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SAIEE

SAIEE THE OFFICIAL PUBLICATION OF THE SOUTH AFRICAN INSTITUTE OF ELECTRICAL ENGINEERS | **MAY 2017**

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wattnow

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Wow - May is here!! The 5th month of the year - we are nearly halfway through 2017!

This issue of **watt**now, *the 60th issue under my management,* features everything about The South African Institute of Electrical Engineers you thought you knew. It was an eye opener for me when I did some research and read through the Transactions of 1909, and how the SAIEE was formed.

As promised in my April Editor's Note, I tell you the story of the SAIEE (pg 18) - everything about it which could've been 10 pages more, but I had to force myself to stop writing. Page 28 features the SAIEE Historical Section (HS), written by the HS Chairman, Max Clarke, sharing with you the history of this section. If you are a retired member, based in Johannesburg, and have too much time on your hands, please join the Historical Section, every Thursday for coffee and biscuits and assist in showcasing the artefacts in our museum.

Mr Llewellyn Hunt wrote a very informative article on Thorium Power Reactors, this you will find on page 42.

Then of course, the **watt**now magazine will not be complete without a thought-provoking article from Dudley Basson. In this issue, he tells us about the Dogger Bank Power Hub. Read the story on page 46.

The SAIEE is hosting its annual Charity Golf Day on the 13th of June at the Glenvista Golf course. To book your 4-ball, please email Gerda Geyer on geyerg@saiee.org.za today.

The 2017 SAIEE Smart Grid Conference will be taking place on 19 - 21 September. Registration is now open and we have an awesome line-up of speakers; visit www.saiee-smartgrid.co.za to register and qualify for a great early bird discount. Seats are limited, so book now to avoid disappointment! Early bird discounts close 31 May 2017.

Herewith the May issue. Enjoy the read!

Minx

Earn CPD Credits *Visit www.saiee.org.za to answer the questions related to these articles to earn your CPD points.*

save the date.

SmartGRID CONFERENCE

SAIEE

19 – 21 Sept | Service Delivery for a **Smarter** Africa

Eskom Conference Centre | Registration opens on **9 March 2017**

Only 300 seats are available.

The 2017 Conference draws on the success of the inaugural Conference that was held in February 2016, but has expanded to include a much wider eco-system including topics such as Smart Cities, the Internet of Things (IoT) and the Fourth Industrial Revolution. The program will also draw on plenary speakers from a number of the BRICS countries, in addition to speakers from Europe and the US.

www.saiee-smartgrid.co.za

South Africa of today has many challenges and, at the same time, there are numerous opportunities to resolve issues and build a this great country.

JACOB MACHINJIKE 2017 SAIEE PRESIDENT

The South African Institute of Electrical Engineers inaugurated its 2017 President, Jacob Machinjike at the end of March.

ABOUT JACOB MACHINJIKE

Jacob has a Bachelor of Science in Electrical Engineering (Honours) and a Master of Business Leadership (MBL). He has thirty years' experience in the projects and engineering industry, and a sound understanding of the operations and maintenance of the entire value chain of the electricity supply industry. He is a fellow of the South African Institute of Electrical Engineers (SAIEE) and is registered with the Engineering Council of South Africa (ECSA) as a Professional Engineer.

Jacob joined the SAIEE in 1996 as a member. He became Senior Member in 1998, and a fellow in 2004. He served as a council member from 1997 to 1998 and then from 2011 to date. Jacob has served on various council committees, including membership, professional development, finance, restructuring and policies and Exco.

In 1998, Jacob was the recipient of the SAIEE's Young Achiever's Award. He is the General Manager at Eskom responsible for the upkeep of Transmission Grid assets. He represents Eskom on the Governing Board of the GO15 (an international organisation of very large power grid operators). He is a former director of a number of Eskom subsidiary companies, which include Trans Africa Projects (TAP), PN Energy Services, Pebble Bed Modular Reactor (PBMR), Umeme of Uganda, Motraco and Elgas of Mozambique.

Jacob is passionate about leadership, developing people, and about coaching and mentoring for the sustainability and growth of the industry.

THE 2017 PRESIDENT'S MESSAGE

South Africa of today has many challenges and, at the same time, there are numerous opportunities to resolve issues and build a this great country. All these require making difficult choices, and often involve having to make decisions with trade-offs. We have high levels of unemployment, poverty, sporadic and widespread unrest among young people in communities and educational institutions, and appalling conditions in certain areas of our health care, among other things.

Therein lies our call to action to provide solutions!

The Role of the Engineering Professional in Today's Complex Decision Making

The late Nelson Mandela said: "Education is the most powerful weapon which you can use to change the world." South Africa must nurture and improve our ability to ensure the smooth running of the educational system and keep the pipeline for the required, skilled personnel in general, and engineering professionals in particular, intact.

Queen Elizabeth II once said: "At its heart, Engineering is about using science to find creative practical solutions. It is a noble profession."

The roots of the South African electricity supply industry reach back to 1884, with the advent of electric street lighting in Kimberley. What followed was municipalities generating and distributing electricity for lighting in homes and businesses, up to the year 1903.

Then the Victoria Falls and Transvaal Power Company (VFP) was founded by mining magnates and engineers, to meet the growing needs of the mining industry, as well as the surrounding businesses and communities.

Our Institute, established in 1909, is a world-respected, learned society of Electrical Engineering Professionals. Our founding task is to promote electrical science and its application for the benefit of all South Africans.

The field of electrical engineering has built a solid technological body for close to 140 years. The challenge looking forward is to build this into an active body of senses', to ensure that it has neural systems to make it 'SMART' and intelligent, in order to optimise decision making.

The objective of the 2017 SAIEE presidential term of office is to continue building on the focus areas of the past few years, namely developing and nurturing skills to ensure the professionalisation of engineers, technologists and technicians.

The role of the Engineering Professional in today's complex decision-making requires enthusiasm in growing membership among students and practicing engineers, together with increasing their ability to serve customers, and to help in resolving South Africa's and society's challenges. Some of the opportunities require making use of new and emerging technologies, industry models, smart technologies, innovative solutions to attract investments, members' access to international institutions and global business.

J Machinjike| SAIEE President 2017
Pr. Eng | FSAIEE

WATTSUP

T-Systems South Africa and Huawei announce a locally based Open Stack Enterprise Cloud for South Africa

In an industry disrupting partnership, T-Systems South Africa and Huawei have announced that they will be bringing Open Telekom Cloud (OTC) to local shores. OTC is a simple, secure and affordable Open Stack Public Cloud platform that will deliver on-demand, pay as you go cloud services to enterprises. With the advent of industry 4.0 and the digitalisation of organisations, OTC will bring the best of global cloud innovation to South Africa and will enable South African organisations to operate and compete on a global scale.

Says Gert Schoonbee, Managing Director of T-Systems South Africa, *"T-Systems is an established South African brand with local shareholding, that has been in the country for nearly 20 years, we pride ourselves on being in South Africa for South Africa. This extended partnership with Huawei, allows us to bring a new level of innovation to the local market. As a multi cloud provider, we have already been delivering high levels of service quality and price compatibility from our current local Datacentres; OTC will enhance our cloud portfolio and allow us to offer hyper scale computing capabilities on the open stack platform that can rival other global cloud offerings. Given that we are deploying OTC locally in South Africa, we will be retaining the revenue in the country, moreover, it enables us to fully comply with the Protection of Personal Information Act (POPI). In all, we are ecstatic about this as it brings simplicity, security and affordability to our customers."*

This partnership, which will see T-Systems adding a new, transformational public cloud offering to its existing portfolio, was officially announced on the 20th April 2017, at the Huawei Eco Connect conference held at the Sandton Convention Centre, Johannesburg.

Commenting on the partnership, Huawei Channel Director of Huawei Enterprise Business Group for Southern Africa, Daniel Liu, says, *"Huawei has enjoyed a successful partnership with leading global ICT provider, T-Systems, working together on the OTC offering in European and Asian markets. T-Systems South Africa has a strong focus on delivering quality ICT to South Africa and African markets and together we aim to focus on accelerating digital transformation within these borders."*

T-Systems South Africa has been offering secure end-to-end cloud solutions since 2005, from consulting, implementation, billing and customer service through to maintenance. In early 2017, T-Systems South Africa was presented with the MDs award at the SAP Partner awards, and is one of a handful of SAP partners that is certified to offer a SAP Partner Managed Cloud. With OTC, the ICT solutions provider plans to extend its cloud solution offering with a growing strategic partner ecosystem that includes SAP, Microsoft, Huawei and Oracle.

"Our customers are discovering the advantages of the public cloud, but they want a local alternative," said Gert Schoonbee. *"With the Open Telekom Cloud we can offer a local solution that is simple, secure, affordable, and, that will benefit from the international R&D and development road map of Deutsche Telekom."*

T-Systems and Huawei plan to start taking customers onto OTC in the 4th Quarter of 2017.

SMC appoints new Sales Engineer

Struan Clark recently joined SMC Pneumatics as a Sales Engineer in the Eastern Cape region. With four years' experience in pneumatic automation and more specifically, in the automotive industry, Struan brings with him a wealth of expertise to best support SMC's automotive customers and to assist in growing this vital sector in his region.

"I joined SMC because I wanted to be a part of an innovative and exciting company, and I look very forward to the challenge ahead" says Struan.

Specifying quality cables saves lives

When buying cables for mission critical applications such as security, fire and CCTV video transmission, installers should make their cabling choice as if their own life depends on it.

To use anything but the best, most reliable cable which is specially designed for the job may even be deemed as negligent, since failure at a critical point, when the system is needed most, may have costly repercussions in terms of property or loss of lives.

To ensure reliable performance under all conditions, specialist cable and accessories manufacturer, Helukabel, has developed fit-for-purpose solutions to meet all mission critical applications including security system, fire alarm cables and video cables. To meet the most stringent requirements, Helukabel has developed a full range of material types to ensure performance under all conditions.

EVERY OCCASSION

"Ranging from ultra-ruggered, halogen-free, super shielded, flame retardant or fire, chemical and shock proof cables, to shielded cables to ensure data integrity and high quality video cables, the choice of cables is large enough to satisfy almost all requirements. In addition, if necessary, custom-made cables can be ordered and manufactured to exact requirements.

"The cables are also manufactured to be easier-to-install [Fast-Connect] and have carefully engineered features, such as extra flexibility, easy running, colour coding and numbering that is designed to assist installers on site. Additional accessories such as intrinsically safe enclosures, glands, connectors, protection tubes, termination and connection sleeves and lugs etc, are also available to make the professional work of installers easier to accomplish.

"Our technical personnel locally, as well as global experts, are also available to assist with the specification and selection of cables, accessories and dedicated tools to ensure the success of projects from start to finish," says Helukabel South Africa Sales Manager, Hardus van Dyk.

RISK MITIGATION

He concludes that the correct security cables need to be specified wherever human life and material assets must be protected, including applications in industrial complexes, power stations, hotels, airports, underground railway networks, hospitals and outpatient clinics, shopping centres, data processing centres, theatres, cinemas, in multi-story buildings, public places, schools, mining sites, offshore plants, traffic communication, emergency power supply and alarm systems.

Hardus van Wyk
Sales Manager | Helukabel SA

Our Future, Our Plan – Demonstrating Commitment

Infrastructure affects people at the most basic levels in both their private and public lives. The Infrastructure Consortium of Africa estimates there are 40 billion potential working hours lost annually, due to the lack of basic plumbing infrastructure in houses alone.

Infrastructure development in South Africa forms an integral part of the country's plan to build a robust and sustainable economy. Looking at the Budget Review of 2016, supplied by the National Treasury, the next three years will see just over R865-billion being spent by the public sector on infrastructure. This budget will be focused primarily on housing, roads, transport, water, electricity and community infrastructure.

The National Planning Commission's Diagnostic Report indicated that a part of the slow economic development in the country had been a result of a failure to implement policies and a lack of broad partnerships on projects. The challenges are especially detrimental to the infrastructure and construction sectors, as they form a strategic part of development in almost all other sectors in the economy – from education and health, to mining and manufacturing. At this stage, the NDP proposes that more "efficient and competitive infrastructure" must be brought about, focusing particularly on commercial transport, energy, telecommunication and water, with special attention to affordability and sustainability; as well as in such ways where the poor will be positively affected in the food value chain and public transport.

The third annual Vision 2030 Summit, being held in June at Johannesburg's Birchwood Hotel, will be addressing all issues relating to the National Development Plan - and how you can join South Africa's leaders, in both government and the private sector, in taking action and driving economic acceleration and transformation in line with the National Development Plan.
For more info, visit www.vision2030.co.za

WATTSUP

Don't Underestimate Your Motors' Hunger For Power

Most readers will be surprised that over 40% of global electricity is consumed by electric motors, and even more surprised that the figure for South Africa is higher still, according to Zest WEG Group sales engineer Machiel de Bruyn.

"This is an indication that most farmers are not fully aware of how much their motors are costing them in electricity," says De Bruyn. *"In turn, this explains why many farms hang on to old, inefficient motors for longer than they should, thinking they are saving money."*

Farms incur particularly high electricity costs to drive pumps in energy-heavy functions like irrigation. While in previous decades the price of electricity was much lower, and less of an impact on the financial bottom line, rocketing energy costs in recent years have meant that the electricity bill is now a major factor in farm viability and profitability.

He says the cost of running a motor, even viewed over just 12 or 24 months, is many times greater than the motor's original purchase price.

"Up to 90% of an electric motor's cost of ownership relates to the power it consumes, so it may not make sense to keep repairing a low-efficiency motor in the belief that this is a cost-saving exercise," he says. *"In fact, modern high-efficiency motors can pay for themselves in a relatively short time, and then start saving the farm money into the future."*

An effective strategy employed by some of the country's most successful farms has been to steadily replace the older, less efficient motors whenever they fail, instead of trying to constantly repair them. This approach provides an affordable way of working towards a lower-cost operation, without having to jettison existing assets.

Zest WEG Group was the first equipment supplier to move from IE2 compliant (high efficiency) to IE3 compliant (premium efficiency) motors, raising the bar with WEG's fit-for-purpose design for the African market. Using even less electricity than the old IE2 units, WEG IE3 motors were introduced at no additional cost to Zest WEG Group customers.

De Bruyn says many farmers have also reduced energy costs by installing variable speed drives (VSDs), which control the speed at which motors run depending on the required power output at any stage in the pumping cycle.

"Combining VSD technology with the new WEG IE3 motors gives farmers two of the best strategies for improving their cost structure in respect of power consumption for activities like irrigation," De Bruyn concludes.

Proximity Detection in Coal Mines can assist with targetting Zero Fatalities

Anton Lourens
Managing Director | Booyco Electronics

With an industry target set to eliminate mining fatalities by 2020, and reduce Lost Time Injuries by 20% from January 2017, the pressure is on mines and their suppliers, including those in the field of proximity detection systems (PDS), to meet this vital goal.

"Transport-related incidents are still one of the top causes of fatalities, alongside fall-of-ground," says Anton Lourens, Managing Director of leading PDS OEM Booyco Electronics. *"While deaths in mining fell 5% to a record low of 73 in 2016 and injuries fell 15% to 2,662 last year, there is still a long way to go meet the 2020 target."*

Lourens says PDS is a key part of the sector's strategy to implement zero harm, and is already a legislated requirement for underground coal mines, who need to ensure their systems are 'fit for purpose' in order to comply.

"Coal mines continue to make strides towards better safety, with the injury rate in 2016 down 11% to 183 from 206 in 2015," he says. "Continued progress requires ongoing compliance and dedication to implementing not just the letter but the spirit of the law."

PDS allows for interventions where a potentially dangerous situation exists between a pedestrian and a machine. The system includes a sensing device, to detect the presence of an object in a working area, and an audible and visual alarm to both the equipment operator and pedestrians as they enter danger zones. It can also help locate people and machinery if there is an emergency underground.

Apart from the safety aspect, this technology helps mines to locate pedestrians and vehicles underground, providing data that can be analysed for patterns that affect production efficiencies. *"The groundwork for the wider application of PDS has already been laid down by the Department of Mineral Resources, through an amendment to Chapter 8 of the Mines Health and Safety Act (MHSA) in February 2015,"* he says. *"It is now required that PDS be installed on all mobile equipment on mines."*

He highlights that mines are required to assess significant risk in terms of moving machinery and people, and to put an action plan in place to mitigate that risk. One of the challenges, however, is that some mines still consider PDS a 'grudge purchase', and do not fully understand their legal responsibility to choose suppliers whose equipment is fit-for-purpose.

"While it may be tempting for a mine to select the cheapest equipment, they will need to prove in the case of an inspection or an accident that the equipment is up to the task and compliant," says Lourens. *"Even from our point of view as PDS suppliers, we have a legal responsibility to deliver a reliable solution, as suppliers can also be legally charged if the equipment fails to comply."*

WATTSUP

Highest number of Renewable Energy installations in SA

Specialist Electrical Contractor, Brand Engineering SA (Pty) Ltd, has carried out the highest number of utility scale solar Renewable Energy (RE) installations in the RE industry in South Africa. It has become a key construction partner for RE developers, and is responsible for the generation of 360 MW of power for Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) projects and other related renewable energy initiatives.

"Our exposure to the multi-disciplined nature of the RE projects enables us to offer engineering, procurement and construction (EPC) solutions for the civil, electrical and mechanical scopes of these projects," explains Herman Kriel, Group Managing Director for Brand Engineering. The company is the only South African contractor with experience and exposure to all types of renewable technologies.

REIPPPP

Brand Engineering ventured into the RE market when the REIPPPP commenced.

The solar photovoltaic (PV) REIPPPP projects which the company has completed to date and which are fully operational are:

- 6,8 MWp Rustmo1 plant – North West (NW)
- 10 MWp Konkoonsies plant – Northern Cape (NC)
- 10 MWp Aries plant – NC
- 22 MWp Herbert plant – NC
- 11 MWp Greefspan plant – NC
- 10 MWp Aurora plant – Western Cape (WC)
- 10 MWp Vredendal plant – WC
- 75 MWp Sishen plant – NC
- 86 MWp Prieska plant – NC

In addition it has completed six separate grid connection projects totaling 127 MW.

