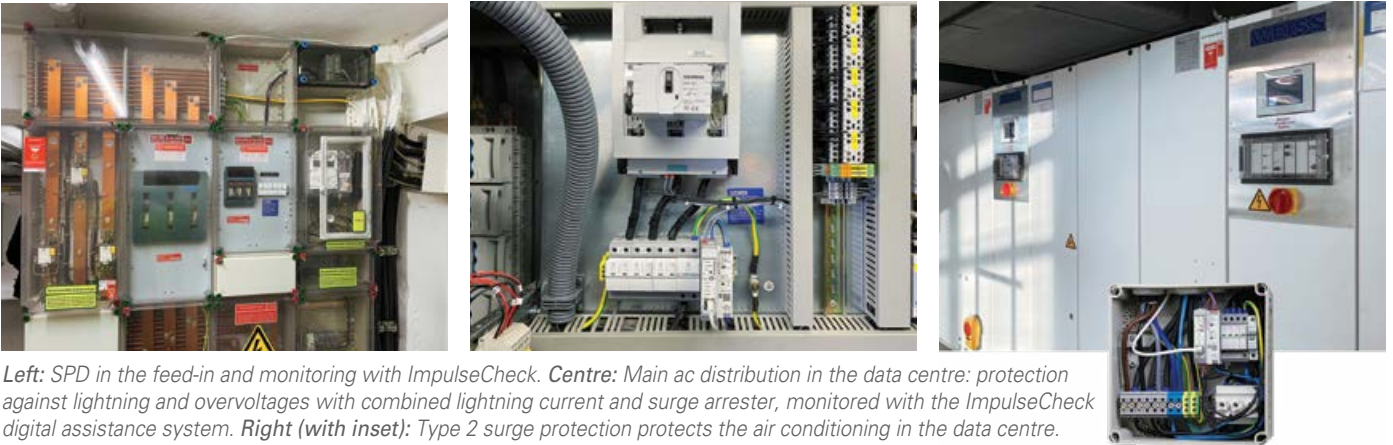
- **Dc power supply:**

Due to the physical proximity to the ac main distribution, further couplings can be prevented in this area, which is why additional SPDs did not need to be used here.

- **Emergency power supply:**

If, contrary to expectations, the main power supply suffers a failure, the emergency power supply is activated. First, a large battery storage system bridges the time until the permanently installed diesel generator has started up and reached its stable operating point.

In this particular application scenario, although lightning



Left: SPD in the feed-in and monitoring with ImpulseCheck. Centre: Main ac distribution in the data centre: protection against lightning and overvoltages with combined lightning current and surge arrester, monitored with the ImpulseCheck digital assistance system. Right (with inset): Type 2 surge protection protects the air conditioning in the data centre.

current cannot be coupled directly into the system sections of the generator, partial lightning currents could occur in this area. This is because switching from normal operation to emergency power operation also carries the risk of surge voltage couplings. In order to minimise this risk, a type 1+2 SPD is used here for smaller partial lightning currents.

- **Air conditioning:**

Another important component in the data centre is the air conditioning. The temperature in the server rooms can increase significantly if the air conditioning fails. This could result in the servers automatically shutting down or, at worst, server racks could fail due to overheating. In this case, type 2 surge protection prevents failures caused by overvoltages.

- **Ac and dc consumer outlets:**

The server rooms are among the most important rooms in a data centre. They are usually located within the inner circle of the protection zone and typically have 48 V dc and 230 V ac loads. Type 2 surge protection is sufficient here to keep interference away from sensitive devices.

Monitoring devices for predictive maintenance

At Telefónica Deutschland, the use of lightning and surge protection systems is not enough. The real-time monitoring of protective devices and the system goes one step further in increasing system availability.

A status indicator on lightning and surge protective devices for mains protection is now a standard feature. However, it is not possible to determine the actual load of the individual modes of protection from a simple indicator that shows only two states. At worst, the indicator is still green but changes to red (defect) after the next overvoltage event, without any prior warning. The protective plug must be replaced.

