wattnow

SAIEE THE OFFICIAL PUBLICATION OF THE SOUTH AFRICAN INSTITUTE OF ELECTRICAL ENGINEERS | MAY 2022

FEATURING

RENEWABLE ENERGY

SAIEE OFFICE BEARERS 2021/2022

PRINCE MOYO
2022 SAIEE President

PROF JAN DE KOCK
Deputy President

PASCAL MOTSOASELE
Senior Vice President

VEER RAMNARAIN
Junior Vice President

PROF SUNIL MAHARAJ
Immediate Past President

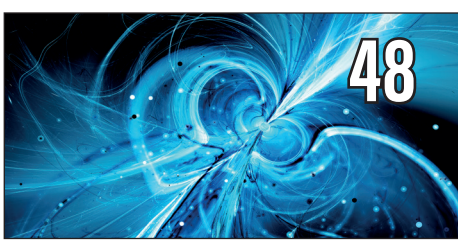
JACOB MACHINJIKE
Honorary Treasurer

JANE BUISSON-STREET
Honorary Vice President

CONTENTS

FEATURES

GENERAL



SAIEE @SAIEE SAIEE

wattnow

MANAGING EDITOR
M Avrabos | minx@saiee.org.za

TECHNICAL EDITOR
J Buisson-Street

EVENTS
G Geyer | geyerg@saiee.org.za

CPD & COURSE ACCREDITATION
Z Sibiya | zanele@saiee.org.za

MEMBERSHIP & TECHNOLOGY LEADERSHIP
C Makhalemele Maseko | connie@saiee.org.za

ADVERTISING
Avenue Advertising
T 011 463 7940 | F 086 518 9936 | Barbara@avenue.co.za

SAIEE HEAD OFFICE
P.O. Box 751253 | Gardenview | 2047
T 011 487 3003
www.saiee.org.za
Office Hours: 8am - 4pm
Mondays - Fridays

ISSN: 1991-0452

Dear **watt**now reader,

Renewable energy systems are costly to implement initially but provide high economic returns in the long run. The two main barriers accompanying renewable energy in South Africa are the energy innovation system and the high cost of renewable energy technologies.

In this issue, we take a look at a few issues.

Page 32 discusses "The five biggest new energy trends in 2022." Today, nearly everyone accepts that to slow the damage we are doing to our planet and environment, humans must transition away from the use of fossil fuels. This has led to many science and business innovations as we search for new sustainable or renewable alternatives to coal, oil, and gas.

In 2021, the renewable energy sector remained remarkably resilient, primarily driven by solid core fundamentals combined with a supportive policy environment. Rapid technology improvements, decreasing costs of renewable energy resources, and the increased competitiveness of battery storage have made renewables one of the most competitive energy sources in many areas. Read more in the "2022 Renewable Energy Outlook" on page 36.

Page 44 discusses "South Africa's Energy Fiscal Policies". Energy fiscal policies in South Africa have historically been framed around distributive aims, particularly in the post-Apartheid state. Depending on the type of energy fiscal policy, these policies can promote domestic energy production and increase energy security and access to affordable energy. Subsequently, this may drive economic development, which positively impacts sectors such as education and health.

The June issue features Power, and the deadline is 23 May. Please send your articles or papers to minx@saiee.org.za.

Herewith the May issue; enjoy the read!

Enlit Africa

Formerly African Utility Week POWERGEN AFRICA

7 - 9 June 2022

IN-PERSON AND ONLINE

CTICC, Cape Town, South Africa

Join the conversation at the following Enlit Africa conference sessions:

- Unpacking the realities of Africa's energy transition
- The role of various generation technologies.
- COVID-19, climate change and the investment landscape – how have things changed and what new finance mechanisms are available?
- Energy storage: the cornerstone of a successful energy transition?
- Digitalization set to revolutionize operations
- Revenue management and protection
- Self-generation and storage - brought to you in association with the South African Energy Storage Association (SAESA)
- Municipal focus: Wheeling, self-generation and more

JOIN US BY REGISTERING TODAY at www.enlit-africa.com

CPD accredited by SAIEE

Your inclusive guide to the energy transition.