Also as part of the REIPPPP, Brand Engineering was appointed to carry out three EPC wind power projects in the Eastern Cape, which are now fully operational. They are:

- 63 MW Grassridge wind farm
- 24 MW Waainek wind farm
- 21 MW Chaba wind farm

The company has multi-year operation and maintenance (O&M) contracts in place for various projects. It guarantees the stipulated power generation, availability and carbon savings for all the projects. *"Utilising online technology, we monitor environmental conditions and all procedures and progress on an ongoing basis from our Cape Town head office,"* says Kriel.

PV ROOFTOP INITIATIVES

It has also completed thirteen solar PV commercial rooftop projects around South Africa in excess of 3400 kWp. Included are three strategic rooftop installations for Eskom's offices in East London, Bellville and Pietermaritzburg. *"We at Brand Engineering see solar rooftop as the future of RE in South Africa."*

BATTERY STORAGE SOLUTION

The provision of consistent solar power output even in peak periods has been a challenge to the RE industry. *"A solution to this challenge is storage provided by means of batteries,"* explains Kriel. *"Brand Engineering is undertaking multiple battery solar storage initiatives which will store in excess of two MW hours."*

SOLAR POWER GENERATION FOR AIRPORTS

In a more recent, ground-breaking RE development, Brand Engineering completed the construction of two solar plants, which are now each generating 500 KW to power Upington and Kimberley Airports. These were full EPC contracts and the Brand Engineering Group was responsible for mechanical, electrical and civils work, as well as grid connection and ongoing O&M.

The value of aftermarket support

When calculating the profitability of operations using capital equipment, the sums are done with the assumption that each piece of equipment is operational and working at its full capacity. Which means the bottom line is directly impacted every and any time a machine is operating inefficiently, idling, waiting for repairs or parts to arrive.

Although these types of breakdowns are dreaded they happen to even the best of equipment at any time. It is for that reason fleet operators need to attach a premium to the suppliers who are timeous, effective and easy to deal with.

ELB Equipment represents a large number of various international brands in the earthmoving, construction and mining industries. With this comprehensive range of equipment supplied by ELB Equipment, they find themselves to be in a unique situation to being a best-of-breed supplier that continually drive their aftersales support to exceptional standards of service.

Syd Rees | National Parts Manager | ELB Equipment

REDUCED DOWNTIME

Syd Rees, national parts manager, and Gerhard Botha, national service manager of ELB Equipment, are responsible for driving the company's aftermarket support and are very conscious of the costs customers incur due to downtime. With this in mind, their highly specialised team are driven to minimize downtime and ensure every interaction with ELB Equipment is done with service excellence, throughout the Sub-Saharan region.

"Most importantly we have adopted an ethic to grow our customers' businesses and focus on serving them in a way that is proactive in order to keep their fleet in the best possible condition to help them meet their goals. This is achieved by supplying OEM quality parts in conjunction with ELB Equipment's technical product support teams and field service teams whilst our internal workshop staff will cater for rebuilds and major component repairs that is standard throughout our branch and dealer network in sub-Saharan Africa."

He explains, *"After the handing over of the machine to the customer, is where the hard work for the aftermarket really begins. It becomes important to continue the standard of service set by the equipment sales team that resulted in the sale of the equipment. For this reason, ELB Equipment specialises in supporting its equipment with a swift turnaround time. However, we always remain vigilant of opportunities that can benefit our customer base in order to assist them with the change in market demands and dynamics in reducing their overall operating costs."*

"Our objective is to treat all customers with the same level of attention and care regardless of the scope and size of their operation." says Syd.

SERVICE BASED

"We strive to build long term relationships with our customers by offering competitive prices and adding more value in distribution, focusing on the things that optimise our customers' operations.' says Gerhard. He continues, *"We personalize our offerings and our logistical operations allow us to offer service to customers the way they like it, when they like it, where they need it, and around the clock."*

GROWING TOGETHER

Gerhard concludes *"ELB Equipment's growth is directly proportional to the growth of its customers. Therefore, the success of our customers and ELB Equipment is intertwined and cannot be separated. The better we serve our customers, the better we excel as a company."*

For more info visit www.elbquip.co.za

WATTSUP

FIRST TECH CHALLENGE

During November 2016 Many FIRST tech Challenge teams are up before 6AM getting ready for the Qualifying tournament at Sci-Bono Discovery center. Some teams slept less than 5 hours, one team even pulled an all nighter, experiencing a real life feel to what could be expected in the engineering world for which they are preparing themselves. Why all this effort and dedication?

Welcome to the FIRST Tech Challenge Velocity Vortex game for high school learners from 12 to 18 years of age. Design and build a metal robot that can team up with another robot to detect color, press buttons, pick up plastics balls scattered on the playing field and shoot them through a center area representing a vortex. To add to the already challenging game, a 30 second end game allow the robots to pick up a 60cm Ball, and place it on the center vortex.

Judges (represented by skilled staff from Ryonic Robotics) were impressed by detailed CAD design of some of the robots, 3D printed parts and complex Java code running on smartphones to navigate and control the robots in autonomous and driver control mode. The FTC program is supported by the SAIMC whereby some teams received sponsorship from Yokogawa, Beckhoff, Vega and Coolermaster.

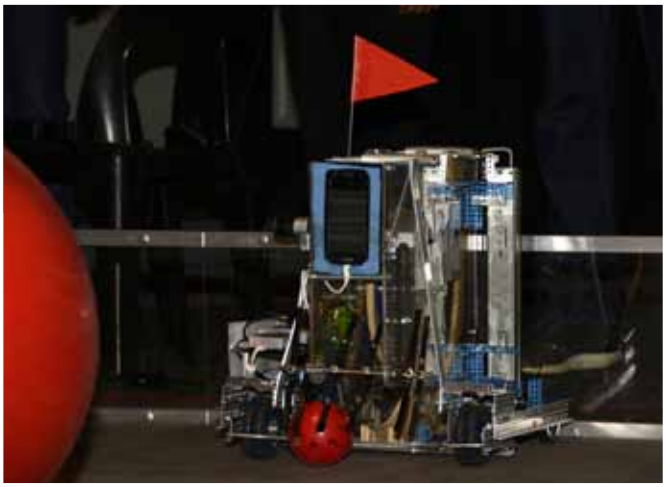
The qualifier tournament for the 2016/2017 season resulted in teams helping teams to compete a true example of gracious professionalism. The winning team Geared Wings will represent South Africa at the Word Festival in April in Houston Texas USA.

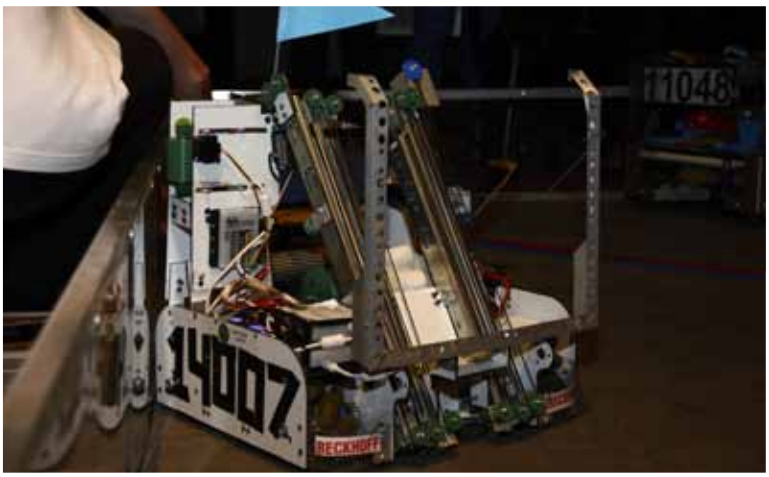
The FIRST Robotics programs are managed by TUT in collaboration with UNISA, NMMU, SAIMC and various science centers. For more information on how to get involved as volunteer, team, mentor or sponsor contact Mr. J de Vries devriesj@tut.ac.za.

FTC Robots in action

Team Creepy Crawley being judges by Staff from Ryonics Robotics and a TUT Student


GEARED WINGS

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FIFTH
ORDER

Newly established Earthing and Lightning Protection Association

The establishment of the new Earthing and Lightning Protection Association (ELPA) is a significant milestone for the sector. Following more than two years of hard work, ELPA has been set up with the intention of becoming the industry benchmark, and source of information for both businesses and individuals seeking to protect their buildings or homes. The non-profit organisation also aims to establish a uniform interpretation of the codes of practise which, as a result will help to protect the industry's image and increase standard and reliability of lightning protection service providers.

Numerous meetings and discussions have since taken place, resulting in what will be an important addition to the standards of safety in South Africa, in terms of the training and certification of qualified designers, installers, and inspectors with recognition by the Department of Labour, SAQA, the University of the Witwatersrand, SAIEE and others.

After approximately a year, the founding committee decided to hold its first 'annual general meeting' which attracted a significant portion of the industry and where almost all the major companies were represented by their owners. Here, a unanimous vote was taken to go ahead and create an association under the principles presented.

Significantly, since ELPA represents a trade directly involved in the provision of the first, second and third lines of defence against one of nature's most mysterious phenomena, a pass mark for its qualifying examination has been set at a minimum of 80% to ensure the competence of its members. It is upon this rigorous standard that ELPA plans to take the industry into the future, securely providing South Africa with genuinely certified, competent lightning protection installers.

The provision of a central database, of suitably qualified and skilled lightning protection service providers, will help people and organizations source specialists skilled in the art, science, and practises of conformant lightning protection designs, installations, inspection, testing, and certification. The modular nature of the skills training program will equip ELPA certified specialists in many of the higher aspects of contracting, such as quality control programs, risk identification, analysis, and management, amongst others.

Committee members include: chairman, Alexis Barwise (DEHN Africa), Mike Visser and Jan Jordaan (Power Quality), Pieter Human (Tesla Power and Lightning Protection), Nelson Pillay (Vodacom), Doug Kay (Electrotech), Andrew Economou and Kevin Rahn (Pontins), Gary Thoresson (Thor Earthing), Trevor Manas (LPConcepts), Paul van As (Surgetek), Seath Scowby (Lightning Protection Services), Bertie van Zyl (Advanced Lightning Protection), Ron Fourie (Pro-lightning), Jacques Hannekom (EHL) and Nico van der Berg (Independent Inspectors).

ELPA is will be participating publicly for the 1st time at the Earthing, EMC, and Lightning Protection symposium from the 5th to the 9th of June 2017.

ELPA will launch officially at its second Annual General Meeting to be held at the University of the Witwatersrand on June 19, where Professor Ian Jandrell, Dean of the Faculty of Engineering and the Built Environment, will give the keynote address. It is here too that the constitution of the organisation will be voted on and approved by a sufficiently broad section of involved parties, enabling ELPA to legitimately claim its appointment as an industry representative.

Until then, registered members (website registration is a simple exercise) can access the founding statements and constitution. The board is committed to an open, fair, and just association dedicated to the continual improvement of our members concerns in an environment of equality, where the voice and vote of every member counts. wn

To become a member of ELPA, visit www.elpasa.org.za

INTRODUCING

ELPA

EARTHING AND LIGHTNING PROTECTION ASSOCIATION

The Earthing and Lightning Protection Association will offer CERTAINTY through CERTIFICATION and COMPLIANCE

A registered non-profit organisation of voluntary membership

- Protecting the Consumer, our Industry and its Members
- Ensuring uniform interpretation of the Codes of Practice
- Keeping members updated about our codes of practice, our industry, our technologies and best practise methodologies
- Safety is our business, standards are non-negotiable, we uphold them

In conjunction with:

SAIEE The South African Institute of Electrical Engineers

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SECOND GENERAL MEETING
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Have your say, vote on our constitution, nominations sought for positions in the organisation

Join us on 19 JUNE at Wits University Auditorium CM1 from 07h30-10h00

Potential MEMBERS and all interested parties should be there

Scan the QR code to register and you will receive the minutes and directions or go to www.elpasa.org.za and click register

The SAIEE

The South African Institute of Electrical Engineers (SAIEE) was formed in February 1909, on the initiative of Messrs JR Bradley, HB Murgatroyd and PE Gregson. In June 1909 the first General meeting was held at the Grand National Hotel in Johannesburg. The 117 attendees comprising of 65 members, 42 Associate Members, 7 Associates and 3 Students, decided that *"a Provisional Committee should be appointed to establish the SAIEE, to draft rules and take steps to make the proposed institute widely known"*.

Today, 108 years later, the SAIEE has grown to 7000 members. As a Voluntary Association (VA), members are professionally engaged in the full range of engineering activities.

This includes academic research, manufacturing, electronics, telecommunications, measurement and control, mining, power infrastructural services, and many more. Our members make meaningful contributions of the quality of life for communities and to the steady advancement of technology.

Their efforts are acknowledged in many countries across the world.

The Institute contributes to the common interests and welfare of the whole engineering fraternity, through close co-operation with the Engineering Council of South Africa (ECSA).

MISSION STATEMENT

The South African Institute of Electrical Engineers strives to be a leading and respected learned society of Electrical Engineers through:

- Promoting electrical science and its applications for the benefit of its members within the Southern African community;
- Constant contact with appropriate organizations;

BY I MINX AVRABOS

and what is stands for...

- Recognizing achievement by advancement of individual members to higher grades of membership within the Institute;
- Enhancing the status of the profession; and
- Being a-political and non-discriminatory.

PROFESSIONAL CONDUCT

All members are required to uphold the dignity of the profession of electrical engineering.

In whatever capacity they may be engaged, they must conduct themselves in a strictly fiduciary manner towards their client, employer, fellow member, or others with whom they may be connected, and consistent with the established traditions of the Institute.

THE OFFICIAL OPENING OF SAIEE HOUSE

The South African Institute of Electrical Engineers was proud to announce the official opening of its new head office complex on 06 October 2011.

After nearly 4 years of deliberation and research, as whether to move to newer parts of the metro surrounds, or to stay in Observatory, Johannesburg - the decision was finally made in 2010. This was to build a new R12m facility on the current site. Forming part of the SA Advancement of Science and Technology Agency (SAASTA) site, the enhanced facilities of the SAIEE adds to the beauty and ambience of the ridge. It gives a 360-degree, endless view of Johannesburg from the highest point of the East-West Educational spine, from Auckland Park to Bruma.

This spine includes some of the country's best sports facilities to boot. The decision to remain on this site will be further validated when the City's redevelopment plans for the Yeoville/Berea area are realised.

The 2011 Minister of Science and Technology, Naledi Pandor, officially opened the prestigious new building that serves the needs of the Institute.

The SAIEE...

continues from page 19

The new building houses the administrative and professional staff, who serve the members, and interact with all similar institutions throughout SA. It is also used for the monthly and quarterly meetings of Council. The prestige and heritage of the previous 100 years of electrical engineers, who helped to build this country and who voluntarily served this noble institution, will be preserved and displayed in the Council Chamber into the future. The cornerstone, laid on 30 March 2011, has embodied in it a time-capsule to mark this milestone. When the SAIEE head office is ever moved, or this new building is eventually demolished, the items of history therein will be available for those who are fortunate to inherit it. Who knows when this will be?

Innes House was originally the residence of the Director of the Observatory over a hundred years ago, and has served as the SAIEE head office since 1994.

This heritage treasure has been restored, and is now home to the SAIEE Museum, which forms part of the Historical Section. This museum displays irreplaceable electrical engineering artefacts from way before the 19th century and provides a home for the extensive library of the SAIEE.

On every first Friday of the month, the various main committees of the SAIEE meet. The SAIEE committees are:

- EXCO
- Finance
- Membership
- Events & Marketing
- Education & Training
- Professional Development
- Technology & Knowledge Leadership
- Publications
- Facilities

The final meeting of the day is when the Council meets. The SAIEE President chairs the council meeting. All the chairpersons of the various committees report back to Council on the deliberations of their committees.

The SAIEE also supports various interest groups, namely:

ELECTRONIC & SOFTWARE SECTION

The objective of the Electronics and Software (E&S) committee is to promote the interests of electronics and software engineering. This includes fields such as telecommunications, control, software development, and broadcasting, to mention a few.

The Electronics and Software committee of the SAIEE meets regularly during the year. This is normally by utilizing teleconference technology since members are not only from Gauteng, but also from other provinces. When face-to-face meetings are held, the option to join by teleconference is still used to allow the distant regions to also be part of meetings.

The committee arranges talks and functions it believes would be of interest to the group it represents. Where necessary, it will facilitate the representation of the E&S community on technical matters. The E&S section also intends to provide a voice to software engineers.

POWER & ENERGY SECTION (PES)

The PES section encourages members to participate in its sub committees, as well as encouraging members to take interest in leadership and policy matters.

The Power & Energy Section is also actively involved in promoting the SAIEE membership to Students and Graduates, including experienced professionals who are not members.

HISTORICAL SECTION

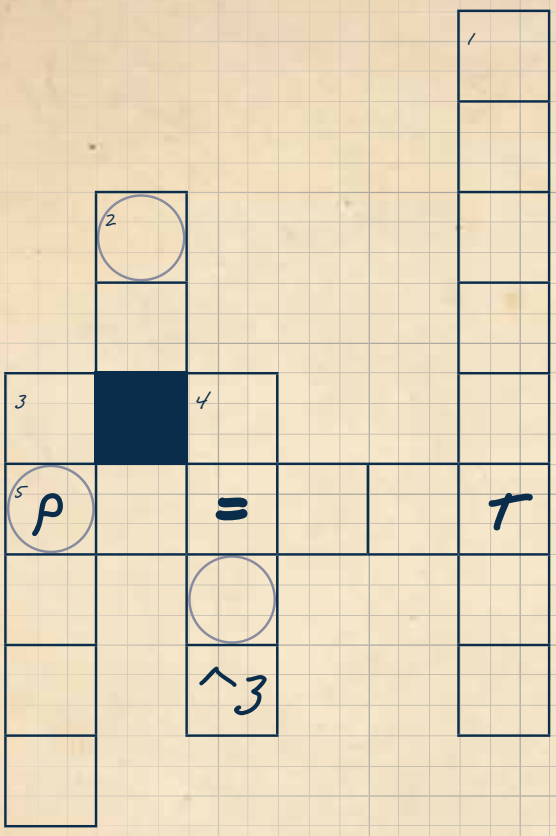
The Historical Section Committee is responsible for the generation and maintenance of the SAIEE's Technical Library and Museum, which are housed at its Headquarters in Johannesburg.