This is where ImpulseCheck, the intelligent assistance system for surge protection from Phoenix Contact, comes in as it measures transient events on live cables. The measurement results are transferred to Phoenix Contact's Proficloud solution, where the results are analysed and interpreted. ImpulseCheck then retrieves the results from Proficloud and can forward them to the relevant monitoring equipment, the data centre's building services management system, for example, used to monitor all systems in the facility. This means the current condition of the installed SPDs can always be determined. Pre-existing damage is detected, and the state of health is indicated visually in the

cloud or on the device by a yellow signal. In this case, yellow means that the normatively prescribed discharge capacity of the SPD has been reached. The protective device is still working, but replacement is recommended.

In addition to monitoring the protective devices, ImpulseCheck provides an insight into the system. Conclusions can be drawn regarding the condition of the system based on electromagnetic interference that is measured via sensors on the live cables.

The advantage for Telefónica

Surge protection is installed at all Telefónica Deutschland technology locations. In addition, in the sensitive areas that are essential for reliable operation, the SPDs are monitored with ImpulseCheck.

"We can also connect ImpulseCheck to our existing systems and thus collect data on the entire technology for long-term evaluation and monitoring. With the cloud-based approach, we gain the benefit from further developments that Phoenix Contact makes in this area," explains Robert Krüger, who was responsible for the implementation of ImpulseCheck in the building services management system at Telefónica.

The assistance system detects the load on the protective devices and helps improve the planning of servicing call-outs. It also means anomalies in the installation are visible and can be rectified before failure occurs.

Investment in the future

Due to their height and metal structure, cell towers are particularly susceptible to lightning strikes.

"By installing ImpulseCheck on a 60-metre tall cell tower, we hope to obtain additional data on lightning strikes, such as how often they occur, and how the current is distributed in the system. This was also why we wanted to use ImpulseCheck in a classic cellular communication environment, and not just with a view to achieving high availability," says Tananow.

In summary, the ImpulseCheck assistance system features analytical options regarding the electromagnetic compatibility within systems. Among other things, the ability to act before a central component fails significantly increases availability. □

For more information visit: www.phoenixcontact.com

A guide to plant-wide safety in the nuclear industry

Remote monitoring specialist Omniflex has released a new whitepaper on nuclear safety. It provides a guide on issues ranging from radiation surveillance equipment to SIL-rated alarm systems. With the UK government set to invest in accelerating nuclear power generation as part of its net zero by 2050 goal, Omniflex is sharing its knowledge of how to operate nuclear facilities as safely as possible.

The nuclear industry is well known for being highly regulated and operating under the most stringent health and safety regulations. There is perhaps no other industry where mission-critical safety systems matter more. According to regulations set by the UK's Health and Safety Executive and the Office for Nuclear Regulation, a key aspect of managing nuclear site safety is radiological monitoring and the recording of all live and historical data.

To meet these requirements and navigate the decommissioning phase at the Sellafield nuclear site, the National Nuclear Laboratory (NNL) and Sellafield Ltd. engaged Omniflex to engineer commercial off-the-shelf (COTS) products to network radiological surveillance equipment. This led to the creation of Omniflex's Radiological Protection Node 1 (RPN1) and W3 Wireless Interface Node, both of which are based on Omniflex's Teleterm technology.

Gary Bradshaw, Director at Omniflex, says, "The installation of the RPN1 across the Sellafield nuclear site helped the NNL save over £1 million in costs and ensured that time spent by personnel in radiologically active areas was greatly reduced. Furthermore, because of the benefits of our plug-and-play systems, in terms of networking radiological monitors, Omniflex is now the preferred technology partner for Sellafield Ltd.

"At the heart of both the RPN1 and W3 is our Teleterm technology: a state-of-the-art remote terminal unit (RTU) designed to increase remote monitoring capabilities as cost-effectively as possible. The Teleterm products feature an on-board RS232/485 port that can be used to acquire data from third party devices, such as Ultra, Mirion, John Caunt and Berthold alpha, beta and gamma



The nuclear power industry is well known for being highly regulated with respect to health and safety.

monitors, using either the Modbus protocol or custom protocols. This is essential for nuclear plant managers relying on devices sourced from various manufacturers."

Omniflex is also helping nuclear sites improve site safety with its range of alarm annunciators, the world's first to be substantiated by EMPHASIS for use in SIL applications in the nuclear industry. The company is now the standard approved supplier of SIL-1 rated alarm annunciators and SIL-2 rated door warning alarms and slave alarm units for the UK's nuclear industry.