Contact us registrations@enlitafrica.com

ESI AFRICA NEWS | KNOWLEDGE | POWER HOST MEDIA

Created by VUKA GROUP

INDUSTRY AFFAIRS

SAIEE KZN Centre Breakfast on Energy Security, Innovation and Sustainability

From left: Richard Alschlager Panellist; Chris Ramble; Shepherd Nkosi, SAIEE KZN Centre Chairman; Prince Moyo, SAIEE President; TC Madikane, SAIEE Past President; Jay Kalichuran, KZN Centre Past Chairman; Prithum Raggo, Panellist and Veer Ramnarain, SAIEE Junior Vice President.

The KZN SAIEE centre hosted a thought-provoking and insightful discussion on Energy Security, Innovation, and Sustainability. A panel of industry experts joined us to discuss the current trends in alternate energy solutions, data analytics, and stakeholder value creation through continual improvement and innovation. With the increased levels of uncertainty on energy security and the volatile climate change experienced, the SAIEE KZN centre is committed to sharing future solutions to build and improve resilient and sustainable infrastructure.

It was an honour to have the newly appointed SAIEE President, Mr Prince Moyo, visit the centre during the same week and be part of the breakfast session. As a keynote speaker, his main presentation on Analytics and Decision-Making in Business tied in nicely with the central theme of our discussion.

After the morning breakfast discussion, a delegation, accompanied by Mr Moyo and Mr Shepherd Nkosi, Chairman of the SAIEE KZN Centre, enjoyed a site visit to the University of KwaZulu-Natal. The focus of the discussion was to encourage students to participate in the SAIEE and join their local SAIEE Student Chapter. Both the students and Senior Lecturers enjoyed the visit and are all fired up with plans on how they can make a difference in our industry. wn

From left: Mokwape Lekganyane, KZN Centre; Prince Moyo, SAIEE President and Krystle Annamalai, KZN Centre.

Embrace your future with the Sasol Bursary Programme

Sasol, the employer of choice in the chemical and energy sector (as voted for by graduates in the SAGEA employer of the choice survey), has announced applications for its corporate bursary programme are now open for the 2023 academic year.

High-performing mathematics and science learners currently in Grade 12 are invited to apply for an all-inclusive bursary to study engineering and science degrees at approved South African universities.

Sasol's bursary programme, which has run for more than three decades, covers bursars' tuition fees, accommodation, meals, textbooks and pocket money. Bursars receive allowances for study tools such as laptops and calculators. The bursary will also provide psycho-social support to enable learners to complete their academic studies.
Sasol bursars also have the opportunity to do paid vacation work and be part of the Sasol Development Programmes when they complete their studies.

Education is one of the critical pillars in Sasol's social investment strategy, emphasising helping to develop a science, technology, engineering and mathematics (STEM) skills base for the future and giving talented, ambitious people from all backgrounds opportunities to succeed. For the 2022 academic year, Sasol will fund 275 bursars.

Sasol is looking for learners who want to study towards a B Eng or BSc Eng in various engineering disciplines, BSc in Chemistry or learners interested in Mining Survey at a university of technology.

Applicants need to obtain 70% for Maths, 70% for Science, and 60% for English to be considered for an undergraduate bursary. Candidates who are either completing or have completed a degree and wish to pursue a Master's or Doctorate study in Science or chemical engineering are also eligible to apply for a postgraduate bursary.

"At Sasol, education and skills development are key social investment areas. We are committed to supporting learners' tertiary education and giving them a platform to launch a successful career and future in STEM. This year we are also particularly excited to welcome applicants in the Green Hydrogen space," said Monica Luwes, Manager of Graduate Centre at Sasol Corporate Bursary Services.

"Sasol needs to invest in today's talent for a prosperous tomorrow, and we're excited to help bright young South Africans the opportunity to harness their potential and shape a high-performing, world-class workforce. Your future is our future with Sasol bursaries". wn

Fluke's 1586A Super-DAQ Precision Temperature Scanner delivers best-in-class accuracy

COMTEST is offering the Fluke 1586A Super-DAQ Precision Temperature Scanner. With up to 40 analogue input channels and scan rates as fast as ten channels per second, the Super-DAQ is ideal for applications such as thermal mapping, process sensor calibration, quality control testing, lifecycle testing, process monitoring and environmental testing that are common in various industries including pharmaceutical, biotechnology, food processing, aerospace, and automotive.