The Historical Section of the SAIEE exists to conserve the history of electrical engineering - with particular reference to South Africa - and to promote interest in this subject. To this end members collect electrical artefacts, books, journals and other printed matter for research purposes. Should you wish to assist these voluntary efforts, please contact us via the link shown on our website (www.saiee.org.za). Donations of interesting items, as well as individual or group visits are welcome. The Section hopes its efforts will help establish a full-scale museum of Science and Technology.

ROTATING MACHINE SECTION

Almost all power generation in the world currently still takes place with rotating electrical machines. This is potentially changing with the introduction of PV based solid-state inverters. However, in turn the consumption for industrial purposes, where mechanical movement is required, relies heavily on rotating electrical machines. This will not change with the introduction of Renewable Energy sources.

The Rotating Machines Section (RMS) has a long history outside the SAIEE as the Rotating Machines Working Group



DOWN

1. The formula p=m•v is used to calculate.
2. The SI Unit for Pascals (the derived unit to quantify internal pressure).
3. The letter S in S=d/t is used to notate which scalar quantity?
4. Formula for the volume of a cube.

ACROSS

5. The equation stated by Émile Clapeyron in 1834 as a combination of the empirical Boyle's law, Charles' law and Avogadro's Law commonly known as the ideal gas law.

The SAIEE...

continues from page 20

(RMWG). It's continued existence testifies to the resilient interest from the industry in having a forum for informal and formal exchange of knowledge in the field of rotating machines. It has traditionally covered the whole gamut from machine design and manufacture through the operation and repair as well as the material technology involved.

The working group finally become a section of SAIEE on 2 May 2014.

The section is vibrant and meetings are well attended, as the rotating machines in various sizes form the backbone of industry. The attendance at the regularly held Rotating Machines Forums reflect the whole spectrum of interested parties, ranging from academics and students, the R&D organisation, through the repair industry to large industrial organisation operating large fleets of rotating machines.

Constant developments in machine technology globally leads to on-going interest in the technological aspects related to rotating electrical machines.

EARTHING & LIGHTNING PORTECTION SECTION

The SAIEE is pleased to announce the introduction of the proposed Earthing and Lightning Protection Section with an MOU between SAIEE and the Earthing and Lightning Protection Association (ELPA). Wayne Fisher, an SAIEE member will be the champion of the section, and is responsible for the recruitment of interested people from all membership grades within SAIEE. Visit www.saiee.org.za for more information. ELPA will be launching at the University of Johannesburg on the 19th of June 2017.

The SAIEE is active nationwide, with support from the various centres in South Africa. The centres are:

- Gauteng Centre
- KwaZulu-Natal Centre
- Western Cape Centre
- Eastern Cape Centre
- Southern Cape Centre
- Vaal Triangle Centre
- Mpumalanga Centre
- Central Centre (Bloemfontein)

See page 66 in this issue to find the contact details of a SAIEE Centre in your area. We are in the process to establish a Centre in East London. Watch this space.

EXCO

The Executive Committee (EXCO) of the SAIEE consists of the Office Bearers (OB) and the Chairpersons of the various committees.

The 2017 Office Bearers are:
President: Jacob Machinjike
Deputy President: Dr Hendri Geldenhuys
Senior Vice President: George Debbo
Junior Vice President: Sy Gourrah
Immediate Past President: TC Madikane
Treasurer: Viv Crone
Honorary Vice President: Prof Ben Kotze.

MEMBERSHIP

In order to become a member of the SAIEE, you have to adhere to certain criteria.

The SAIEE have different Membership levels:

- Student Members;
- Associates;
- Members;
- Senior Members; and
- Fellows.

Professionals are registered with the Engineering Council of South Africa (ECSA), provided that they have met the required qualifications and experience.

Young graduates and diplomats should register with ECSA as one of the following:

- an Engineer in Training
- a Professional Engineer
- a Technologist in Training
- a Professional Technologist
- an Engineering Technician in Training
- a Registered Engineering Technician
- a Certified Engineer in Training
- a Registered Certified Engineer

THE IMPORTANCE OF REGISTRATION

Registration is a statutory requirement if you:

- Perform consulting engineering work;
- Take the responsibility for the performance of engineering work;
- Perform functions as laid down in certain statutes; and
- Wish to become a full member of a Voluntary Association.

It is also beneficial for the following reasons:
That you are a Registered Professional;
You are bound by an ethical code; and
You are qualified.

STUDENTS

The SAIEE are keen in getting involved with our future engineers and members, and therefore support students at all education establishments, ie. Universities, Universities of Technology (UT) and Further Education and Training (FET) colleges.

The SAIEE Centres are actively involved at the education establishments in their area to promote the SAIEE and support the

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The SAIEE...

continues from page 22

Electrical Engineering Student Chapters. The activities include:

- Meetings, at which interesting papers are presented – no entrance fee charged;
- Continuous Professional Development (CPD) courses - on current and important subjects at preferential rates;
- Lectures and Talks on topical electrical engineering subjects as well as topics to assist self employed electrical engineers with managing their businesses – no entrance fee charged;
- Visits to places of interest;
- National Student's Project Competition where students nominated by their various Universities and Universities of Technology present their projects. It is a great honour to be one of the winners, not to mention the cash prizes, which all students certainly could do with;
- Bernard Price Memorial Lecture which always features highly respected International speakers; and
- The Annual Banquet – one of the most prestigious social events in the Engineering Fraternity, and the guest speaker is usually a prominent public figure.

BURSARIES & SCHOLARSHIP

We have various options available for suitable candidates who intend to study for a diploma or degree in Electrical or Computer Engineering at a South African tertiary institution:

THE SAIEE EDUCATION AND BURSARY FUND

The SAIEE awards a number of bursaries each year. Monies made available from these funds are used to finance a certain number of bursaries annually, as well as funding the existing bursaries. These bursaries are awarded subject to the general rules and conditions of the SAIEE bursary scheme.

STUDY LOANS

In addition to the bursaries available, the SAIEE has a study loans assistance scheme for applicants who have not been awarded a bursary.

This scheme is to assist applicants to continue with their studies for a degree or diploma. We assist students with the following:

Application with a study loan, at major South African banks;

The SAIEE will pay the interest on such a loan until the studies have been completed*.

The loan applied for should equal the cost of tuition plus any special equipment on books, etc. The bank is required to grant the loan at a preferential interest rate applicable to study loans. The loan is to be repaid on successful completion of the course.

A motivation letter to any of the above banks will be provided by the SAIEE to assist the applicant with the loan.

MENTORSHIP

The South African Institute of Electrical Engineers (SAIEE) provides Electrical Engineering mentorship services in order to assist:

Engineering Candidates to register with the Engineering Council of South Africa (ECSA) as Engineering Professionals; and

University of Technology/Comprehensive University student technicians, in conjunction with organizations/companies providing P1 and P2 Work Integrated Learning (WIL), to obtain their National Diplomas. After graduation they are eligible to register as Engineering Candidates.

The Engineering Council of South Africa's (ECSA) Policy Document on Registration of Person's in Professional Categories, R-01-P, defines the policies governing the registration of both candidates and professionals in the four Professional categories:

- Professional Engineer
- Professional Engineering Technologist
- Professional Engineering Technician
- Professional Certificated Engineer (Requires a Government Certificate of Competence)

The scope of mentorship covers the four sub-disciplines of Electrical Engineering as follows:

- Power
- Electronics (Control and Instrumentation)
- Telecommunications
- Computers and Software

CONTINUING PROFESIONAL DEVELOPMENT (CPD)

The core business of the SAIEE is to serve its members, with this in mind Value Chains were developed for CPD and the identified tasks in these Value Chains were allocated to members of the PDWG to address. The output of these efforts was summarized in a CPD brochure that the SAIEE presents to its Members and to Industry. Furthermore the brochure is a standard mailing item when mail shots are done and are discreetly placed in reception areas of all Higher Learning Institutions, ECSA, Industries and of course the SAIEE. The brochure is also available on the SAIEE website.

CPD is used as the mechanism through which all registered practitioners have to renew their registration with ECSA. In this regard section 22(1) of the Engineering

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The SAIEE...

continues from page 24

Profession Act, 2000 (Act 46 of 2000) requires that a registered practitioner has to renew his or her registration annually and has to "apply, in the prescribed manner, to the Council for the renewal of his or her registration".

The policy has now been converted into a set of rules, which have been published as Board Notice 131 in Government Gazette No. 28328 on 23 December 2005. Interested and affected parties are urged to study the rules, which came into operation on 1 January 2006. In addition to the CPD Rules, provision has also been made in the Rules for "Renewal of Registration", which links CPD as a mechanism for implementing renewal of registration.

PUBLICATIONS

The SAIEE has two publications: the **watt**now magazine and the peer-reviewed research journal "SAIEE Africa Research Journal" (ARJ).

The **watt**now magazine was launched on 16 October 2006 and addresses interesting subjects in Electrical Engineering such as robotics, rockets, automotive developments, astronomy, nanotechnology, bioengineering, telecoms and other brand new technologies. This magazine was brought in-house and revamped in November 2011, and is now being published by the SAIEE. The magazine is distributed to all SAIEE members.

TRANSACTIONS

The original Transactions of the SAIEE journal were established in 1909, at the same time as the South African Institute of Electrical and Electronics Engineers. Its purpose was to serve as a medium of communications for the fledgling institute and to serve the interests of the electrical community in South Africa. Until approximately 1984, it carried news of the institute, published transcripts of papers presented at institute meetings, and peer reviewed papers. Around this time it was deemed appropriate to split the Transactions into two parts, ELEKTRON, which was to continue to serve as a communications medium for the institute, and which would carry articles of a general nature (not peer reviewed), and the Transactions, which would henceforth carry only peer reviewed articles. In accord with this history, the Transactions of the SAIEE was currently running at Volume 96 (2005).

Since 2005, the title "Transactions of the SAIEE" changed to "SAIEE Africa Research Journal." The Journal is accredited by the South African Dept. of Education, implying that South African academic institutes are eligible for government subsidy for articles published by members from their institutes.

SAIEE LIBRARY

Since its inception, the SAIEE library has grown to a collection of more than 3000 books. A large number of these books were made available by the late Dr G D Walker and are held at the SAIEE headquarters in Observatory, Johannesburg. Members are most welcome to visit the SAIEE and loan books for a period of three weeks, with the option to extend. This service is free of charge.

CORPORATE PARTNERSHIP

The SAIEE offers corporate companies an opportunity to tap into the Engineering Industry by offering a Corporate Partnership. There is a four-tiered Corporate Partnership status structure allowing for one entry-level corporate partner called a 'Bronze-Partner' with two intermediary levels called 'Silver-Partner' and 'Gold-Partner', and one premium partner level called 'Platinum-Partner'.

The Corporate Partner can select a customised bouquet of projects or items from the Corporate partner Application Form, such that the bundled costs will be significantly cheaper than taking the individual product components. It is further envisaged that new or existing products or services offered by the SAIEE (such as CPD accreditation for events) could be offered to the Corporate Partner at a discount rate.

ANNUAL EVENTS

The SAIEE has various annual traditional events. They are:

THE BERNARD PRICE (BP) MEMORIAL LECTURE

Dr Bernard Price was instrumental in the formation and endowment of both the Bernard Price Institute of Geophysical Research, and the Bernard Price Institute of Palaeontology at the University of the Witwatersrand. He died in 1948. To commemorate his name, the Institute's Council decided that in future there should be an annual lecture to be known as the Bernard Price Memorial lecture and, because of his association with the University, this lecture should be presented at the Joint Meeting.

The first lecture, on 26 July 1951, was presented by Dr B F J Schönland (later Sir Basil Schönland). He addressed the gathering on the work of the Bernard Price Institute of Geophysical Research.

The SAIEE will host the 66th BP Lecture in September 2017.

ANNUAL BANQUET

The First Annual Dinner was held on Friday 8 December 1911 at the Grand National Hotel. About 170 members and guests attended and a number of toasts were proposed. The Annual Dinner has been held each year since and its name was later changed to the Annual Banquet, a name that it still retains today. In later years, the Annual Banquet has become birthplace to acknowledging engineering advancement in the industry. At the annual banquet, the SAIEE awards different floating trophies for:

- The President's Award
- Engineer of the Year Award
- The Keith Plowden Young Achiever's Award
- SAIEE Engineering Excellence Award
- The SAIEE/IEEE Distinguished Volunteer Award

CHARITY GOLF DAY

The SAIEE hosts an annual Charity Golf Day. The SAIEE President chooses a charity of his choice to donate the proceedings of this golf day to. The SAIEE will hosts its 21st Charity Gold day on the 13th of June 2017, at the Glenvista Golf Course. Visit our website for more information, or email Gerda Geyer on geyerg@saiee.org.za.

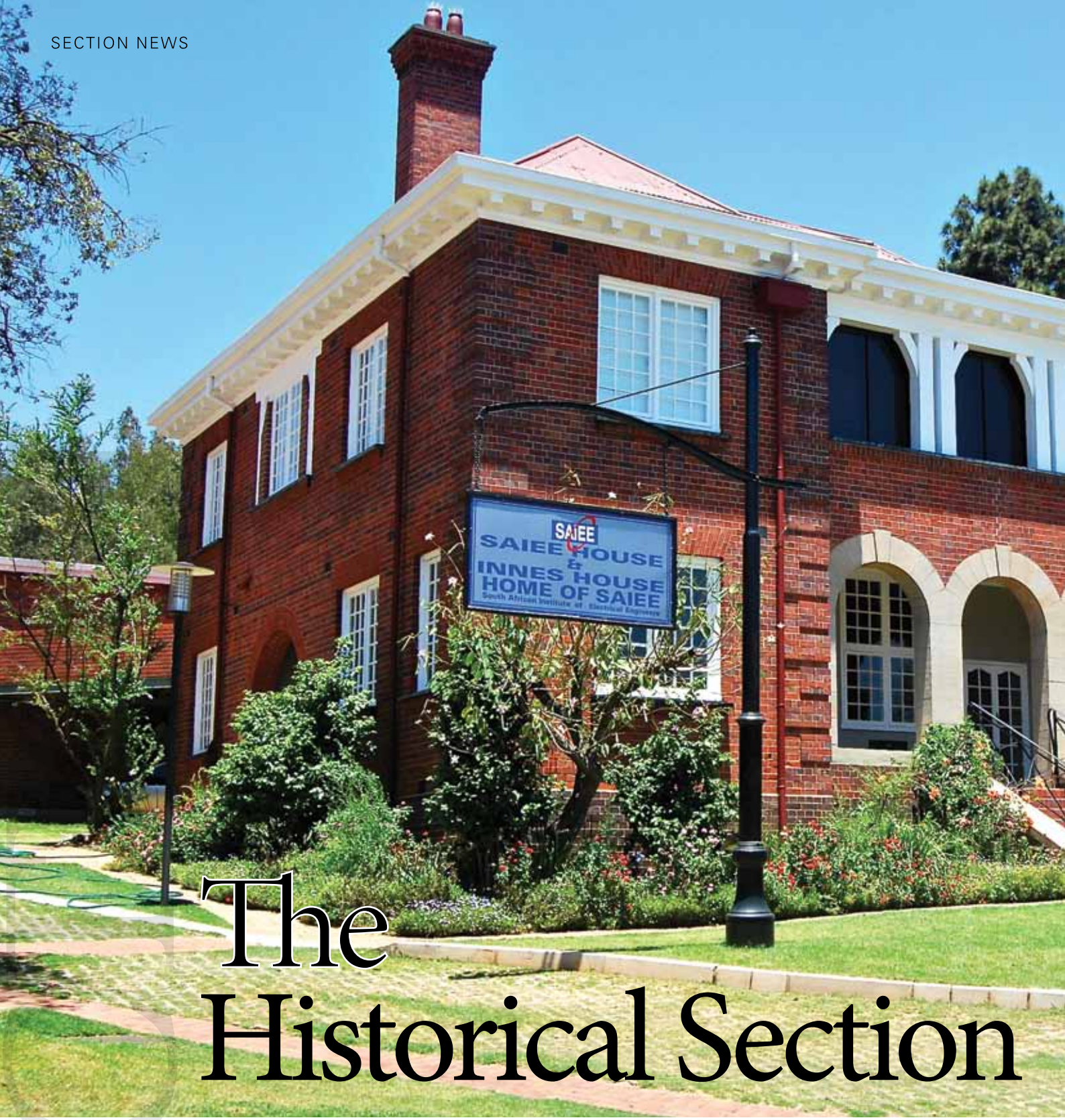
PRESIDENT'S INVITATIONAL LECTURE

The first President's Invitation Lecture took place on 24 July 1980. The paper titled: Transportation in Southern Africa" was presented by Dr GH Loubser. The SAIEE President invites an academic to present his paper to SAIEE members.

NATIONAL STUDENT'S PROJECT COMPETITION

The SAIEE encourages final year students to participate in entering the annual National Student's Project Competition, showcasing the final year project. This is open to final years students who study Electrical Engineering in Universities and Universities of Technology.

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



The Historical Section

On the 28th of November, 1978 a small group of senior members of The South African Institute of Electrical Engineers (SAIEE) met in Pretoria to consider how to "preserve important electrical engineering objects and books". Their deliberations included the possibility of displaying items for viewing by the public and establishing a library of "historical books", amongst other things.

BY | MAX CLARKE | FSAIEE

Other interested members soon joined the initiative and they decided to call themselves "The Historical Interest Group" (HIG). After about 10 years they had 20 participating members.

At that time the SAIEE was based in Kelvin House a building in the Johannesburg CBD, which housed many professional engineering and scientific organisations.

From early on it was obvious to the group that storage and display facilities were going to be a major problem for the proposed activities. The short-term solution was provided through the good offices of fellow members of the Institute who were able to arrange for storage in un-used spaces in substations and other industrial buildings in the City area.