"The SIL rating shows that Omniflex's alarm annunciators have been independently assessed and certified to a high standard," Bradshaw continues. "This gives plant managers the confidence they need that the systems they rely on to keep their sites running safely will see them through those crucial moments."

Omniflex has over 55 years' experience as a specialist in industrial alarm annunciation and is keen to share its knowledge and improve safety measures throughout the industry.

In the nuclear industry, where saving money and improving safety do not often go hand-in-hand, Omniflex is bringing the two together.

The whitepaper is available at no cost and can be downloaded from the Omniflex website.

For more information visit: www.omniflex.com



Safe valves for combustible gases

The GEMÜ 550 angle seat globe valve from the Ingelfingen-based valve specialist GEMÜ is available with gas approval, certified by the DVGW (German Technical and Scientific Association for Gas and Water) to DIN EN 161:2013-04 and DIN EN 16678:2016-02 standards.

The angle seat globe valve can be used as a shut-off valve for combustible gases in the gas families 2 and 3, in gas burners and gas appliances. Typical gases in this

family include natural gases, petroleum gases and biogases, consisting mainly of methane, liquid gases containing propane and butane, and hydrogen.

The designs of the GEMÜ 550 angle seat globe valve that are suitable for use with combustible gases are those with the flow direction 'over the seat'. In these models, the sealing force is not reduced by the inlet pressure. The maximum operating pressure is 10 bar.

For more information visit: www.gemu-group.com

Specific designs of the GEMÜ 550 angle seat globe valve are now available with gas approval.

Virtual safety training for working at height

After 18 months in the making, the Dekra Institute of Learning (IOL) has launched its working at heights training course on a virtual reality (VR) and augmented reality (AR) platform – with its PC-based 3D e-learning being a first in South Africa. This innovative course was developed in partnership with software company, Virtutec.

Dennis Vaden, Chief Operational Officer of Virtutec says, “While there are other AR and VR training courses in existence, we believe the program’s ability to offer a 3D e-learning module which is PC-based for multiple corporate users, is a first in South Africa. The training program can be used by individuals and corporates.”

Christopher Mörsner, Head of the Training Division at Dekra IOL, notes: “Working at height remains one of the biggest causes of fatalities and major injuries across many sectors, including in the engineering, construction, mining and industrial environments. ‘Work at height’ means work in any place where, if there were no precautions in place, an employee could fall a distance liable to cause personal injury or death.

“Addressing this very serious issue, we have created the Dekra IOL VR training course, which is fun, interactive and informative. It gives the user the impression of being on a construction site – and the context can be adjusted to suit different customers’ needs. Importantly, the training course is SETA-accredited.

“I believe learning is especially effective when it is fun, and this training course enables anyone to learn about working at heights in a way that is safe and entertain-

ing. It equips the individual to go into the field with knowledge gained, safely yet effectively.”

Mörsner adds that the training program is useful across multiple industries, and is available on the Dekra learner management system for anyone who wants to do working at heights training, whether for the first time, or as a refresher course.

The training program is based on self-paced learning and can be accessed using virtual reality headsets as well as through a laptop.

“A facilitator can be available to assist and support if required,” Vaden adds. “And because the learning is self-paced, the individual doesn’t have to complete it all at once – the program remembers where you are, and the multiple modules can be carried out over time to suit your time availability.”

Mörsner says, “In performing work at height, it is important to remember there is always a risk of fall injuries – and certified and expert training is an important part of an employer’s responsibility in facilitating their employees’ safety.

“I am grateful to our Dekra employees who tested the platform vigorously and gave us their feedback. Dekra IOL, in partnership with Virtutec, is proud to present a fun, safe and informative digital way for anyone to learn about working safely at heights – using this technology,” he says.

For more information contact Dekra IOL.
Visit: www.dekrainstitute.co.za



Dekra IOL has introduced a virtual reality training program for safe work at height.

IR windows for safe electrical inspection

Infrared (IR) cameras are based on digital camera technology and therefore require a direct line of sight to record a thermal image. The area to be measured needs to be operating under normal conditions if a hot spot is to be detected, which means it has to be live and must have been so for at least 20 minutes prior to inspection.

An arc flash does not happen without a trigger; it nearly always begins due to a ‘change of state’ that causes even a momentary connection between phases. 99% of the time, arc flash incidents are caused by some intervention, someone contacting components, or a similar misstep. Spontaneous arc flashes very rarely occur. Thermographers are thus put at risk when they have to open cabinets or doors to gain access to the internal energised components that they want to image.