With the flexibility of both internal and external input modules, the 1586A is designed for use both on the factory floor where channel count as scan speeds are necessary and in the calibration laboratory where accuracy and quick input connections are required.

The Super-DAQ has a colour display with channels that can simultaneously chart up to four channels. It features four modes of operation (scan, monitor, measure and digital multimeter) and alarms that indicate when a channel measurement exceeds an assigned high or low limit.

It has 20 MB of onboard memory for storing data and configuring files, a USB port to collect and store files to a USB drive and a LAN interface for easy connection to PCs and networks. It also includes a dedicated RS-232 interface to control Fluke Calibration Drywells or temperature baths for automated tests. wn

INDUSTRY AFFAIRS

SAPVIA appoints new CEO

The South African Photovoltaic Industry Association (SAPVIA) is stepping into the next decade of solar with a new CEO at the helm.

SAPVIA has appointed the internationally recognised thought leader, Dr Rethabile Melamu, as CEO, effective from May 2022.

A Chemical and Environmental Engineer by training, Melamu has become renowned for her international expertise in the green economy and energy sectors. She has leveraged both the theoretical and practical to harness innovative smart technologies to mitigate the impact of climate change in society, with a dedicated focus on African sustainable development.

Melamu also brings on-the-ground experience developing sub-national energy, green economy and public sector strategies and policies from inception to implementation.

Recognised most recently as one of the "Women Who Are Changing South Africa in the Public Sector", Dr Melamu's private and public sector technical and strategic leadership experience is sure to be an asset to SAPVIA as the Association charts a forward path to continue growing the solar PV sector's role in South Africa's energy future, in collaboration with government, the private sector and other stakeholders.

"As we celebrate a decade of solar in South Africa, it is fitting that we have a driven, experienced and powerful advocate for renewable energy at the helm of the Association. Dr Melamu comes to SAPVIA with an outstanding track record of delivery. She will lead the organisation into a new era of growth, focussing our strategic direction and ensuring that our members capitalise on the local and regional solar markets."

"Dr Melamu's experience and insight will ensure that we take SAPVIA and solar PV in South Africa to the next level, developing a culture of thought leadership, leveraging credible market intelligence and curating a best practice solar PV value chain," said Wido Schabel, SAPVIA Chair.

Dr Melamu was most recently general manager of Green Economy at The Innovation Hub. She managed a portfolio of 40 green economy start-ups that develop and commercialise clean-tech solutions and technologies that contribute to climate change mitigation and adaptation and create much-needed employment opportunities.

She was also Acting Chief Director: Sector and Industry Development at the Gauteng Department of Economic Development. She led the development of 11 economic sector strategies to ensure that the province was transformed, modernised and re-industrialised.

During her time at the Gauteng Department of Economic Development, Melamu also spearheaded engagement with private and public sectors, locally and internationally, to stimulate the growth of the Green Economy in the Gauteng province.

"I am delighted to take on the role of CEO, and I have no doubt that unlocking largely untapped renewable energy capacity can catalyse the country's sustainable development imperatives, invigorate industrial activity, and deliver meaningful socio-economic status value to its citizens," said Dr Melamu.

Dr Rethabile Melamu
CEO, SAPVIA

"As a trusted partner to government, I foresee SAPVIA and key stakeholders increasingly contributing towards creating conducive business and regulatory environments that will unlock market opportunities along the solar PV value chain for the benefit of SAPVIA's members and the broader sector."

SAPVIA is a member-led organisation formed to grow the solar PV sector's role in powering South Africa's future. The Association advocates engagement and influence on behalf of members to harness the power of solar PV and capitalise on the opportunities it offers companies, individuals and the broader South African economy. wn

UKZN Inaugurates Dr Reuel Khoza as Chancellor

From left: Chancellor Dr Reuel Khoza and UKZN's Chair of Council, Dr Leticia Moja.