June 1990 saw the Institute and most of its sister organisations re-locate to the current site in Observatory, Johannesburg, This was prompted by various things, not the least of which was that the Division of CSIR that had occupied the site - after the Observatory had re-located to Sutherland in the early 1970's - had moved, leaving the buildings vacant.

The SAIEE purchased the south-eastern corner of the property on which Innes House was situated and this became the administration and office accommodation of the Institute. The house had been the home of Dr. Inness, the Union Astronomer of about 100 years ago.

The outbuildings originally comprised a single garage and servant's accommodation. The Research Organisation had added to these with a large double volume room that was equipped to simulate long distance driving conditions and matters relating to driver fatigue and abilities.

The Historical Section

continues from page 29

THE SIMULATOR ROOM

When the SAIEE staff moved into Innes House, the outbuildings – including the "simulator room" – were allocated to the HIG for their use. A Library was soon established in one part of the building and artefacts were quickly placed in the others.

By the year 2000 storage and display space was again at a premium. At a cost of R39 000 the Simulator Room was modified by erecting a mezzanine floor and steel shelving racks. Also, additional storage space was negotiated with SAASTA (the new occupants of the main office block on the site) where two unused basement rooms were located as well as some other space the main site.

The group continued to accept donations of artefacts and books and working sub-groups were active in the ongoing process of sorting and cataloguing the items. From time to time visitors were given tours of the facilities, limited as they were, and members gave talks to interest groups. Other members were active in researching and writing, and numerous papers were published. In addition visits were arranged and undertaken to places of historic interest.

Other activities carried out by the members were establishing a "virtual museum" on the SAIEE website, and identifying places and items of historical importance around the country. Four sites have so far been commemorated with appropriate wall plaques.

It was an active group of people. At their meeting in August 2002 the SAIEE Council formally accepted a proposal that the HIG be upgraded to become a "Section" of the Institute and that from that date forward these activities would be carried out as the "Historical Section" under the direction of the HS Committee.

After a few years SAASTA started extensive re-development in their buildings and the storage space occupied by the HIG artefacts was no longer available to the Group. At short notice these items had to be re-located. The only practical way of doing this was to hire a 40ft. shipping container and placing it on open space adjacent to the HIG "outbuildings". It remained in use from 2007 until June 2011, when the new office block had been completed and the present basement storage facilities were taken into use.

The move of the SAIEE administrative staff into the new office building then cleared the way for the establishment of the one facility that had eluded the Section, namely, a formal display area and facilities for the

establishment of a museum. The Innes House Museum now stands as a testimony to the vision and enthusiasm of the original concerned members, and to those who have carried the baton since their passing.

INNES HOUSE MUSEUM

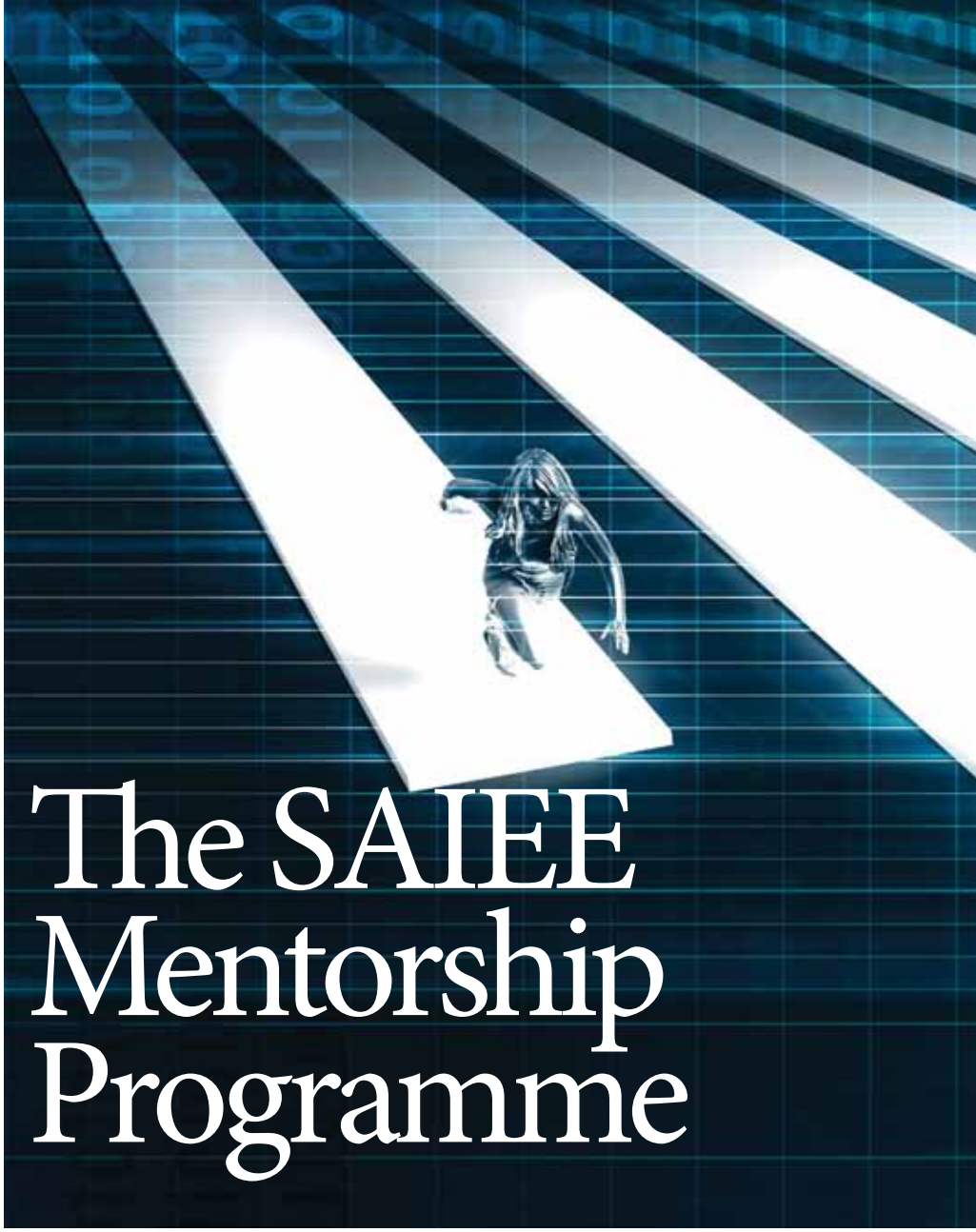
The pole in front of the museum and cross-arm carrying the SAIEE signboard is an HS artefact. It is one of the original poles used to support the conductor on the electrified railway haulage line on the Pilgrims Rest mine at the turn of the previous century.

An interesting development arising directly from equipping the museum has been the development of a close working relationship with the Antique Wireless Association. Two of their members have not only been co-opted onto the HS committee and are energetic contributors to our work, they have also established a fully licensed and operational amateur radio station in the museum.

While the displays are largely complete the museum is very much a "work in progress". New artefacts are donated from time to time and exhibits are upgraded and improved. In addition, the original library space has become congested and is being re-located into a larger space in the simulator room, which has become available since many artefacts were removed for display and others placed in the new basement store. A second phase to these changes will create space for what will become an "inter active" centre where visitors will have a touch and feel experience of some of the old equipment.

The Section is alive and well. All visitors, prospective members and volunteers are welcome! wn

To learn more about the museum and see some of the artifacts, visit the museum online www.saiee.org.za



The SAIEE Mentorship Programme

The South African Institute of Electrical Engineers (SAIEE) provides Electrical Engineering mentorship services to assist: Engineering Candidates to register with the Engineering Council of South Africa (ECSA) as Engineering Professionals and University of Technology/ Comprehensive University student technicians, in conjunction with organizations/companies providing P1 and P2 work integrated learning (WIL), to obtain their National Diplomas. After graduation they are eligible to register as Engineering Candidates.

BY | JOHN GOSSLING | FSAIEE

The Engineering Council of South Africa's (ECSA) Policy Document on Registration of Person's in Professional Categories, R-01-P, defines the policies governing the registration of both candidates and professionals in the four professional categories:

- Professional Engineer
- Professional Engineering Technologist
- Professional Engineering Technician
- Professional Certificated Engineer (Requires a Government Certificate of Competence)

The scope of mentorship covers the four sub-disciplines of Electrical Engineering as follows:

- Power
- Electronics (Control and Instrumentation)
- Telecommunications
- Computers and Software

WORK BASED EXPERIENCE FOR ENGINEERING CANDIDATES

After graduation an engineering candidate undergoes a programme of work based training and experience that builds on their higher education qualification to develop the competencies required for registration. Competence is a combination of theoretical knowledge, work experience

related to the application of theoretical knowledge together with the management thereof and a person's personal attributes as it relates to work, interacting with others and their relationship with the broader environment.

Candidates need to undergo a minimum of three years of training and experience in order to develop competencies as detailed in ECSA's Competency Standards R-02-PE/PT/PN/CE based on 11 outcomes and 5 levels of responsibility.

Development of Engineering Candidates towards professional registration requires:

- Comprehensive on-the-job-training
- Supervision and coaching generally provided by the line-manager
- Long-term mentoring
- Supplementary training to enhance technical and soft skills

Employer organizations such as Companies, Local Authorities, State Owned Enterprises and others form an integral part of enabling a candidate to obtain appropriate work based experience.

The following are typical types of work experience in which a candidate can develop the required competencies:

- Conception
- Planning
- Design
- Implementation, manufacture or construction
- Close out
- Engineering Operations
- Maintenance
- Optimization
- Improvement of materials, components, systems or processes
- Disposal
- Project Management

Due to the diverse nature of employer organizations and the opportunities

Mentorship

continues from page 33

available within those organizations for training and experience, it is not possible to provide one specific programme for the training and experience of all candidates. However, in this regard the role of the mentor is paramount in ensuring that the training programme is appropriate to ensure that the candidate achieves the standard of competency required for registration in the applicable Professional Category.

WORK INTEGRATED LEARNING FOR UNIVERSITY OF TECHNOLOGY/ COMPREHENSIVE UNIVERSITY STUDENT TECHNICIANS

In order for a University of Technology/ Comprehensive University student technician to complete their academic qualification, they need to receive relevant practical on-job work integrated learning (experiential training) over a period of 12 to 18 months, in the discipline of their qualification, in order to acquire practical knowledge and skills.

The practical on-job work integrated learning in the discipline of electrical engineering, needs to satisfy the requirements for P1 and P2 practical work place experience in accordance with the requirements of the applicable University of Technology/Comprehensive University. The student ultimately needs to demonstrate competence in the competency assessment related to all the aspects of the work integrated learning plan.

Due to the diverse nature of employer organizations and the opportunities available within those organizations for work integrated learning in the discipline of electrical engineering, it is important that the work integrated learning plan satisfies the requirements for P1 and P2 practical work place experience. In this regard the role of the mentor is paramount in ensuring that the work integrated learning plan achieves the standard of competency required.

MENTORSHIP SERVICES

MENTORSHIP

A mentor must be professionally registered in the appropriate ECSA Professional Category and a member of the SAIEE. A mentor is a trusted advisor whose role is to guide and facilitate the professional development of the candidate given the diverse nature of the training and experience/work integrated learning opportunities available.

A mentor is a senior experienced professional who will assist and measure the candidates progress towards professional registration for the duration of the development process. The mentor essentially plans and overseas the candidate's career and personal development over a longer term, with a focus on developing competence, capabilities and leadership.

A supervisor or coach is an experienced professional who, for the time that the candidate works for the supervisor, allocates work, provides technical guidance and support and ultimately takes responsibility for the work. The focus is generally on managing the candidate and the task, developing skills and competence in the workplace and is short term.

In situations where employers/candidates/ students require more detailed involvement from the mentor, a coaching service can be provided. Coaching includes the same scope as mentoring, however, in addition fosters learning and skills transfer.

In order to ensure commitment on the part of all parties, the provision of mentorship/ coaching services will be based on formal mentorship / coaching service agreements which will be entered into by all parties together with the payment of an appropriate fee by the employer / candidate to the SAIEE. The SAIEE will in turn pay the independent contractor (mentor / coach) for services rendered. The following are activities undertaken by the mentor, to ensure a successful Mentorship programme:

CANDIDATES

- Quarterly candidate reviews involving one-on-one and group meetings as appropriate.
- Candidates to submit necessary documentation (Training Plan, TES, TERs, IDP, ER) to Mentor for review and to provide guidance at quarterly review sessions.
- Each candidate's training plan to incorporate activities appropriate to the organizational structure in which the candidate is working.
- Facilitate supplementary training courses to enhance registration and work related knowledge including soft skills.

TRAINING PLAN

- Training progress to be reviewed at quarterly review sessions and training plan to be updated accordingly.
- Facilitate appropriate Candidate Rotation Plan (Training Plan – 11 Outcomes based).
- Ensure coaching/supervision of candidates provided at the work level.

MANAGEMENT / ADMINISTRATION

- Process to be established with key role players to guide and plan the programme and resolve issues i.e. training plans.
- Meetings of coaches/supervisors and other role players with mentor as appropriate.
- Establish meetings with senior management to review progress, reinforce "buy-in" and provide commitment from the top down.

MENTOR REGISTRATION

Engineering professionals who are registered in one of the ECSA Professional Categories covering Electrical Engineering and wish to serve as mentors, apply to the SAIEE to register and be included in the SAIEE mentor data base.

The engineering professional needs to submit a CV and complete the Application to become a Mentor which focuses on the professional's qualifications, ECSA registration, SAIEE membership, work experience and electrical engineering specialities related to the four sub-disciplines of electrical engineering.

Once the professional's application has been evaluated, a letter of registration is issued and the professional's details are included in the mentor data base.

MENTOR DATABASE

The SAIEE mentor database includes details of all registered mentors and is updated when a new professional is approved as a mentor. The data base presently consists of 47 ECSA registered engineering professionals covering all four sub-disciplines of electrical engineering and located in all major cities and a number of large towns.

Prior to being assigned to mentor a candidate, a mentor is required to undergo training on mentorship and attend the "Road to Registration" workshop. The mentor is also required to enter into a mentorship/coaching service agreement.

EMPLOYER ORGANIZATIONS PROVIDING WORK BASED EXPERIENCE FOR ENGINEERING CANDIDATES

Employer organizations such as Companies, Local Authorities, State Owned Enterprises and others are encouraged to provide training and experience (work based experience) for electrical engineering candidates in order to ensure registered engineering professionals who are responsible for quality professional services.

They are also encouraged to contract with the SAIEE for the provision of a suitable mentor to provide mentorship during the period of work based experience.

The employer organizations should preferably register with ECSA by signing a Commitment and Undertaking (CU). The implication being that the organization agrees to train and develop the candidate to meet the requirements for professional registration. In addition engineering candidates should be encouraged to register with ECSA as candidates in the applicable registration category.

The candidate is required to undergo a minimum period of 3 years training and experience (work based experience) under the guidance of an experienced supervisor and mentor, based on a training plan. During this period they need to undertake work to meet ECSA's 11 outcomes at the required level of complexity and at an increasing level of responsibility from 1 (observing) to 5 (performing). The training plan needs to be reviewed on a regular

Mentorship

continues from page 35

basis and updated if necessary, based on the candidates progress and learning needs.

The outcomes and levels of responsibility are basically the same for all categories of registration, whilst the work based experience complexity levels required, related to the categories of registration are as follows:

- Candidate Engineer – Complex
- Candidate Engineering Technologist – Broadly Defined
- Candidate Engineering Technician – Well Defined

During the period of training and experience the candidate needs to prepare a portfolio of evidence, which is a record of the work based experience gained, consisting of the following reports:

- Training and Experience Summary (TES)
- Training and Experience Report (TER)
- Engineering Report (ER)
- Initial Professional Development Report (IPD)

The employer needs to establish a contract with the candidate, based on the employers policies and procedures, covering the period of training and experience.

EMPLOYER ORGANIZATIONS PROVIDING WORK INTEGRATED LEARNING (WIL) FOR UNIVERSITY OF TECHNOLOGY/ COMPREHENSIVE UNIVERSITY STUDENT TECHNICIANS

Employer organizations such as Companies, Local Authorities, State Owned Enterprises and others are encouraged to provide work integrated learning for University of Technology/Comprehensive University student technicians in the field of electrical engineering. They are also encouraged to contract with the SAIEE for the provision of a suitable mentor to assist with the implementation of the programme.

The employer organizations are required to enroll all workplace sites as accredited work place sites with their respective SETA (i.e. MERSETA, EWSETA etc) in accordance with SETA requirements for host employers. In addition enter into a Learnership Memorandum of Understanding (MOU) with the respective SETA and ensure compliance with all legislative requirements.

The employer organizations will need to develop an implementation plan covering a period of 12 to 18 months in conjunction with the University of Technology/ Comprehensive University and comply with the requirements set out in the Learnership MOU.

The University of Technology/ Comprehensive University recommends students for participation in the work place learning programme. The employer organization can reserve the right to determine which students will be admitted for participation in the programme.

Work place learning needs to be provided in terms of the implementation plan and should commence with orientation in occupational health and safety and relevant employer organization policies and procedures.

Resources need to be provided for the purposes of the student's participation and completion of the work place learning programme and should include the necessary personal protective equipment, required tools and engineering equipment in line with the specific scope of work.

Attendance records need to be maintained of all students and quarterly progress reports prepared and any other reports as required by the implementation plan.

The employer needs to prepare a Work Place Learning Contract in order to establish a learning agreement between the contracting parties, covering the discipline specific practical on-job work place learning that will be received. The contract in addition needs to cover possible financial support in relation to which two options exist:

- The first is an unfunded workplace learning programme in which the learner will not be provided with a monthly allowance.
- The second is a funded programme in which the student will be provided with a monthly stipend and possibly other forms of support.

PROGRESS WITH THE MENTORSHIP PROGRAMME

The SAIEE presently has 8 of its mentors assigned to mentor engineering candidates in the three categories of engineer, technologist and technician.

There are 71 candidates being mentored in 10 different locations as follows: Johannesburg, Tshwane, Ekurhuleni, Cape Town, Paarl, George, Lephalale, Pietermaritzburg, Middleburg, Witbank.