Some organisations prohibit live inspection of energised higher voltage equipment, although this is not common practice in South Africa. IR windows offer an alternative to not doing the required inspections. They remove the risks and downtime associated with live inspections. The use of IR windows in a thermographic inspection programme removes 99% of the triggers of arc flash incidents, and improves electrical safety by allow-

ing safe, regular infrared inspections of energised and loaded electrical switchgear.

The use of IR windows is becoming more common. Some electrical panel manufacturers are now pre-fitting their panels with windows to make them more IR friendly. The use of these IR windows allows for IR inspection without the need to open panels.

Today, IR thermography is reportedly the fastest growing predictive maintenance technology globally. The number of IR equipment manufacturers has increased significantly over the last decade.

Established in 2007, IRISS Inc. is a privately held company that aims to enable industrial organisations and others to ‘save time, save money and stay safe’. As a manufacturer of the world’s first and only industrial-grade infrared windows, IRISS designed its products for the end user – to enable efficient and safe work processes for infrared electrical surveys. It provides a way for companies to reduce and eliminate the risk of arc flash in order to protect plant assets and personnel.

For more information contact R&C Instrumentation.
Tel: +27 (0)11 608 1551
Email: info@randci.co.za
Visit: www.randci.co.za



IRISS IR inspection windows allow for safe electrical inspection of energised equipment.

Moving towards hydrogen

Volvo Trucks showcases new zero-emissions truck

Volvo Trucks has started to test vehicles using fuel cells powered by hydrogen. To decarbonise transport, the company already offers battery electric trucks and trucks that run on renewable fuels, such as biogas. In the second half of this decade, it will add a third CO₂-neutral option to its portfolio – fuel cell electric trucks powered by hydrogen.

“We have been developing this technology for some years now, and it's great to see the first trucks successfully running on the test track. The combination of battery electric and fuel cell electric will enable our customers to completely eliminate CO₂ exhaust emissions from their trucks, no matter the transport assignments,” says Roger Alm, President of Volvo Trucks.

The fuel cell electric trucks will have an operational range comparable to many diesel trucks – up to 1 000 km – and a refuelling time of less than 15 minutes. Total weight can be around 65 tons or higher, and the two fuel cells have the capacity to generate 300 kW of electricity on-board.

Customer pilots are expected to start a few years from now and commercialisation is planned for the latter part of this decade.

“Hydrogen-powered fuel cell electric trucks will be especially suitable for long distances and heavy, energy-demanding assignments. They could also be an option in countries where battery charging possibilities are limited,” says Alm.

- Generates its own electricity

A fuel cell generates its own electricity from the hydrogen on-board instead of being charged from an external source. The only by-product emitted is water vapour.

- Fuel cells by cellcentric

The fuel cells will be supplied by cellcentric – the joint venture between the Volvo Group and Daimler Truck AG. Cellcentric will build one of Europe's largest series production facilities for fuel cells, specially developed for heavy vehicles.

- More green hydrogen needed

Fuel cell technology is still in an early phase of development and the new technology presents many benefits, as well as some challenges. One of them is large-scale supply of green hydrogen (that is, hydrogen produced using renewable energy sources). Another is that refuelling infrastructure for heavy vehicles is yet to be developed.

“We expect the supply of green hydrogen to increase significantly during the next couple of years, as many industries will depend on it to reduce CO₂. However, we cannot wait to decarbonise transport, we are already running late. So, my message to all transport companies is to start the journey today with battery electric, biogas and the other options available. The fuel cell trucks will then be an important complement for longer and heavier transports a few years from now,” says Alm.

For more information visit: www.volvo.com

Test bench for mtu hydrogen engines

Rolls-Royce has commissioned its first in-house test stand for mtu hydrogen engines at its Augsburg site. “This marks another milestone on the road to climate-neutral energy supply,” said Andreas Schell, CEO of Rolls-Royce's Power Systems division, speaking at the official commissioning. Over the past year and a half, the company has invested around ten million euros at Rolls-Royce Solutions in Augsburg in test bench modernisation, hydrogen infrastructure and other measures as part of its ‘Net Zero at Power Systems’ climate protection programme.