The University of KwaZulu-Natal inaugurated Dr Reuel Khoza as its fourth Chancellor at a ceremony attended by the University Community. On Wednesday, 4th May 2022, the inauguration took place at UKZN's Westville Campus.

A Distinguished thinker, businessman, President of the Institute of Directors, Africanist, public speaker, and change agent at the forefront of black economic empowerment, Dr Reuel J. Khoza is both a practitioner and theorist in African leadership. As President of the Institute of Directors (IoD), he co-authored King Reports II, III and IV on Corporate Governance. He has been hailed as a role model of leadership in corporate life.

Dr Reuel Khoza is currently Chairman and major shareholder of Aka Capital (Pty) Limited, an investment holding and private equity company with investments in various industries. He was the first Black Chairman of Eskom Holdings. He later chaired the Public Investment Corporation Ltd (PIC), Nedbank Group Limited, Corobrik (Pty) Limited, Globeleq (an African continental investor in the energy sector focusing on renewables; funded by the Commonwealth Development Corporation [CDC] and the Norwegian Fund). He has been a director of several companies in which Aka Capital was invested, including Nampak, Old Mutual plc, Protea Hospitality Holdings, and Sasol Oil. He was also director of Standard Bank Group and Liberty Life Group.

Reuel's qualifications include BA Honours (Psychology) from the University of the North, now the University of Limpopo, a MA Marketing Management degree from the University of Lancaster in the United Kingdom, an Engineering Doctorate (Business) from the University of Warwick in the United Kingdom, a Programme for Management Development (PMD) certificate from Harvard Business School in the USA, and International Programme for Board Members (IPBM) from IMD, Lausanne in Switzerland and a Doctorate of Laws Honoris Causa from Rhodes University, a D Econ Honoris Causa from the University of Free State and a Doctor of Laws Honoris Causa, from the University of Warwick in January 2020.

He is a former Chancellor of the University of Limpopo (2007 – 2017) and Medunsa (2007 – 2012). As Chancellor of the University of Limpopo, he succeeded former president Nelson Mandela at his alma mater; and was pivotal in raising funds for the establishment of the Chair of Audit & Accounting.

Dr Khoza is currently Chairman of Assupol Holdings Ltd and Assupol Insurance Company, and he was recently (2021) appointed Chairman of Discovery Bank and Discovery Bank Holdings.

He is a Fellow and President of the Institute of Directors in Southern Africa, a former member of the Presidential Economic Advisory Panel (under President Thabo Mbeki), and a former member of the Honorary International Investment Council of the President of Nigeria. Reuel serves as a member of the King Committee on Corporate Governance in South Africa; in 2002, he chaired the section that dealt with triple bottom line reporting and, in 2008, convened its task group on integrated sustainability reporting. As a Chartered Director SA, he deputised Mervyn King in King III and King IV. He is also a founding member, past director and patron of the Black Management Forum (BMF), former council member of the South African Institute of Management and a Programme Pioneer of "Nelson Mandela - The Champion Within". wn

Local HVAC Expert Works to Global Rail Standards

While Booyco Engineering has been designing HVAC systems for South Africa's rail industry for over three decades, it has also been serving the world's largest rail players for more than 15 years by meeting their exacting standards including design, development, qualification and documentation.

"Having developed HVAC systems for the defence and mining sector, we understand the requirements for designing and manufacturing products for harsh operating conditions," says Grant Miller, executive director at Booyco Engineering. "Our customised HVAC solutions for the local rail sector were based on our proven expertise."

About 15 years ago, the company raised the bar even further working with the large rail multi-nationals based in Europe, the US and China. Its local office of engineers and designers began aligning its engineering design and development processes with international rail industry standards.

"When South Africa's rail utility started to move towards a more standards-driven approach, we ensured we were up to speed with all the standards and specifications that the world's leading players required," says Miller. "This meant that we were already familiar with the way of working required to meet the demanding standards specified by multi-national rail companies."

This includes conducting extensive vibration and shock testing, airborne and structure borne noise testing, electromagnetic compatibility (EMC) testing, and high and low temperature and humidity cycling testing specifically to the standards of the rail sector.