The SAIEE has also entered into two Memoranda of Understanding with two Universities of Technology and one employer for the provision of Work Integrated Learning for student technicians. wn

Copper is found in all Energy Systems

Whether powered by sun, wind or water, efficient and renewable energy systems rely on copper to transmit the energy they generate with maximum efficiency and minimum environmental impact.

Superior conductivity of copper and recyclability

Copper is a preferred electrical conductor and an excellent thermal conductor. Superior conductivity allows smaller conductors to be used, saving space and cost.

Copper is infinitely recyclable without any loss of performance and is nearly indistinguishable from freshly mined copper. It is estimated that 80 percent of all copper ever mined during the past 10,000 years is still in use somewhere today. Estimates also reveal that 33 percent of today's world annual copper demand is supplied by recycled copper.

Copper's contributions towards reducing greenhouse gas emissions

Increasing the cross section of wires and cables, overhead railway lines, and motor and transformer windings can significantly increase electrical energy efficiency. Incorporating one extra kilogram of copper can save between 100 and 7,500 kilograms of greenhouse gas emissions (CO_2). Every conductor in an electrical system has a built-in resistivity. This means that part of the electrical energy it carries is dissipated as heat and lost as useful energy. Generating this wasted electrical energy produces carbon emissions and consequently contributes to global warming. An important initial decision, in seeking to reduce these losses, is to use copper as the conductor.

Renewable energy

Copper plays an important role in renewable energy systems. By using copper instead of other lower electrical energy-efficient metal conductors, less electricity needs to be generated to satisfy a given power demand.

Copper has long been used in solar heating/hot water systems, where it is commonly used in heat exchangers. Now, it promises to become equally valuable in photovoltaic (PV) and wind systems.

Longer-term programmes, such as wind powered production processes and the electrification of thermal processes, are less certain and will require economic incentives and significantly more development to build technical viability. However, in light of the very large savings potentials, close to 300 million tonnes of CO_2 per year, they are worthy of further investment and investigation. It should be clear then that CDAA shares the European Copper Institute's vision for a low-carbon economy and will pursue it with all of the resources at its disposal. We urge policymakers to support a reasoned balance between the energy needed to manufacture the building blocks of that new economy and the overarching goals for reduced energy demand and carbon emissions.

The CDAA and ECI role in reducing energy consumption

The CDAA and European Copper Institute have developed strategies that will both trigger and support substantial carbon reductions in the downstream industrial, residential and service sectors.

Electric motors account for a large amount of the electricity consumed by industry. Energy-efficient motor driven systems could save electricity consumption, resulting in reduced maintenance, improved operations and reduced environmental costs.

Cable size is very important for the correct operation of any electrical circuit. Selecting too small conductors for an application could compromise the operation of the circuit: it causes voltage drop, poor performance and in extreme cases the cable temperature will increase enough to melt the insulation. On the contrary, selecting too large conductors increases costs and weight. Please view Leonardo ENERGY's website for courses offered:

http://www.leonardo-academy.org/course/index.php?categoryid=72

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To most manufacturers the management of the supply chain is the 'just in time' stock control system of the components required to produce their end product. Effective energy management, whether electricity or gas, is often assessed by the facilities management department on a simple cost to supply basis.

Supply Chain Management

BY | JASON BUTLER **|** EA TECHNOLOGY LTD

Therefore isn't it time for you to reassess your energy supply by viewing it as an essential component, whose security of supply is as important as the key elements of your production schedule?

After all your contracts with suppliers are likely to include service level agreements covering delivery, stock levels and potentially penalties for the lack of supply. Electricity is the ultimate just in time component; you hold no stock, its delivered to site as need arises and if it fails so does your entire production effort.

It's down to risk management, it's down to criticality, and it's down to the fact that without the high voltage (HV) power grid your factory grinds to a halt.

There are two key constituents to the HV grid; cables and switchgear. Both sit there, slowly deteriorating over time until they are either replaced or fail. There is though a way of identifying those elements that are in danger of failing. Partial Discharge….

Partial Discharge is an electrical discharge or spark that bridges a small portion of the insulation between two conducting electrodes. This is commonly known as Partial Discharge (PD) activity and can occur at any point in the insulation system where the electric field strength exceeds the breakdown strength of that portion of the insulating material. PD can also occur in voids within solid insulation, across the surface of insulating material or within gas bubbles in liquid insulation.

Realistically you do not need to fully understand what PD is, but you do need to understand the benefits that active PD monitoring of your assets can give you. It can give you early warning of potential network failures as well as providing you with a method of justifying your investments and decreasing negative consequences to your business.

Supply Chain management

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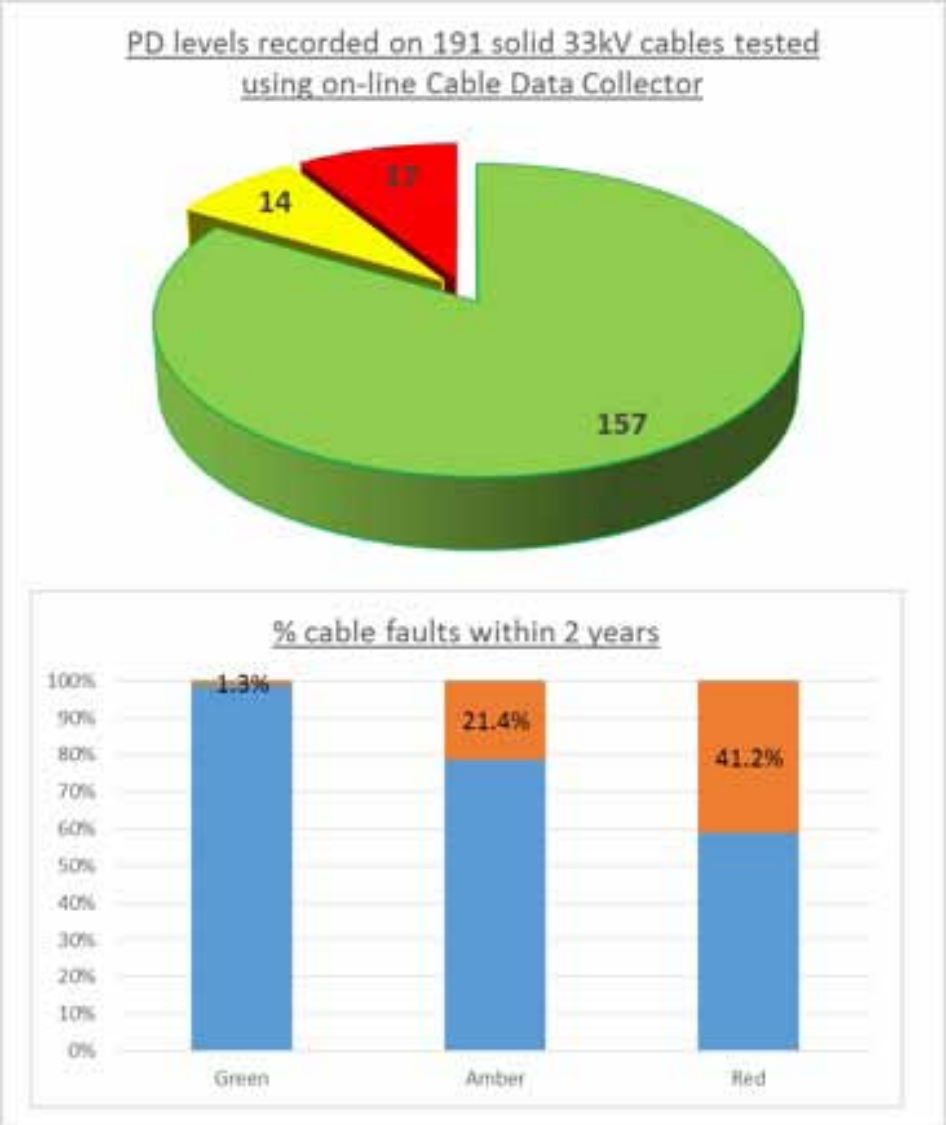

With over 40 year's industry experience and expertise, EA Technology has become leaders in PD monitoring technology.

Our products have been deployed for both cables and switchgear with strong, factual evidence to support our technology's superiority.

Two of our recent successes have been turned into case studies, with the highlights below:

CABLES

EA Technology's CableData Collector™ was used to carry out a PD assessment of nearly 200 high voltage cables. The assessment was undertaken with the cables energised and tested in a non-intrusive manner.

The cables were categorised Red (high risk of failure) – Amber (potential to fail as PD detected, monitor on a regular basis) – Green (PD not detected) according to the Partial Discharge signatures. Of the 17 cables that were categorised Red, over 40% of them developed a fault inside of 2 years. Of the 14 cables that were categorised Amber, 20% of these cables failed within 2 years. Importantly less than 2% of those categorised green had an issue inside the 2 year period.

SWITCHGEAR

Technology's UltraTEV Monitor™ was installed in a substation for a long term software test. It was not monitored, as it was simply there for software stability testing. The substation failed unexpectedly (at the right hand edge of the trace below), leaving many thousands of homes and businesses without power. The data collected during the test showed that PD monitoring would have given almost 4 months' notice of the failure.

Convinced yet? The key is to get the technology to do the work for you. Periodic inspections give you a snapshot of the asset health at that discrete moment in time. Continuous, and remote monitoring provides greater piece of mind due to detailed trend analysis giving you early warning of potential failure, decreasing financial outlay and also it releases your inspection teams to more productive tasks.

When you assess the cost-benefit for the financial justification, please account for the cost of lost production, the cost to brand reputation as well as the cost of the replacement equipment. Far better to try to avoid the crisis in the first place!

Full copies of case studies are available from sales@eatechnology.com

calendar

MAY | JUNE | JULY 2017

MAY 2017

3 - 4	Core Financial Management Skills for Engineers	Johannesburg	roberto@saiee.org.za
10 - 11	Effective Document Writing for Engineers	Johannesburg	roberto@saiee.org.za
16 - 19	Planning Strategic Feasibility Studies	Johannesburg	roberto@saiee.org.za
16-18	African Utility Week	Cape Town	www.african-utlity-week.com
17 - 18	Design of Economical Earthing Systems	Johannesburg	roberto@saiee.org.za
23 - 24	Fundamentals Of Practical Lighting Design	Cape Town	khuvutli@gmail.com
24 - 25	Photovoltaic Solar Systems	Johannesburg	roberto@saiee.org.za
25 - 26	Fundamentals Of Power Distribution	Cape Town	khuvutli@gmail.com
25 - 26	Arc Flash Studies	Johannesburg	roberto@saiee.org.za

JUNE 2017

5 - 9	Earthing Africa Symposium & Exhibition	Johannesburg	www.earthingafrica.co.za
7	Power Transformer Unit Protection And Testing	Johannesburg	roberto@saiee.org.za
8	Power Transformer Operating And Maintenance	Johannesburg	roberto@saiee.org.za
7 - 8	Fundamentals of Long Term Eveolution (LTE) Mobile Communications	Johannesburg	roberto@saiee.org.za
14 - 15	Optical Fibers, Cables & Systems Fundamentals	Johannesburg	roberto@saiee.org.za
13	SAIEE Charity Golf Day	Glenvista Golf Club	geyerg@saiee.org.za
13 - 15	ORHVS - Operating Regulations For HV/MV Systems	Johannesburg	roberto@saiee.org.za
13 - 18	Sustainability Week	Pretoria	www.sustainabilityweek.co.za
19	ELPA Launch	Johannesburg	www.elpa.org.za
21 - 22	Ethernet Acceptance Testing	Johannesburg	roberto@saiee.org.za
28 - 29	Fundamentals Of Practical Lighting Design	Johannesburg	roberto@saiee.org.za

JULY 2017

4-5	Photovoltaic Solar Systems	Johannesburg	roberto@saiee.org.za
12 - 14	West Africa Power Summit	Senegal	www.wafpower.com
18 - 20	PowerGen Africa	Johannesburg	www.powergenafrica.com

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Thorium Power Reactors

Nuclear risks and benefits all pertain to a very specific kind of energy: nuclear fission of uranium or plutonium isotopes. There's another kind of nuclear energy that's been waiting in the wings for decades – and it may just demand a recalibration of our thoughts on nuclear power.

BY | L. HUNT | SMSAIEE

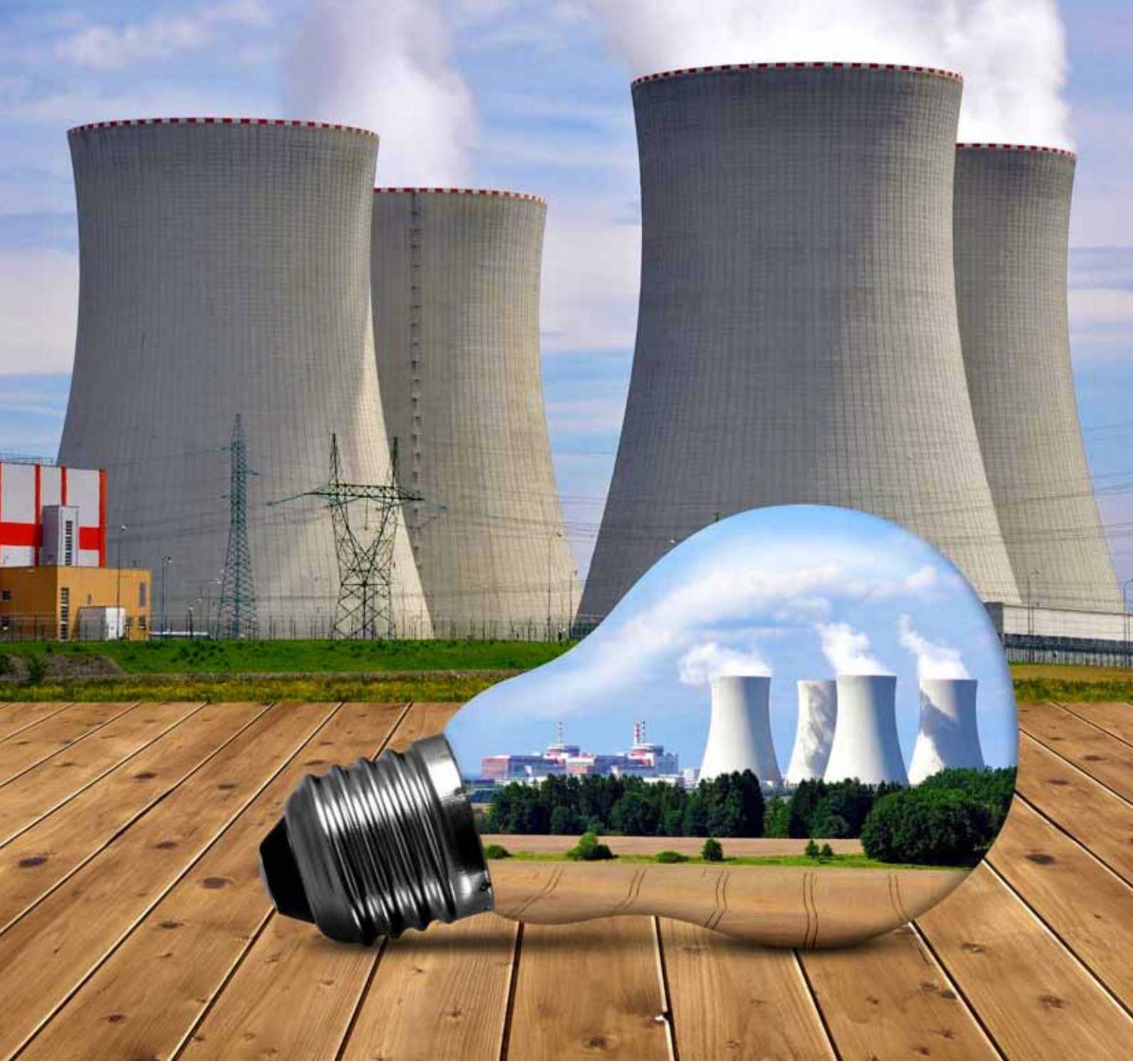
Nuclear fission using thorium is easily within our reach, and, compared with conventional nuclear energy, the risks are considerably lower.

THORIUM'S STORY

Ideas for using thorium have been around since the 1960s, and by 1973 there were proposals for serious, concerted research in the US. But that program fizzled to a halt only a few years later. Why? The answer is nuclear weapons. The 1960s and '70s were the height of the Cold War, and weaponization was the driving force for all nuclear research. Any nuclear research that did not support the US nuclear arsenal was simply not given priority.

Conventional nuclear power using a fuel cycle involving uranium-235 and/or plutonium-239 was killing two birds with one stone: reducing America's dependence on foreign oil, and creating the fuel needed for nuclear bombs. Thorium power, on the other hand, didn't have military potential. And by decreasing the need for conventional nuclear power, a potentially successful thorium program would have been threatening to U.S. interests in the Cold War environment.

Today, however, the situation is very different. Rather than wanting to make weapons, many global leaders are worried about proliferating nuclear technology. And that has led several nations to take a closer look at thorium power generation.



HOW THORIUM REACTORS WORK

The isotope of thorium that's being studied for power is called Th-232. Like uranium, Th-232 comes from rocks in the ground.

A thorium reactor would work like this: Th-232 is placed in a reactor, where it is bombarded with a beam of neutrons. In accepting a neutron from the beam, Th-232 becomes Th-233, but this heavier isotope doesn't last very long. The Th-233 decays to protactinium-233, which further decays into U-233. The U-233 remains in the reactor and, like current nuclear power plants, the fission of the uranium generates intense heat that can be converted to electricity.