Rolls-Royce has commissioned its first in-house test stand for mtu hydrogen engines at its Augsburg site.

In this sustainability programme, Rolls-Royce announced in 2021 that it would realign its product portfolio so that by 2030, sustainable fuels and new mtu technologies can reduce greenhouse gas emissions by 35%, compared to 2019. The company is already successfully operating an mtu fuel cell system,

has released its power generation gensets for sustainable fuels such as HVO (hydrotreated vegetable oils), and is developing electrolyzers to produce green hydrogen. The mtu gas engine portfolio is being prepared for hydrogen as a fuel, to enable a climate-neutral energy supply.

“To reduce CO₂ emissions in electricity supply, renewable, often decentralised, energy sources are needed to generate electrical energy on a much larger scale than today. In conjunction with these renewable sources, we see hydrogen as an essential energy carrier of the future. This is why we are working towards gradually bringing our mtu gensets and CHP units based on the Series 500 and 4000 gas engines to market for operation with a hydrogen blending of 25% by volume and more and for operation with up to 100% by volume,” said Dr Otto Preiss, Rolls-Royce Power Systems Chief Technology Officer and COO.

The Power Systems division of Rolls-Royce has set itself strict targets for reducing greenhouse gas emissions in its own operations: the company aims to be climate neutral worldwide by 2050, and in Germany as early as 2045.

For more information visit: www.mtu-solutions.com

Developing the skills industry needs

The shortage of technical skills is a huge challenge for business, not only in Africa but around the world. With its graduate and MBA programmes, engineering firm Babcock is developing the skills it needs now and well into the future.

Finding the right skills to meet industry needs has become a major concern for organisations across many sectors. As industry changes and grows, it is important for forward-thinking companies to have a system in place to develop the skills they need, now and going forward. Babcock invests in several skills development programmes, including the Babcock Graduate Programme and the Babcock Senior Leaders MBA programme.

Graduate programme

Kathryn Paradisos, Talent Manager - Africa, explains that the Babcock Graduate Programme was designed to provide new graduates in the company with the opportunity to participate in a structured programme that maximises development, integration and adoption of the Babcock system as easily and seamlessly as possible.

"With the assistance of their respective mentors and selected subject matter experts, the graduates work through key competencies which are outlined in a logbook. This is a full two-year programme," Paradisos adds.

Two finance graduates who have recently completed the programme, Tebogo Chabeli and Shonisani Sinyoni commented on it.

Shonisani Sinyoni says, "The Babcock Graduate Programme provides youth with opportunities to gain experience and prepares them for the corporate world. It has offered me a good base to become an accountant and find ways to gain knowledge through exposure."

Tebogo Chabeli says she is convinced this is one of the best graduate platforms around. "It introduces young, vibrant minds to industries they might not otherwise have considered."

Four engineering graduates, Cathleen Beukes, Obed Salman, Rylan Naidoo, and Thelma Thangoane, also successfully completed Babcock's Graduate Programme in 2022.

Babcock provides innovative engineering solutions and specialised support services for strategic capital assets in the energy sector. Paradisos says that as an engineering company, Babcock pushes boundaries to achieve and exceed project and client objectives. To keep this market-leading position, the company trains and develops its engineers in line with the requirements for them to become Professional Engineers, registered with the Engineering Council of South Africa.

Thelma Thangoane says, "The programme has given me the opportunity to mature as an industrial

engineer. I have gained experience in business analytics and quality assurance, and grown my leadership skills. This bodes well for my future goals at Babcock."

Cathleen Beukes commends Babcock for investing in young engineers today, which she believes is key to helping create and secure the future of South Africa.

Commenting on his experience of the programme, Rylan Naidoo says, "The Babcock Graduate Programme is phenomenal. As well as introducing engineers in training to Babcock company procedures and operational systems, it provides exposure to design, fabrication and construction environments."

Obed Salman sees it as a well-structured programme, which gives graduates the much-needed exposure to all business units and departments within Babcock.

"Babcock's Graduate Programme helps us provide our clients with the best quality service, by training and securing the best talent. In turn, this will provide South Africa with the most advanced engineering skills it needs to meet its energy needs. It will also help support local development so these skills grow and stay in the country," says Paradisos.