To fully leverage its expertise, Booyco Engineering's in-house resources include over R8 million worth of specialised Computational Fluid Dynamics (CFD) and Finite Element Analysis (FEA) software for modelling factors such as the strength of components and structure-borne vibration.

"For instance, these tools allow us to demonstrate to rail companies that our HVAC systems will not transmit vibrations, which could create resonance in the train's structure," he says. "Our digital design verification using CFD and FEA allows us to ensure that the physical tests conducted are more or less a formality, saving both time and money."

Among the global rail standards against which Booyco Engineering has qualified its HVAC products are EN14750 thermal comfort in urban and suburban rolling stock, EN14813 thermal comfort in driving cabs, EN13129 thermal comfort in main line rolling stock, EN61373 for shock and vibration tests, EN15085 for welding qualification, EN50155 for the electronic equipment qualification and EN50121 for EMC compliance testing, all of which are standards developed specifically for the rail industry.

Once the big global players could see the company's level of professionalism and conformity with the highest standards, it was also asked to design a cooling tower for an electric locomotive. To date, it is the only South African firm which has successfully designed and

Booyco Engineering's HVAC solutions have matched the demands of leading international rail industry players.

manufactured this equipment locally, adding significantly to the railway's South African local content targets.

"Stepping down and converting the catenary voltage in a locomotive generates considerable heat of up to 400 kW," he says. "Our cooling tower design is capable of effectively ejecting that heat in a +50°C ambient through the radiators at an airflow rate of 10 cubic metres per second."

He highlights that the cooling tower order was another important indicator of the company's extensive local design and manufacturing capacity, placing it in a strong position to serve the country's needs while meeting global industry standards. wn

Booyco Engineering's local manufacturing facility is aligned with global best practice and products meet compliance standards for the rail sector.

Dekra Institute of Learning offers new hygiene & environmental solutions

A dynamic new partnership with LenExcCo allows the Dekra Institute of Learning (IOL) to offer occupational health-related hygiene and environmental surveys to clients across all industries, including processing and manufacturing. The importance of these surveys is underscored by the fact that employers are required by law to conduct these to protect employees' well-being.

Christopher Mörsner, Head of the Training Division at Dekra IOL, says: "Dekra IOL is part of a 97-year-old international company, which in line with its operational ethos, exists to be 'the global partner for a safer world.'

Therefore, monitoring and advising on quality and safety considerations play a vital role in this arena. The new arrangement with LenExCo enables us to offer these essential surveys, which assist with the long-term protection of workers - and is critically important for their well-being in the workplace."

Mörsner notes that it is the employer's responsibility to consider employees' safety and well-being at work. In the longer term, this also positively affects their productivity.

"Over time, factors and situations that are not managed correctly can have a lasting effect on workers' health," he explains. "Conversely, however, being proactive and managing the workplace environment correctly tends to positively affect employees, which can ultimately improve productivity and hence the employer's bottom line.

To give a relatively simple example: ventilation surveys measure whether or not there are adequate airflow and oxygen levels in the workplace. When the airflow is not adequate, a lack of oxygen will make people feel tired and lethargic, and the resulting fatigue will lower productivity."

Mörsner clarifies that the occupational health-related hygiene and environmental surveys Dekra IOL is now able to offer to include the following: noise surveys, which are due annually according to the Occupational Health and Safety Act in SA; dust suppression surveys; air quality surveys, which involve monitoring dust and / hazardous chemicals, pollutants or contaminants in the air which workers may be exposed to; luminance testing, which analyses levels of lighting in the workplace, both internally and externally; ventilation surveys; occupational hygiene surveys, for example of kitchens, general housekeeping, the physical footprint or layout of the facility, medical facilities such as first aid assistance and so on; and ergonomics surveys.

"We are very pleased to provide this

new pivotal new offering in partnership with LenExCo," he says. "Dekra is a well-known name within the local health and safety sector, and this new relationship allows us to close the health and safety loop in our offerings. It is also consistent with our ethos, whereby we believe that each of our offerings should support the next one. It adds a new solution to Dekra IOL's overall strategy and market offering by allowing us to provide our existing clients with a one-stop, holistic health and safety training service.
Furthermore, because legislation requires these occupational health-related hygienes and environmental surveys across all industries - as per the Occupational Health and Safety Act - we can also anticipate opening new business opportunities. To this end, I am pleased to report that we are already servicing some new clients with this environmental survey offering."