To keep the process going, the U-233 must be created continuously by keeping the neutron-generating accelerator turned on. By contrast, the neutrons that trigger U-235 fission in a conventional reactor are generated from the fuel itself. The process continues in a chain reaction and can be controlled or stopped, only by inserting rods of neutron-absorbing material into the reactor core. But these control rods aren't foolproof: their operation can be affected during a reactor malfunction. This is the reason that a conventional fission reactor has the potential to start heating out of control and cause an accident. A thorium fuel cycle, by contrast, can be immediately shut down by turning off the supply of neutrons. Shutting down the fuel cycle means preventing the breeding of Th-232 into U-233. This doesn't stop the heating in

Thorium Power Reactors

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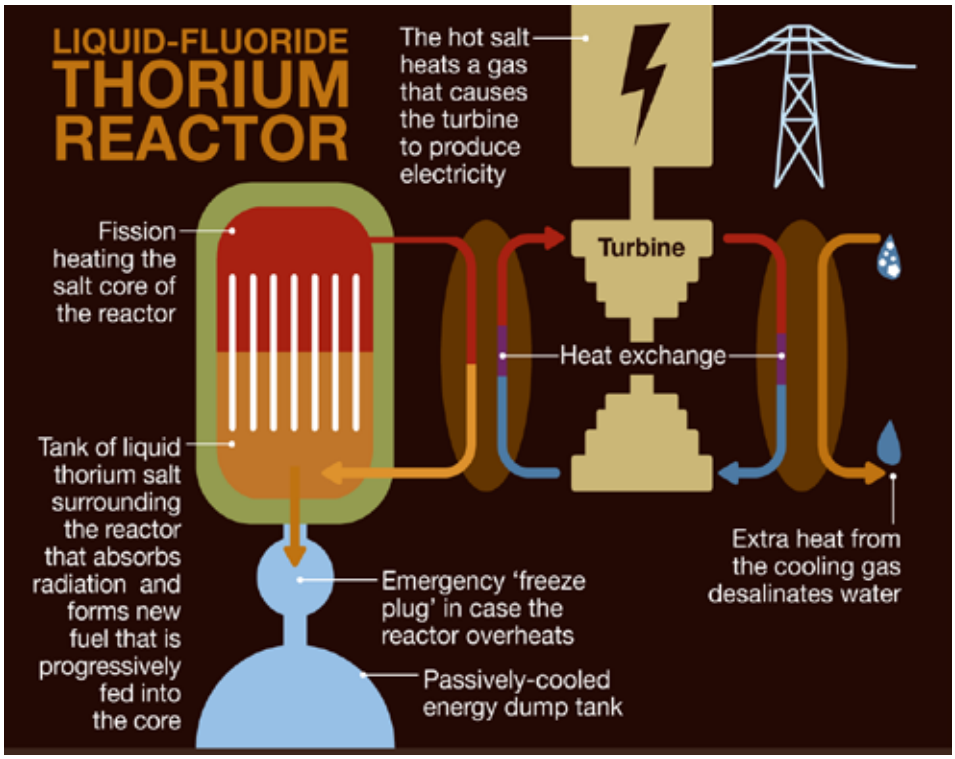


the reactor immediately, but it stops it from getting worse.

The increased safety of thorium power does not end there. Unlike the U-235 and plutonium fuel cycles, the thorium reactors can be designed to operate in a liquid state. While a conventional reactor heading to meltdown has no way to jettison the fuel to stop the fission reactions, a thorium reactor design called LFTR features a plug at the bottom of the reactor that will melt if the temperature of the reacting fuel climbs too high. If that happens, the hot liquid would all drain out and the reaction would stop.

POWERED UP

Thorium power has other attractions, too. Its production of nuclear waste would be orders of magnitude lower than conventional nuclear power, though experts disagree about exactly how much: Chinese researchers claim it's three orders of magnitude (a thousandth the amount of waste or less), while U.S. researchers say a hundredth the amount of waste.

Thorium would be easier to obtain than uranium. While uranium mines are enclosed underground and thus very dangerous for the miners, thorium is taken from open pits, and is estimated to be roughly three times as abundant as uranium in the Earth's crust.

But perhaps the most salient benefit of thorium power, in our geopolitically dicey world, is that the fuel is much harder to turn into a bomb. Thorium itself isn't fissile. The thorium fuel cycle does produce fissile material, U-233, which theoretically could be used in a bomb. But thorium would not be a very practical route to making a weapon, especially with LFTR technology. Not only would the proliferator have to steal the fissile U-233 as hot liquid from inside the reactor; they'd also be exposed to an extremely dangerous isotope, U-232, unless they had a robot to carry out the task.

FUTURE FUEL

China has announced that its researchers will produce a fully functional thorium reactor within the next 10 years. India, with one of the largest thorium reserves on the planet, but not much uranium, is also charging ahead. Indian researchers are planning to have a prototype thorium reactor operational early next year, though the reactor's output will be only about a quarter of the output of a typical new nuclear plant in the west. Norway is currently amid a four-year test of using thorium fuel rods in existing nuclear reactors.

Other nations with active thorium research programs include the United Kingdom, Canada, Germany, Japan, and Israel.

There are some drawbacks to thorium fuel cycles, but they are highly technical. For instance, thorium reactors have been criticized as potentially having more neutron leakage compared with conventional reactors. Higher neutron leakage means more shielding, and this means more protection is needed for workers at the power plant. And as in most types of alternative energy, thorium power faces a lack of funding for research, and of financial incentives for power companies to switch over.

In recent decades, stories about safe, green nuclear power in popular media have tended to focus on the quest for nuclear fusion. Certainly, we can expect and should hope for, continued progress toward that

type of power. But while that happens, the investments by China, India, and other countries suggest that thorium is en route to contribute to the grid in the near term – and to dramatically improve the world's energy sustainability in the process.

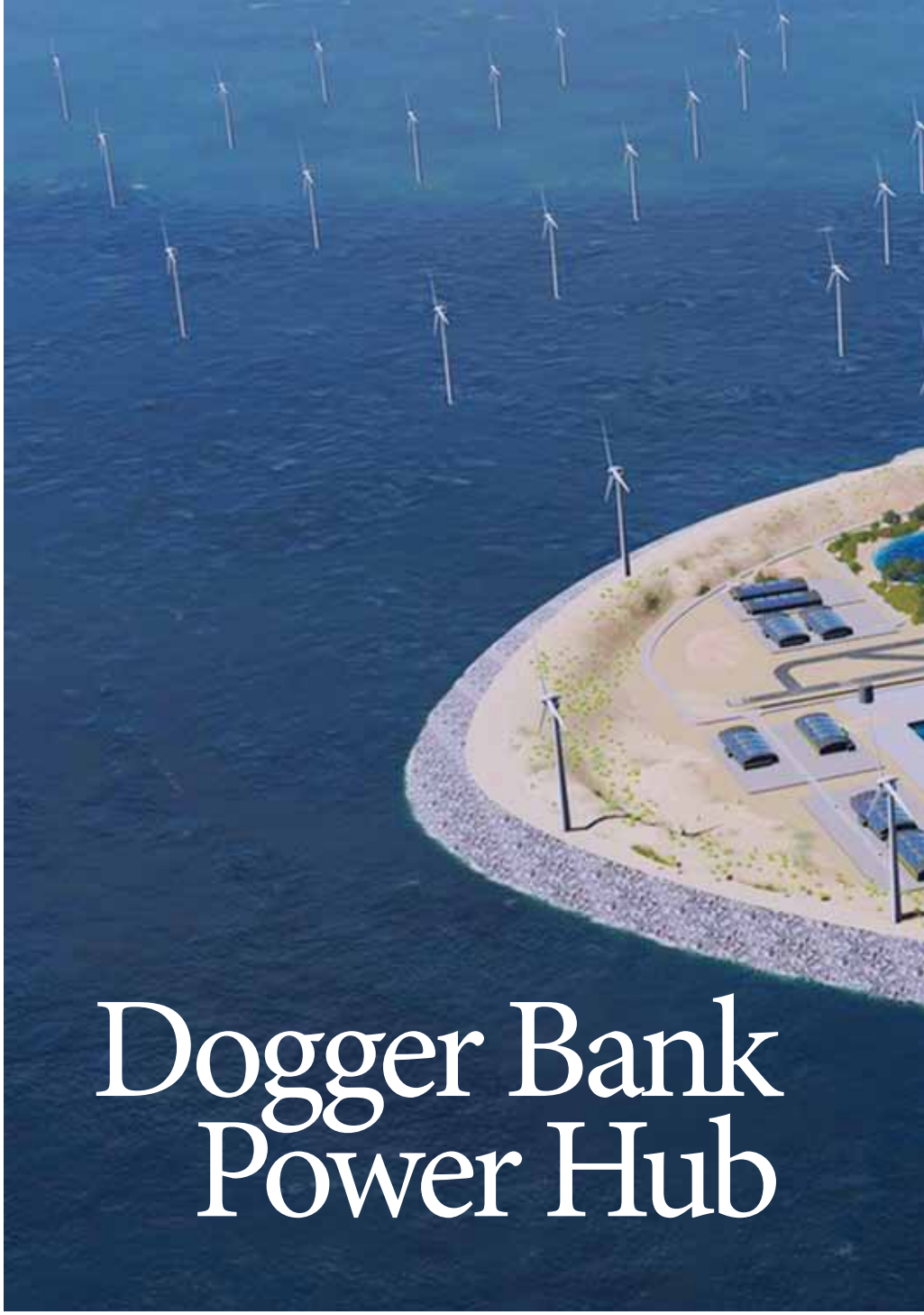
It's this new generation of reactors that's firing enthusiasm inside industry, the markets and energy-hungry customers. We're working on a bigger piece with our favorites on the old and new side of nuclear power for Portfolio 2020; this article will focus on a dark horse with a lot of closing speed: thorium.

Thorium is a neighbor of uranium in the periodic table, in the actinide series. Basically, that means it's a heavy rare earth metal (REM) that's ideal for nuclear fission. Thorium is readily available and burns more efficiently than uranium, leaving less waste. It also has fewer and less hazardous peripheral waste products, and its half life is measured in centuries, not millennia. And there's plenty of Thorium in the US.

Why haven't we used Thorium the whole time? The answer traces back to the Cold War. Uranium is refined into plutonium, which can be used to make nuclear weapons. Thorium, unfortunately, is no help in building an arsenal of nuclear weapons; when push came to shove for the early development of civilian nuclear energy, the powers that be backed uranium.

But this approach is being reevaluated for several pragmatic reasons. If you're building new reactors, why not build them to run on a different fuel? And there's already been decades of study on Thorium-based reactors, so researchers aren't starting cold.

Thorium also enjoys significant support on Capitol Hill. Senate Majority Leader Harry Reid (D-NV) is a big proponent of Thorium reactors. He has joined forces with fellow power Senator Orin Hatch (R-UT) to draft the Thorium Independence and Security Act with the specific purpose of getting Thorium reactors up and running. The bill sets out to establish an office in the NRC specifically for Thorium production and use. wn



Dogger Bank Power Hub

The Dogger Bank is a large sandbank in the North Sea between England and Denmark. The bank has an area of approximately 17 600 square kilometres and a depth below sea level of 15 to 36 metres. The surrounding sea is about 20 metres deeper. The entire North Sea lies on the continental shelf. The name Dogger comes from early Dutch boats used for cod fishing.

BY | DUDLEY BASSON

The bank is thought to be the moraine of a glacier formed during the Pleistocene epoch. At various stages the bank was either an island or part of the landmass connecting the British Isles to Europe.

The British Isles, Europe and Scandinavia all share the Eurasian tectonic plate. This continuous geology is most fortunate for undersea tunnelling which would otherwise not be possible.The area has been continuously inundated since the end of the most recent ice age, and the melting of the ice dam which closed off the northern part of the North Sea area.

The Bank is a significant fishing area and also produces phytoplankton throughout the year. It has been proposed that it be designated as a marine nature reserve. The bank has numerous shipwrecks and has also revealed mammoth and rhinoceros remains.

Palaeolithic hunting artefacts have also been found. In 1916 the Battle of Jutland

took place north east of the Dogger Bank. This horrific battle involving 250 warships was the last major battle fought by battleships.

The North Sea region is the living domain of about 50 million people in nine highly developed industrial countries. It is one of the best and most intensely investigated sea areas in the world.

The Strait of Dover initially had a chalk ridge isthmus linking the Weald of Kent and Artois. This contained what is now the North Sea as a freshwater lake, fed by major rivers and glacial meltwater.

The barrier is thought to have failed around 425 000 years ago and again around 225 000 years ago causing catastrophic floods which permanently diverted the Rhine into the English Channel and scoured the Channel, leaving evidence of streamlined islands and deeply gouged channels at the site of the isthmus collapse.

The North Sea is an ideal area for the deployment of wind turbines.

In January 2010, a licence was granted to a consortium of developers to develop a 9 GW wind farm on the Dogger Bank as part of an eventual 32 GW farm. This was subsequently downscaled to 7,2 GW but development has repeatedly been postponed.

Calgary based Enbridge Inc. plans to invest $1.7 billion in a North Sea off-shore wind

Dogger Bank Power Hub

continues from page 47

energy project off the coast of Germany. The company will have 50% ownership of the wind farm, the rest owned by German utility EnBW. The 497 MW output will be sold under a German government incentive program.Some 38 off shore wind farms are currently operating or under construction in the North Sea (Table 1).

Statoil is currently building the world's first floating wind farm offshore of Scotland. Irene Rummelhoff, Statoil's Executive Vice President for New Energy Solutions declared: *"The Hywind Scotland pilot park has the potential to open attractive new markets for renewable energy production worldwide. With Masdar onboard as a strong strategic partner we are teaming up with a company with high ambitions within renewable energy. We believe Masdar can be a strong partner also in future Hywind projects and we hope that our collaboration will result in future value creation opportunities for both parties."*

The pilot park will cover around 4 square kilometres 25 km offshore Peterhead at water depths of 95-120 metres. The average wind speed in this area of the North Sea is around 10 metres per second. The Hywind Scotland substructures have been constructed in Spain and will arrive at the yard at Stord in Norway followed by assembly during the summer of 2017, before sail off to Peterhead. (1)

Dutch, German and Danish electrical grid operators have embarked on a project to build a North Sea Wind Power Hub on artificial islands on the Dogger Bank as part of a European system for sustainable electricity. The TSOs (Transmission System Operators) are TenneT TSO B.V. (Netherlands), Energinet (Denmark) and TenneT TSO GmbH (Germany).

On 23 March 2017 a trilateral agreement between the three TSOs was signed. Discussions with other potential partners, including other North Sea TSOs and infrastructure companies, are ongoing. The goal is to achieve a multi-party consortium to realise the project, which is envisaged for building in the 2030 to 2050 timeframe. By this time, some of the presently running wind farms might well be decommissioned.

Wind farm	Cap. (MW)	Turbines	Where	When	Build Cost	Cap. fac.	Depth range (m)	km to shore	Country
Alpha Ventus	60	6 × Multibrid M5000, 6 × REpower 5M	54°1'0"N 6°36'0"E	2010	€250 million		28	56	Germany
BARD Offshore 1	400	80 × BARD 5.0	54°21'18"N 5°58'48"E	2013	€2,900 million		40	100	Germany
Beatrice	10	2 × REpower 5M	58°06'20"N 03°05'35"W	2007	£35 million	20%	45	23	United Kingdom
Belwind	165	55 × Vestas V90-3.0MW	51°39'36"N 02°48'0"E	2010	€614 million			46	Belgium
Blyth Offshore	4	2 × Vestas V66-2MW	55°08'09"N 01°29'25"W	2000	£4 million		6-11	1.6	United Kingdom
DanTysk	288	80 × Siemens SWP-3.6-120	55°8'24"N 7°12'0"E	2015	$900 million		21-31	70	Germany
Egmond aan Zee (OWEZ)	108	36 × Vestas V90-3MW	52°36'22"N 4°25'8"E	2008	€200 million		15-18	13	Netherlands
Eneco Luchterduinen	129	43 × Vestas V112/3000	52°24'18"N 4°09'43"E	2015	€450 million		18-24	24	Netherlands
Irene Vorrink	17	28x Nordtank NTK600/43	52°35'53"N 5°35'20"E	1996	GBP 19m		2-3	1	Netherlands
Greater Gabbard	504	140 × Siemens SWT-3.6-107	51°56'0"N 1°53'0"E	2012	£1,500 million		20-32	23	United Kingdom
Gunfleet Sands 1 & 2	172	48 × Siemens SWP-3.6-107	51°43'0"N 01°12'50"E	2010	£300 million		2-15	7	United Kingdom
Horns Rev I	160	80 × Vestas V80-2MW	55°31'47"N 7°54'22"E	2002	€272 million	39%	10-20	18	Denmark
Horns Rev II	209	91 × Siemens SWP-2.3-93	55°36'00"N 7°35'24"E	2009	€470 million	45%	9-17	32	Denmark
Humber Gateway	219	73 × Vestas V112-3.0	53°38'38"N 0°17'35"E	2015	€900 million		10-18	10	United Kingdom
Hywind	2.3	1 × Siemens SWP-2.3-82	59°08'24"N 05°01'55"E	2009	NOK 400 million		220	10	Norway
Kentish Flats	90	30 × Vestas V90-3.0MW	51°27'36"N 01°05'24"E	2005	£121.5 million	30%	3-5	10	United Kingdom
Lincs	270	75 × Siemens SWT-3.6-120	53°11'0"N 0°29'0"E	2013	£1,000 million		10-15	8	United Kingdom
London Array	630	175 × Siemens SWT-3.6	51°38'38"N 1°33'13"E	2013	£1,800 million		0-25	20	United Kingdom
Lynn and Inner Dowsing	194	54 × Siemens SWP-3.6-107	53°07'39"N 0°26'10"E	2009	£300 million	37%	6-11	5	United Kingdom
Meerwind Süd/Ost	288	80 × Siemens SWT-3.6-120	54°23'0"N 7°41'0"E	2014	€1,300 million		22-26	53	Germany
Nordsee Ost	295	48 × Senvion 6.2M126	54°26'00"N 7°41'0"E	2015				55	Germany
Northwind	216	72 × Vestas V90-3.0	51°37'08"N 02°54'00"E	2014	€850 million		16-29	37	Belgium
Princess Amalia	120	60 × Vestas V80-2MW	52°35'24"N 4°13'12"E	2008	€350 million		19-24	26	Netherlands
Riffgat	113	30 × Siemens SWT-3.6-120	53°41'24"N 6°28'48"E	2014	€480 million		16-24	15-42	Germany
Scroby Sands	60	30 × Vestas V80-2MW	52°36'0"N 1°47'0"E	2004	£75.5m	26-32%	0-8	2.5	United Kingdom
Sheringham Shoal	317	88 × Siemens SWT-3.6-107	53°07'0"N 1°06'0"E	2012	£1,100 million		12-24	17	United Kingdom
Teesside	62	27 × Siemens SWT-2.3	54°38'50"N 1°05'40"W	2013	£200 million		7-15	1.5	United Kingdom
Thanet	300	100 × Vestas V90-3.0MW	51°26'0"N 1°38'0"E	2010	£780-900 million		20-25	11	United Kingdom
Thorntonbank	325.2	6 × REpower 5M, 48 × Senvion 6M	51°38'39"N 2°55'36"E	2013	€1,100 million		13-19	27	Belgium
Trianel Windpark Borkum (phase 1)	200	40 × Areva M5000-116	54°2'30"N 6°26'0"E	2015	€900 million		28-33	45	Germany
Westermost Rough	210	35 × Siemens SWT-6.0	53°48'18"N 0°08'56"E	2015	€1,000 million		10-25	8	United Kingdom

Table 1

1. http://www.4coffshore.com/windfarms/hywind-scotland-pilot-park-united-kingdom-uk76.html
2. On-line readers may use the following link for further information on the wind power hub as well as an animated video clip.
   https://stateofgreen.com/en/profiles/energinet-dk/news/cooperation-european-transmission-system-operators-to-develop-north-sea-wind-power-hub
   http://www.energinet.dk/EN/ANLAEG-OG-PROJEKTER/Nyheder/Sider/Cooperation-European-Transmission-System-Operators-to-develop-North-Sea-Wind-Power-Hub.aspx

Dogger Bank Power Hub

continues from page 49

The world's longest wind turbine blade, at 88.4 Meters, has successfully completed its first journey – perhaps as the largest cargo ever transported on danish roads.