Senior Leaders MBA Programme

Process Engineering Manager, Juan Gerber, and Finance Director, Abdul Samad Patel, recently completed the Babcock Senior Leaders MBA Programme. This is a Babcock International initiative that brings together around 20 senior members of Babcock International's global operations to complete a three-year course, exclusively for Babcock employees.

The MBA, which is offered by the University of Strathclyde Glasgow's Strathclyde Business School in Scotland, covers a broad spectrum of business-related topics, relevant to any senior manager's portfolio.

"The MBA qualification allows each participant to broaden their skillset, enhance their leadership capabilities and learn valuable business principles. It certainly takes a lot of time, effort and dedication to complete a course of this magnitude while balancing family and work commitments, but at the end, it feels truly worth the effort," says Patel.

Gerber says, "I am honoured to have been selected for this programme and will forever be thankful to Babcock for providing me with this prestigious learning opportunity."

For more information visit: www.babcock.com



Shonisani Sinyoni.



Tebogo Chabeli.



Thelma Thangoane.



Cathleen Beukes.



Rylan Naidoo.



Obed Salman.

Achieving net zero, the role of carbon tax

Nirvasha Singh, Partner, Carryn Alexander, Partner, and Amanda Nkwanyana, Associate at the law firm Webber Wentzel, highlight that the structure of South Africa's carbon tax legislation incentivises compliance to convert to green sooner rather than later – particularly for those sectors that are typically heavy carbon emitters.

A reduction in carbon emissions is integral to South Africa's global commitment to achieve net zero. The government strategically introduced carbon tax to encourage a low carbon economy – and combat global warming.

The extractive industry is South Africa's primary supplier of fuel to generate energy. While coal has been Eskom's main resource (fuelling 75% or more of South Africa's energy supply), its negative environmental, climatic and social impacts can no longer be overlooked. Great strides have been made by some industry leaders to move to clean energy – using hydrogen-powered vehicles in their mining fleets, for example. Mining in a more environmentally friendly way will undoubtedly result in a reduction in carbon emissions and carbon tax liability. However, such projects are notably capital-intensive and will take some time to implement.

In response to the crisis of South Africa's energy deficit, the South African government has also taken steps to prioritise the acceleration of renewable energy programmes to generate more electricity and ease the demands on Eskom. This urgent focus by government forces the extractive industry not only to consider switching to environmentally friendly production processes, but also to re-look the minerals mined in South Africa.

The new global clean energy economy has opened the way for industrial opportunities in strategic alternative minerals such as: platinum, vanadium, titanium, cobalt, copper, manganese, chromium, and lithium. The exploration of these alternatives can lead to reduced emissions and pollution levels, which will also lead to a reduced carbon footprint and thus, a reduction in a business's carbon tax liability.

South Africa's carbon tax regime is being implemented in progressive phases, starting with a relatively modest rate, together with transitional support and exemptions. Currently, companies are entitled to carbon tax allowances of up to

95% to assist financially in transitioning their operations to low carbon and cleaner technologies. However, these allowances will not remain applicable for all three phases. In the 2022 Budget, government announced its intention to ramp up the carbon price and strengthen the price signals to promote behaviour changes over the short, medium, and long term. It proposed increases in the carbon tax rate for the 2023 to 2025 tax periods by a minimum of USD 1, increasing gradually to USD20 in 2026 and at least USD30/tCO₂e in 2030.

Additional short-term tax relief was introduced by government through the energy efficiency savings tax incentive, which provides for a tax deduction equivalent to the monetary value of actual energy efficiency savings (kWh) achieved, subject to a certificate of approval issued by the South African National Energy Development Institute. It is proposed that this incentive be continued until 1 January 2026, for relief from the proposed higher carbon tax margin and to encourage companies to reduce greenhouse gas emissions and help stimulate new energy-efficient practices and industries during this period. Companies need to take advantage of this temporary relief now, by transforming their activities through investments in energy efficiency, renewables, and other low-carbon measures with the aim of reducing their carbon footprint.

Furthermore, investing in low-carbon energy sources will help a business to fulfil its obligations in terms of environmental, social and governance (ESG) principles. A commitment to ESG principles is important for many reasons – including attracting investors and talent. ESG-focused investments can also, importantly, reduce a business's carbon tax liability – and the savings are greater for early adopters.