Lené Hugo, Managing Director of LenExCo, adds: "We pride ourselves on the value of our offerings and are confident that Dekra will be proud to be associated with us. Our company motto is service excellence, and we offer world-class service and exceptional reporting. I believe that our reports are a true value-add for the industry, as they focus on the relevant details and include discussion points and mitigating actions to allow the client to achieve the required compliance.

Every report sent out has our signature on it, which indicates that our work has been completed to the highest standard and meticulously checked. I believe that joining hands with Dekra IOL will open doors for both parties by expanding our joint client bases and assisting LenExCo to extend our geographical footprint."

"This is a hugely exciting new stage for Dekra IOL and a logical extension of our existing offering. I wish LenExCo all the best with our new joint venture. I look forward to working with them and am confident that their experience, integrity and expertise will enhance our offering to our clients from now on," Mörsner concludes. wn

Africa's largest data centre obtains internationally accredited certifications

Africa Data Centres has strengthened the integrity of its day to day running by acquiring ISO certifications through the internationally recognised authority in ISO certification, the British Standards Institution South Africa (BSI).

Through the BSI's Integrated Management System (IMS), Africa Data Centres could implement the certifications seamlessly. Following the IMS route, more applicable certification was implemented while retaining the return on investment and enabling the company to remain up to date with its accreditation requirements.

"When a company starts the journey to obtain ISO certification, it's quite scattered, and you realise how expensive the process is. By utilising BSI's IMS approach, we could make a 35% saving on the entire process," explains Hendrik Crous, the quality, accreditation and resilience manager at Africa Data Centres.

"ISO standards are integrated, meaning that one builds upon the other. As Africa Data Centres, we were able to integrate the certifications that there's a single body that can manage and control them, which saves on resources and external and internal audits," adds Hendrik.

BSI – THE PREFERRED CHOICE

When Africa Data Centres sought the authority to acquire certification, it made sense that they chose BSI to accompany them on their journey to certification. Apart from their vast experience of helping businesses improve and maintain high standards for over 100 years, their seamless IMS approach, cost-saving, and global renown won Africa Data Centres.

Hendrik further adds that the foundation of all the ISO standards is the quality management standard ISO 9001. BSI's integrated certification route allowed the company to obtain the other relevant ISO certifications, namely, ISO/IEC 27001, which deals with information security management and forms the core part of the business as they are entrusted with highly sensitive data from their clients. Data centres such as Africa Data Centres have legislative and regulatory requirements they need to comply with.

They also obtained ISO 14001, which pertains to environmental management and helps the company's day to day operations be more sustainable. ISO 45001 ensures that the company is proactive in occupational health and safety, demonstrating a commitment to providing a safe, healthy and sustainable work environment.

Working during a global pandemic means that many industries were disrupted. However, ISO 22301, which deals with business continuity, ensured that all of Africa Data Centres' contingency plans remained intact. The company was able to remain productive despite the drastic changes happening globally.

Africa Data Centres offers scalable and secure colocation services to support

The team at Africa Data Centres accepts their BSI stamp of approval. Pictured from left to right are: Dawn Simpson, business process coordinator, Stefan Rademeyer, HSE Construction specialist, Henk Gerber, business process manager, Sewes Erasmus, QHSE executive, Dawn Abrahams, executive assistant, Robyn Eckert, governance and enterprise risk manager and Vusumuzi Dladla, health, safety and environment officer.

data, applications and backend systems to meet all current and future business needs. They have locations across the continent's major regional business and trade hubs. These locations are rapidly emerging as epicentres for public and private cloud hosting, attracting multinationals and the most significant African enterprises.

"Put simply; excellence is in our DNA. From the top-class service from our team of experts to the secure and reliable data centres, we take pride in our business and want the best for our customers too. This perfectly resonates with our standards." says Hendrik.

ISO accreditation enhances business

Obtaining the certification has opened gateways for new business opportunities for Africa Data Centres. These business opportunities have created savings in the aspects of collective implementations. Each ISO enhances, amongst other things: productivity, and continual improvement, helps the business adopt a more proactive approach, increases sustainability, encourages innovation and ensures quality and service excellence are maintained.