The next stage will be the detailed feasibility study.

The scale of the project is huge – thousands of wind turbines delivering 70 GW to 100 GW of power – more than double the present power usage of South Africa. This project will not only provide power, it will also allow the purchase and sale of electrical energy between the participating countries. It seems likely that the largest size of turbines will be best suited to the task. At present the largest available has an output of 8 MW but even larger monsters are envisaged. These will have helipads on the nacelles. Landing a helicopter on one of these in windy conditions will require nerves of steel. The slightest contact between the horizontal blades of the helicopter and the vertical blades of the turbine will result in instant catastrophe.

One cannot readily appreciate the huge height of the turbines as they are never seen in proximity to high rise buildings. The Danish manufacturer Vestas is now partnered with MHI (Mitsubishi Heavy Industries). The MHI Vestas V164 has a blade tip height of 220 m – this is equivalent to the height of a 70 storey tower block. Continuing with lay-parlance, an 8 MW output is equivalent to 10 724 horsepower. The scale of construction would have left even the ancient Egyptians gasping. When huge turbine blades are transported by road haulage this is a most astonishing spectacle. Millions of tons of concrete foundations and thousands of km of undersea cable will be required, not to mention the thousands of costly turbines. A large number of designs of foundations for offshore turbines are in use. For shallow water, caisson construction can be used with the addition of piles if necessary. For deeper water, lattice towers can be used. The new deep water turbines of Japan are of floating design, which are anchored by catenary cables allowing for wave and tidal movement. A floating substation is used.

Wind farms do pose some threat to bird life. A large flock of migrating birds flying through a wind farm could result in much slaughter. Globally however, birds killed by turbines amount to about 1 in 10 000 of those caught by cats. There is however some disparity – turbines will tend to be a threat to large migratory birds whereas cats will prey mostly on small birds. Bird life is under far greater threat due to climate change.

The initial artificial hub island of some 6,5 square kilometres will include a harbour, landing strip and helipad as well as substation, workshops, stores and housing. Mel Kroon, CEO of TenneT, said: 'This project can significantly contribute to a completely renewable supply of electricity in Northwest Europe. TenneT and Energinet.dk both have extensive experience in the fields of onshore grids, the connection of offshore wind energy and cross-border connections. TSOs are best placed to play a leading role in the long-term development of the offshore infrastructure. I am happy that we are going to take this step with our Danish colleagues and I look forward to the participation of other transmission system operators and possibly other partners.'

Peder Østermark Andreasen, CEO of Energinet.dk, commented: *"Offshore wind has in recent years proved to be increasingly competitive and it is important to us to constantly focus on further reduction in prices of grid connections and interconnections. We need innovative and large-scale projects so that offshore wind can play an even bigger part in our future energy supply." (2)*

South Africa is fortunate in that wind and solar power can both be utilised, extending the available time of renewables, and consequently reducing the need for energy storage (3). wn

3. The following link gives details of the largest wind turbines currently available. http://www.windpowermonthly.com/10-biggest-turbines This website also gives some idea of the worldwide thrust into wind power.

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IN MY OPINION - ATTILIO DALVIT

The truth about Energy Independence in residential households

South Africa is really blessed with solar power from the Limpopo province to the Western Cape.

BY | ATTILIO DALVIT

Let's take an example in the Gauteng Province.

PV STORAGE

The average household of 5 has the consumption of electricity of around 1600Kw/h per month. To be precise we must check the municipality electricity invoices for a one year at least to have a reliable average for the summer and winter months.

Graph 1 shows the daily consumption. The graph is obtained by tabulating the electrical consumption in the household of by the utilisation of a recorder. It is easily seen that the consumption starts from 05:30 in the morning with a peak at 07:30 and then from 17:00 to 23:00.

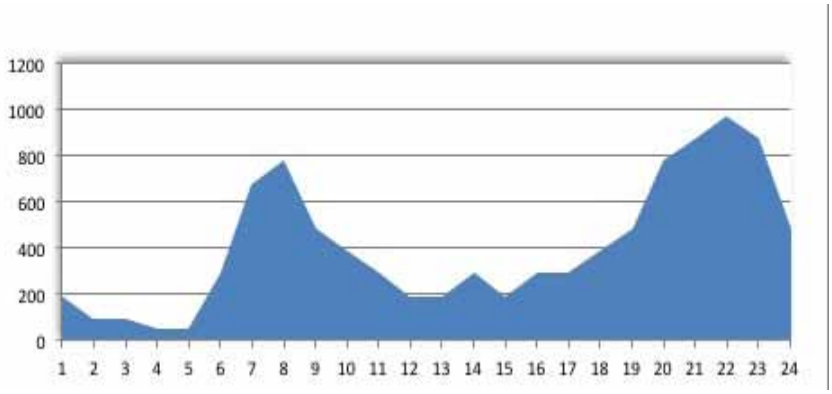
We are making an assumption of having 26 days of sun and 4 to 5 days of rainy or cloudy weather.

The average of sun shining over Gauteng is 6 to 8 hours daily but for the purpose of this exercise we will use the 6 hours of sun per day.

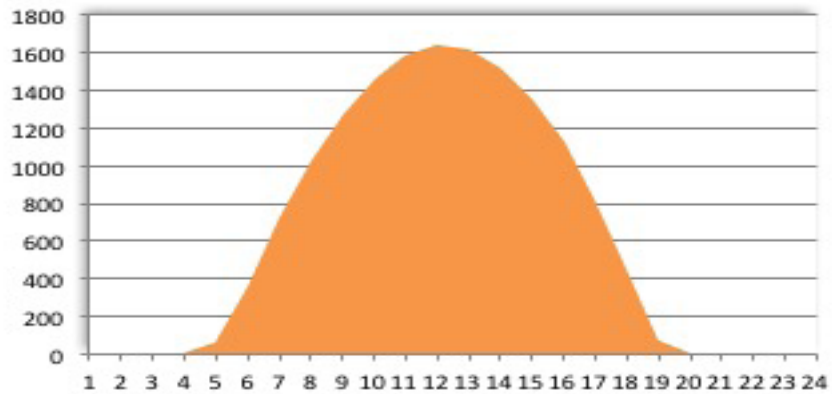
With this information we can easily calculate the Kw/p for the household - 1600Kw/h/26/6=10,256Kw/p.

The Daily PV production (Graph 2) from the photovoltaic module can vary from module to module; an example is that the efficiency of the Polycrystalline modules may reach 15% efficiency whereas the monocrystalline may reach 21% of efficiency. So, the sun rises at 05:00 am and sets at 18:30 pm (around 11 hours of sun).

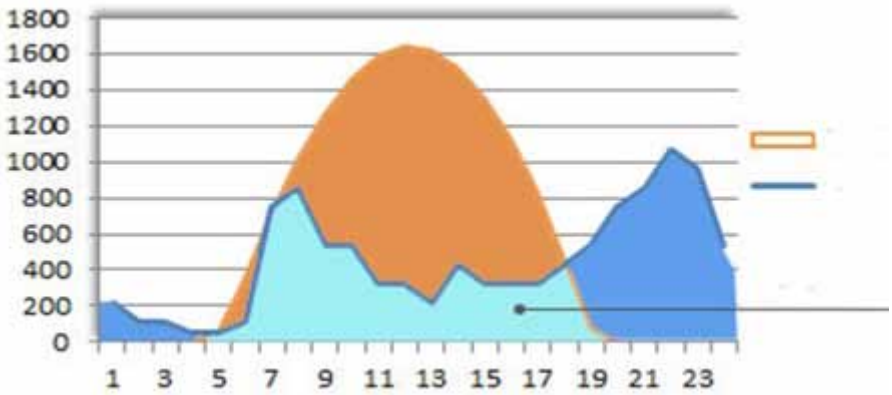
If we overlap the household consumption (Graph 3) with the daily production of electricity from the photovoltaic panels we can see we have a surplus of energy from 09:00 until 17:00



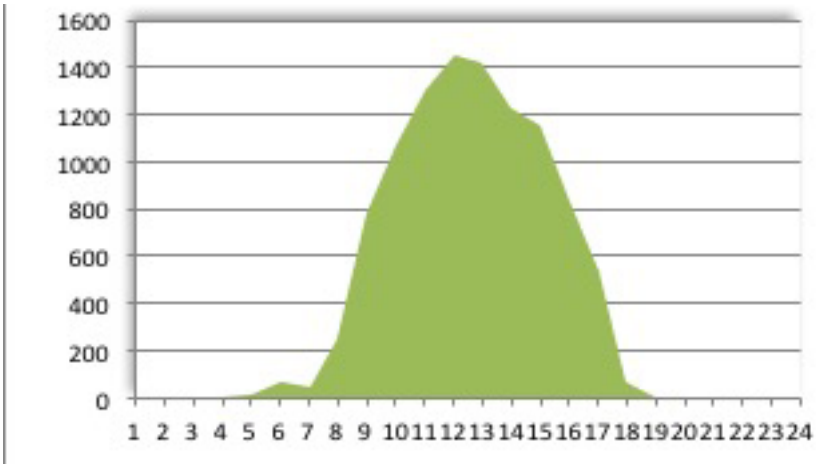
Graph 1 - Daily Consumption



Graph 2 - Daily PV Production



Graph 3 - Overlap of household consumption with daily production from PV panels



Graph 4 - Power in surplus to accumulate or to sale

Energy Independence in households

continues from page 53

and no energy from 00:00 to 05:30 and from 18:30 to 23:59.

This lack of energy has to be obtained from the grid or from another form of storage.

So, we found that the daily energy used on the household is 1600Kw/h monthly and therefore we use approximately 54Kwh daily.

From the graph we can see that during the day the consumption is 1/3 of the total daily energy equivalent to 18 Kwh and 36 Kw/h between the 16:00 to the 05:00.

We need to store 36 Kw/h for at least 2 days (bad weather) = 72 Kwh or 72000Wh

There is also the operating temperature factor to be evaluated: If the ambient temperature is low then we need to multiply the factor to the A/h of the battery.

In our case let's keep the factor at 1 so, we need 72000Wh
We can select many types of batteries:
12V 200Ah Gel battery 1400 cycles (low maintenance) will give us 2400Wh

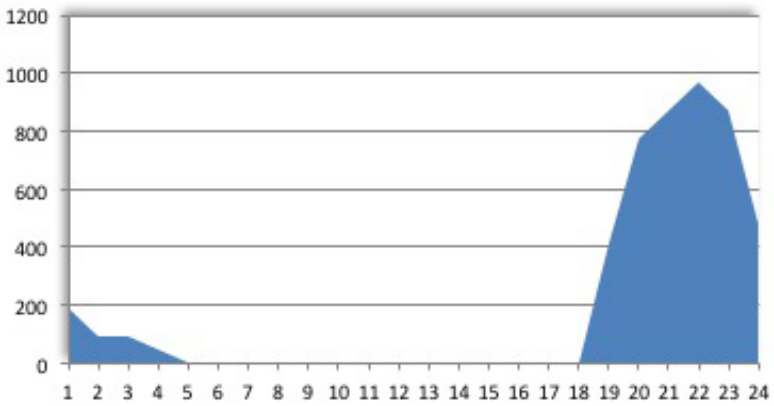
For 72000 Wh we need 30 batteries with a maximum DoD (Depth of Discharge) of 50% and a lifetime of 3,8 years

or

2V 350Ah tubular battery 1800 cycles (low maintenance) will give us 700Wh
102 batteries needed and a maximum DoD of 50% and a lifetime of 4,9 years

or

12V 100 AhLiFePo with more than 3000 cycles (no maintenance) will give 1200Wh 60 batteries and a maximum of DoD of 80% and a lifetime of 10 years. wn



Graph 5 - Power to accumulate in batteries

Temp	Factor
26,7 °C	1,00
21,2 °C	1,04
15,6 °C	1,11
10,0 °C	1,19
4,4 °C	1,30
-1,1 °C	1,40
-6,7 °C	1,59

Graph 6 - Temperature Factor Evaluation

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PLACE

Zwartkops Raceway, Quagga Road, Centurion, Gauteng

ENQUIRIES

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PREPARING FOR A NEW ENERGY FUTURE

UL is helping companies of all sizes seize key opportunities in the rapidly changing energy sector

Big changes are afoot in the global energy sector, and providers of all sizes are faced with the challenge of having to transform in response to both market and environmental factors. In short, they are having to prepare to operate in what can only be called a new energy future.

As a global independent safety science company, UL (Underwriters Laboratories) provides a wide range of solutions and services in this strategic sector. These cover areas as diverse as battery and energy storage technology; e-Mobility; large-scale power generation; oil and gas; solar and wind generation; generator control; and smart grid technology.

In all of these areas, UL offers its customers access to a global network of experts who understand energy requirements and issues on a local, regional, national and international basis. They serve as a trustworthy single source for testing, verification, certification and compliance.

When working with large power utilities, for example, UL helps its customers to determine and understand both market and regulatory requirements. In consultation with its customers and national regulators, UL professionals help to identify, define, develop and assess compliance with relevant safety, performance, interoperability and security requirements. They also work with product manufacturers to certify utility-owned or interconnected products, including meters, inverters, transformers, switchgear, and large-scale storage installations. In the burgeoning field of renewable energy, UL helps customers in both the solar and wind sectors to meet demanding product launch dates while also managing the risks associated with rapid innovation. The company's safety, performance and verification testing services provide critical checks against all key standards. Its professional teams also provide customised testing services for research into and evaluation of new designs, as well as testing to determine whether products meet the qualification requirements for energy-saving incentive programmes.

In the critical oil and gas sector, UL has 120 years of experience in dealing with safety issues. Its testing, inspection, certification and advisory services are fully focused on a single goal: helping to keep people and sites - especially hazardous locations or hazlocs - safe.

UL understands the challenges of maintain existing technologies and introducing new ones. It occupies a key leadership position in major international standards development and harmonisation bodies such as the International Electrotechnical Commission (IEC), and invests heavily in standards development for innovative or enhanced technologies such as modules, inverters, converters and balance of system (BOS).

As a global service provider with a well-established track record, the company is able to provide not only quality and safety testing and certification for both components and installations, but consulting and due diligence services right from concept stage through to commissioning. It is also able to advise at both operational and financial level throughout the lifecycle of an installation in order to ensure that it operates optimally at all times and under all conditions. And for greenfield projects, it is able to conduct all-important site screening and feasibility studies.

UL has both the knowledge and capacity to assist companies in navigating the regulatory requirements in different countries - and so to save both time and money in the process of bringing their products to market. As importantly, it has the ability to assist companies in managing the challenges and pitfalls of the geopolitical landscape, in which countries such as Kenya, Morocco and Tunisia are trying to carve out a space. This is evident in the fact that UL has seen a 25% increase in demand for its services in this sector over the past 12 months alone.

The tide is turning in the energy sector, and UL is here to open the doors of opportunity for providers of all sizes operating in all segments of the market. wn

UL has partnered with pioneers across every industry to make sure safety is always in step with innovation, including the future-focused Renewable Energy Market. The UL team works diligently with renewable energy innovators to protect this generation and the next, all while inspiring the search for the next great innovative leap.

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WATT? is a forum related specifically to the industrial and commercial electrical sector.

Do you have any burning questions, topical issues or points of interest about the electrical industry, from the perspective of a contractor, supplier or professional service provider? Submit your comments, thoughts, ideas, suggestions or questions for the attention of our industry experts, and these will be addressed in a future issue of the magazine. This is your forum, and we would like to hear from you!

WATT? is an opportunity for people on the ground to engage with each other and related professionals in an informative and friendly manner. This is a platform for you to discuss anything related to your particular sector, to highlight anything new, or to ask a specific question related to a technical topic or to engage in general industry issues. . Please note that we will not be considering anything related to the domestic sector, such as residential wiring.

We hope that this section of the magazine not only becomes a regular feature, but that it is widely read and distributed among your peers. Remember, it can only become a success with the full participation of our readers! Send your burning questions to minx@saiee.org.za - subject 'WATT?'.

We look forward to hearing from you.
- Ed

QUESTION ONE

Normal Duty or Heavy Duty? How do you select the correct Variable Speed Drive (VSD) for your specific application?

ANSWER ONE

The first thing to consider would be the type of application, as this will determine what type of load the VSD will be driving, i.e. constant torque, variable torque or constant power, to only mention a few. Approximately 60% of VSD driven applications are variable torque loads, i.e. centrifugal pumps and centrifugal fans. Around 35% of the applications are constant torque applications and the remaining 5 % are made up from other load types such as constant power or linear torque.