Although paying extra tax is generally resented, the monitoring and controlling of carbon emissions is more than just a tax obligation. It is fundamental to everyone's commitment to achieving sustainability in South Africa (and globally) through a low-carbon and circular economy.

*For more information visit:
www.webberwentzel.com*



*At law firm Webber Wentzel:
Nirvasha Singh, Partner,*



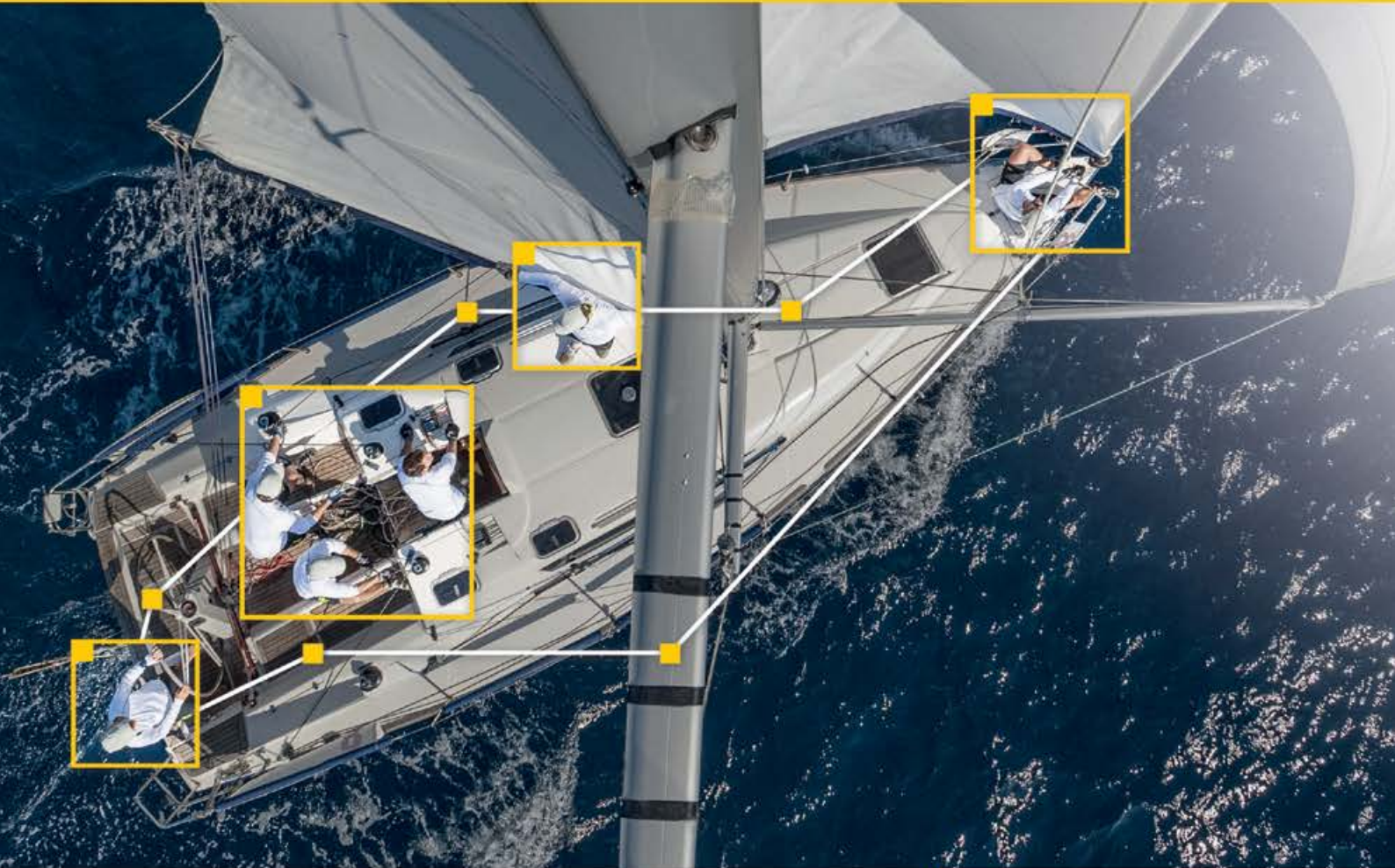
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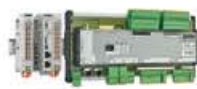
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