"Being certified has also helped us grow our sales pipeline, especially in the financial services industry and cloud sector, where certifications are critical for their data centre site selection criteria," adds Hendrik.

Like many organisations, Africa Data Centres has had to adapt to working under the constraints of a global pandemic, which has increased remote work for many. This increased need has opened the door for Africa Data Centres as a carrier-neutral colocation data centre and its parent company Cassava Technologies, which provides fibre broadband networks, cloud and cybersecurity, digital platforms, renewable energy, and fintech solutions. ISO certifications have ensured that, as a data centre, Africa Data Centres assures their clients that their organisation offers a safe and dependable environment. wn

Positive exhibitor commitment as Africa's largest OHS expo returns to Gallagher Convention Centre

The excitement is mounting behind the scenes as the confirmed exhibitors for the continent's leading occupational health and safety (OHS) show continue with their preparations after a two-year gap. Specialised Exhibitions, the largest trade show organiser in Southern Africa, announced earlier this year that A-OSH Expo was confirmed to go ahead in 2022.

The expo will take place over three days, from 31 May to 02 June 2022, at Gallagher Convention Centre in Johannesburg. It is co-located with Securex South Africa and Facilities Management Expo, together with the exciting addition of Firexpo to the Securex show. The 'one roof, four industries' together present a 360° view of the built environment.

Securex South Africa presents the latest technology and information in the security sector for both physical and cyber security, while Firexpo covers fire safety. Facilities Management Expo brings together all aspects of products and services associated with property and building management and maintenance.

Mark Anderson, portfolio director at Specialised Exhibitions, explains: "We are celebrating more than a decade of A-OSH Expo and will once again focus on all things occupational health and safety-related. The exhibitor interest has been high, showing that key players in the OHS industry are keen to re-embrace the opportunities presented by the face-to-face interaction that trade shows offer.

"We have been very pleased to welcome back many organisations and companies who have been part of A-OSH Expo previously. We look forward to welcoming additional new exhibitors who are keen to take their place at Africa's biggest OHS trade show for the first time."

Anderson confirms that Dromex, a significant company supplying technology solutions for personal protective equipment (PPE), is again the platinum sponsor. In contrast, BBF Safety Group, an integrated workplace safety solutions provider, has stepped forward for a repeat performance as the show's gold sponsor.

The South African Institute of Occupational Safety and Health (Saiosh) is one of the A-OSH Expo silver sponsors. Saiosh is recognised as the professional body to register occupational health and safety professionals in South Africa. It will once again be offering its highly-

regarded and free-to-attend seminar theatre.

In addition, over the first two days of the A-OSH Expo, on 31 May and 01 June, Saiosh will be hosting its 10th Annual International Health and Safety Conference (a paid-for event) in parallel, in the Main Auditorium at Gallagher Convention Centre.

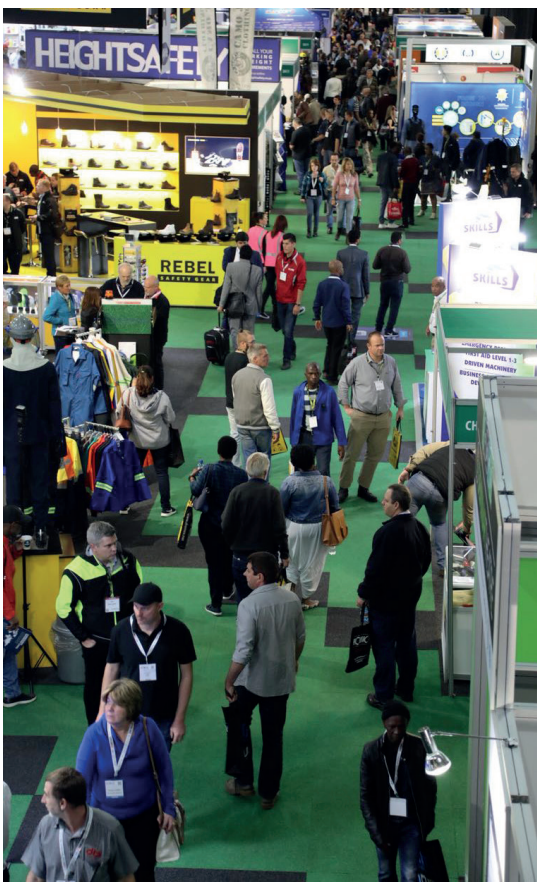
"We are so pleased to welcome back these 'old friends in their familiar sponsorship roles," says Anderson, "and we also extend a warm hand to Pinnacle Welding and Safety as a silver sponsor."