Once the load type has been determined, the VSD can be selected based on normal duty or heavy duty operation, and overload capability requirements. Generally, normal duty VSDs are more suitable for variable torque loads, as these load types do not require very high starting or break away torque.

Applications such as conveyors or cranes, on the other hand, require high starting torque and one would therefore need to consider a VSD with a higher overload capability, in order to ensure that the load can be started and run successfully. Overload capabilities for normal duty VSDs can vary from manufacturer to manufacturer, but are normally in the region of 110% x rated current for 60 seconds. Heavy duty VSDs though, will typically be able to supply around 150% x rated current for 60 seconds, again depending on the manufacturer.

Hence for about 60% of all applications normal duty VSD would be suitable, but one has to always take into consideration the load type and the overload requirements for each and every application.

QUESTION TWO

Once you have established normal duty, or heavy duty, do you size the VSD based on motor Kilowatt (kW) or current (Amps)?

Q&A

WATT?

ANSWER TWO

There are a number of things that have to be taken into consideration. You need to consider the supply voltage(V), kilowatt rating(kW), motor speed (RPM) and lastly, and probably the most important, the motor current rating(A).

The most logical assumption would be to select the VSD based on kilowatt, and this is where mistakes are often made, as will be explained below.

Most manufacturers rate their VSDs considering a fixed voltage. A typical example is if the VSD manufacturer rates a 400 V VSD unit at 88 A. Then there will be a reduction of about 6% in current if the supply voltage applied to the VSD is reduced to 380 V.
Most VSD manufacturers rate their VSDs based on the full load current, of either two or four pole motors, due to the majority of electrical motors (approximately 75%) being supplied into the market either being two or four pole. It is therefore very important to take motor current into consideration when selecting the most suitable VSD.

Motor rated speed, and rated full load current, are effected by the number of pole pairs. Two pole motors will have a synchronous speed of 3 000 rpm, while four pole motors will have a synchronous speed of 1 500 rpm, and six pole motors a synchronous speed of 1 000 rpm.

The higher the number of poles, the slower the motor speed, but as the rated speed decreases the rated current will increase. This is mainly due to the fact that, as the speed decreases, the motor torque will increase resulting in a higher rated full load current.

In conclusion, it is therefore best practice, when selecting a VSD for running a specific electrical motor, to consider the supply voltage (V), the kilowatt (kW) rating and motor speed(rpm), but most importantly, the motor full load current (Amps).

The selected VSD should always have a higher continuous current rating than that of the equivalent standard electrical motor, irrespective of motor speed or kilowatt rating, in order to ensure correct operation. wn

Information provided by Zest WEG Group

May

Movers, shakers and history-makers

COMPILED BY | JANE BUISSON-STREET
FSAIEE | PMIITPSA | FMIITSPA

1 MAY

1994 International Workers' Day commemorates the historic struggle of working people throughout the world.

2 MAY

1962 Sathyadranath Rugunanan Maharaj (Mac), returned to SA, with his first wife Ompragash, from the United Kingdom. In 1985, he was elected to the ANC's National Executive Committee

3 MAY

1991 World Press Freedom Day. According to United Nations Educational, Scientific and Cultural Organisation (UNESCO) the objective of World Press Freedom Day is "to evaluate press freedom around the world, to defend the media from attacks on their independence and to pay tribute to journalists who have lost their lives in the exercise of their profession.

4 MAY

1927 A balloon soars over 40,000 feet for the first time.

5 MAY

1957 Actor Richard E. Grant was born in Swaziland.

6 MAY

1840 The world's first postage stamp, the Penny Black, was issued in Great Britain.

7 MAY

2006 Former President Nelson Mandela invited the Protea Cricket Team to his Houghton home to congratulate them on their excellent performance, in scoring the highest ever total of runs, in a one-day match against New Zealand.

8 MAY

1992 Miss Namibia, Michelle McLean, a six-foot-tall model and masseuse, was crowned Miss Universe in Bangkok, Thailand.

9 MAY

1994 Nelson Mandela was elected unopposed as the first President of South Africa in the first session of the National Assembly.

10 MAY

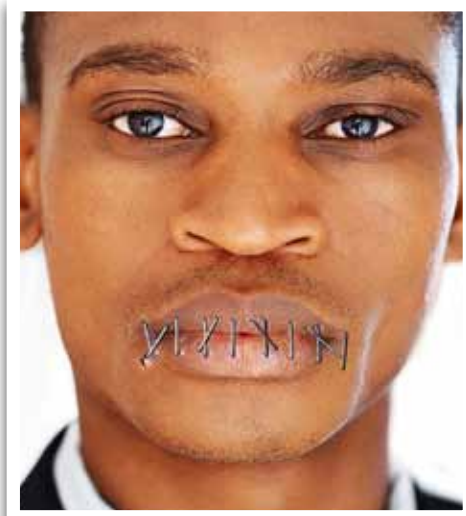
1952 Ruben Xulu, a South African artist, was born in Hlabisa, Natal. Xulu, who was born deaf, began carving with Bernard Gcwensa at Hlabisa Mission Station. He embarked on a life-long career of producing religious sculptures in both stone and wood. He exhibited in 1965 and 1978. He passed away in 1985.

11 MAY

1959 Professional soccer was introduced in South Africa when the National Football League was founded.

12 MAY

1994 South African all-round cricketer, Xenophon Constantine Balaskas (aka Xen/Bally) died aged 83. He scored 2,696 first-class runs at 28.68 and took 276 wickets at



24.11 with his leg-spin bowling. His professional career began on 24th December 1930 and he played his final test in December 1938.

13 MAY

1857 The district of Albert (Burgersdorp), submitted a petition to parliament in which the use of Dutch, jointly with English, was requested in the Cape parliament.

14 MAY

1925 Sir Henry Rider Haggard, author of adventure books, such as King Solomon's Mines and who worked in South Africa for several years, died in London. H. Rider Haggard, as he was also known, set his books in exotic locations, predominantly Africa, and he was a pioneer of the Lost World literary genre. He was also involved in agricultural reform throughout the British Empire. His stories, situated at the lighter end of Victorian literature, continue to be popular and influential.

15 MAY

1928 Mickey Mouse made his 1st ever appearance in the silent film "Plane Crazy".

16 MAY

1998 Neal Stephenson, South African Champion Body Board Surfer, lost his leg in a shark attack at Keurbooms River, near Plettenberg Bay, Western Cape.

17 MAY

1971 Melrose House, in Pretoria, was officially opened as a museum. It is an example of the transition from Victorian to Edwardian architectural styles and interiors.

18 MAY

1912 Walter Sisulu, co-founder of the ANCYL and Umkhonto we Sizwe, was born.

19 MAY

1962 A birthday salute to U.S. President John F. Kennedy took place at Madison Square Garden, New York City, USA. The highlight was Marilyn Monroe's rendition of "Happy Birthday".

20 MAY

1916 Die Huisgenoot, the oldest still existing Afrikaans magazine, was first published, and was the second publication of 'Nasionale Pers' ('Die Burger was published ten months earlier).

21 MAY

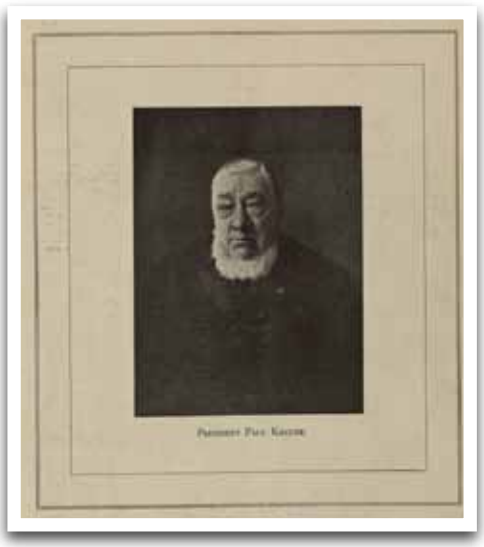
1737 Nine ships were wrecked and 208 lives lost in Table Bay during a severe gale at the Cape, proving again that the Cape was quite aptly called 'Cape of Storms' (Cabo das Tormentas) by Bartholomeu Dias, the first Portuguese explorer to reach the Cape in 1488. There have been more than 2 000 shipwrecks, dating back at least 500 years, off the SA coast.

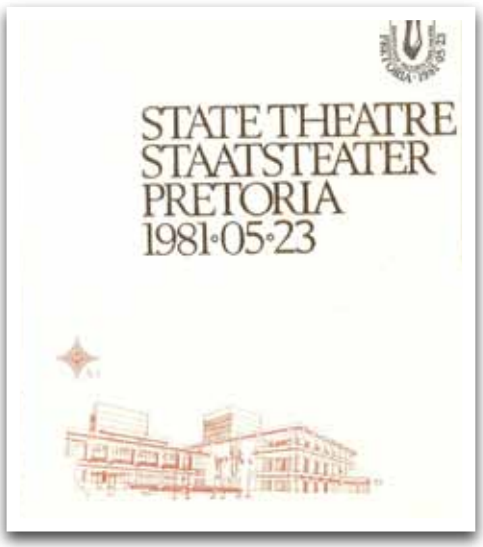
22 MAY

1859 The author of Sherlock Holmes and field doctor in the South African War of 1899 - 1902, Arthur Conan Doyle, was born at Picardy Place, Edinburgh, United Kingdom.

23 MAY

1981 The State theatre in Pretoria opened in 1981 as a non-profit government funded company. The Japanese influenced building is a complex of theatres. At the time of construction, it was the first of its kind in Southern Africa. The theatre consists of five arenas, a large public square and several restaurants. It can accommodate any event, from festivals, product launches to shows such as opera, ballet and musicals.





MAY

continues from page 61

24 MAY

1921 The first Comrades Marathon was run by Vic Clapham, a WWI veteran and 34 runners, who initiated it as a reunion. Clapham wanted to remember those who had fallen in the war by the ultimate test of body and mind, and triumphing. Sixteen runners completed the 87,9km race from Pietermaritzburg to Durban.

25 MAY

1963 Africa Day was first celebrated. Previously known as African Freedom Day and African Liberation Day; and is the annual commemoration of the foundation of the Organisation of African Unity (OAU).

26 MAY

1941 Eric Clifford "Cliff" Drysdale was born in Nelspruit, Mpumalanga. He was widely regarded as one of the best tennis players South Africa has ever produced. In 1965 Cliff was ranked fourth in the world and remained under the top ten best players in the world until 1973. In the late 1970s Cliff embarked on a new career as a tennis announcer.

27 MAY

1927 The Ford Motor Company ceased the manufacture of the Ford Model T and began to retool plants to make the Ford Model A.

28 MAY

1907 The first Isle of Man TT (Tourist Trophy) Race was held. It is a motorcycle sport event that has been held annually on the Isle of Man in May or June of each year since then. The Isle of Man TT for many years has been the most prestigious motorcycle race in the world, and is also seen as the ultimate test for competitors and machines alike. In 2003, Sports Illustrated writer Franz Lidz described the spectacle as *"38 Miles of Terror... a test of nerves and speed that may be sports' most dangerous event."*

29 MAY

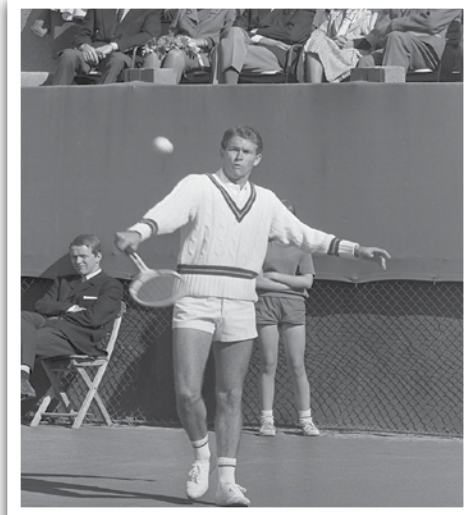
1500 Bartholomew Dias, the Portuguese discoverer of the Cape of Good Hope, drowned at sea.

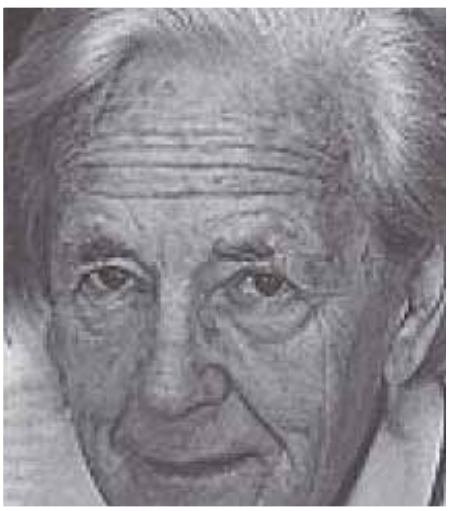
30 MAY

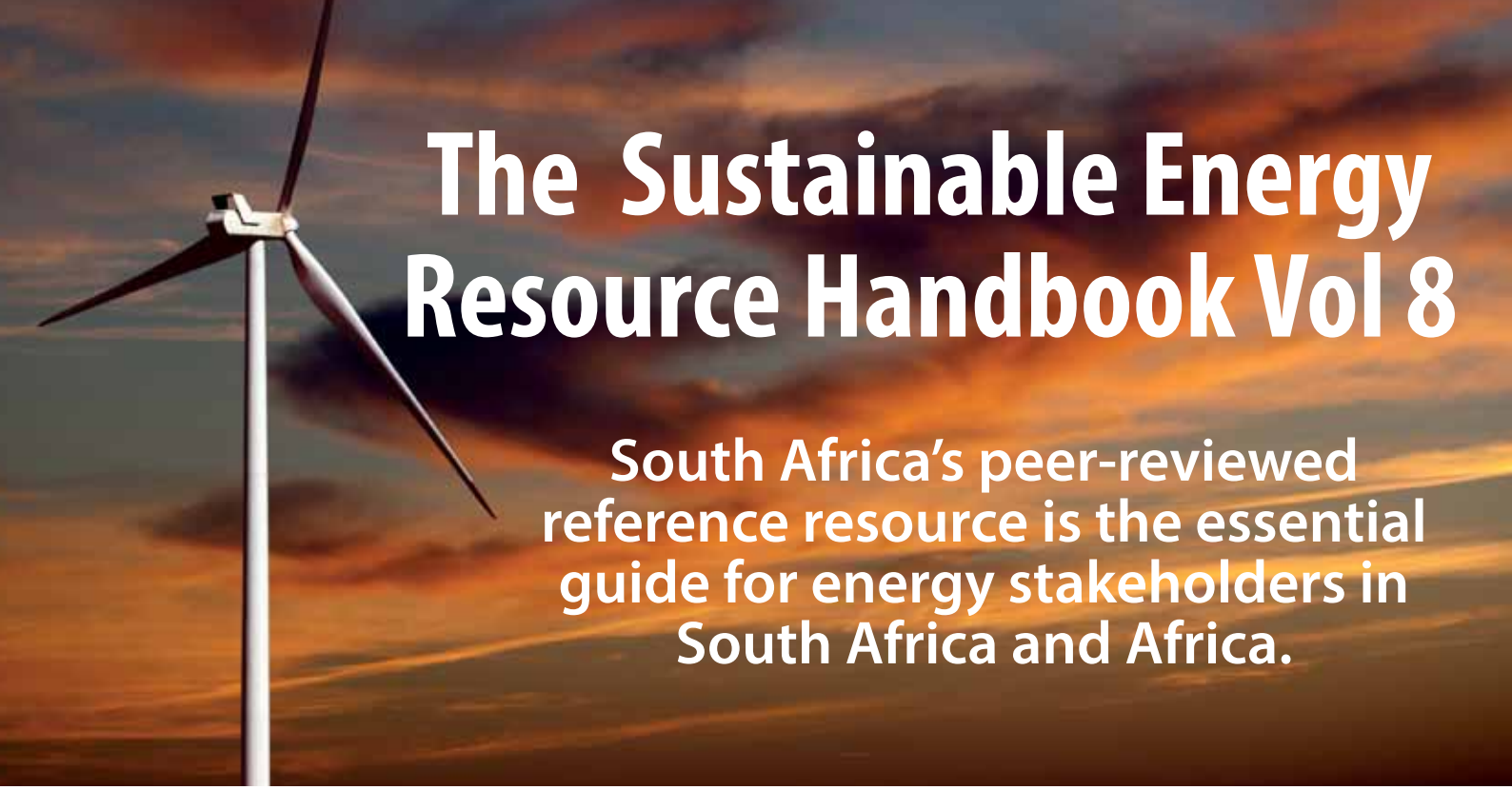
2006 The Welkom based Thabong Serenade Choir became the first choir outside Gauteng to win the Gauteng Choral Music Association's championship in Germiston.

31 MAY

1996 Former editor and publisher of Drum magazine, Jim Bailey, received the award of Commander of the British Empire (CBE) for his contribution to journalism in Africa and the part he played in World War II as an RAF pilot. He received the Distinguished Flying Cross (DFC) in 1944. wn







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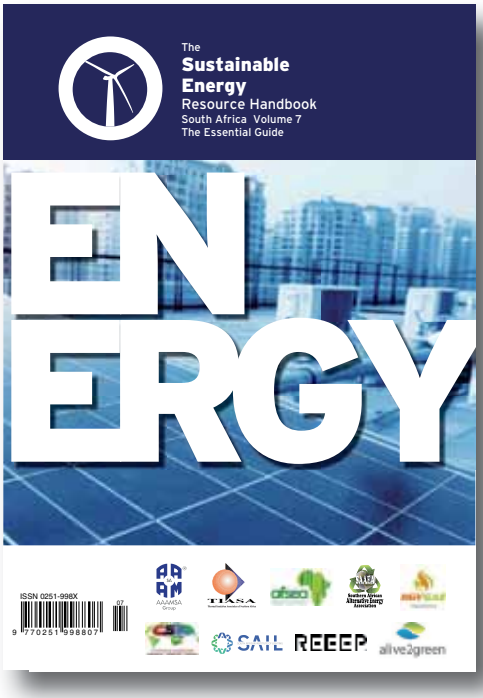

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