He clarifies that A-OSH Expo's exhibitor groupings to date include - but are not limited to - tried and trusted suppliers of all PPE, cleaning and industrial supplies; protective hearing systems; working at heights; information and technology related to alcohol and drug safety testing; dealing with dangerous snakes in the work environment, and consulting services for workforce management systems.

"Specialised Exhibitions has demonstrated previously under the new Covid-19 regulations that it is still possible to hold organised gatherings in a controlled, safe way. We're expecting to see thousands of visitors attending the free-of-charge events over the three days, with the four-industries-under-one-roof experience for Securex South Africa, A-OSH Expo, Facilities Management Expo and Firexpo together offering visitors exceptional networking opportunities and key learning experiences.

"There is still some space available for those organisations wishing to exhibit, thereby boosting their brand awareness and engaging directly with potential clients. We are very excited to be back in 2022 and, together with our confirmed exhibitors so far, are looking forward to an excellent show!" concludes Anderson.

For more information, visit www.aosh.co.za. wn



Cutting a great deal

FIRST CUT ANNOUNCES NEW DEVELOPMENTS AND PRODUCTS WITH MESSER CUTTING SYSTEMS

First Cut, a leading South African provider of cutting, welding and grinding consumables and equipment, recently hosted a visit from the President and CEO Global of German company Messer Cutting Systems, John Emholz, to consolidate their existing relationship and discuss strategic new possibilities.

In 2019 First Cut concluded an agreement with Messer Cutting Systems, a global supplier of cutting solutions for the metalworking industry, to take over the existing South African distribution agency.

Emholz was joined by Martin Zeller, Division Manager Sales and Axel Vogelsang, Area Sales Manager Oxyfuel Business Unit, who is also the main point of contact for First Cut and their customers regarding Oxyfuel sales and service.

SHARING OF KNOWLEDGE

Emholz explains: "The focus of this visit was mainly at a strategic level: to understand how to bring in our cutting systems expertise and look at opportunities that we believed could be leveraged, which includes discussing market leads with First Cut for both the oxyfuel as well as the equipment side of our business.

We believe that we have a viable opportunity to leverage some of the South African market developments globally. We have a solid commitment to this market, and indeed this visit has clarified and strengthened our understanding of the significant long-term market potential in the South African market."

Andrew Poole, Managing Director of First Cut, adds: "Messer Cutting System's participation in our local distribution and sales strategy development has really been demonstrated by John - as their President and global CEO - visiting in person.

This shows an invaluable and highly-appreciated long-term commitment on their part. Messer Cutting Systems is a large, global organisation which has given us great flexibility in the local distribution of their products. They have also been willing to share their expert technology and knowledge. We have sincerely appreciated the cooperation and openness with which they have approached their agreement with us and our business. Having held joint discussions on positioning ourselves in the South African market, we have some inspiring new directions unfolding. In this regard, our safety offering has been significant."

RELATIONSHIPS AND SAFETY ARE KEY

Safety is of paramount importance in First Cut's key target cutting and welding market sectors. Its recent merger of interests with respected industry stalwart Gas Safety International (GSI)

reflects this. GSI provides certified gas safety training and quality gas equipment to various sectors to ensure a safe and efficient working environment.

This relationship has strengthened First Cut's service offering, particularly the highly-respected training experience and expertise offered by GSI's Managing Director Peter Rohlssen concerning gas safety training, consulting and auditing.

"This holistic safety offering - and the passion and experience demonstrated by First Cut and GSI - is very attractive," observes Zeller. "This immediately inspired us upon our arrival - and it has only added to the overall relationship of trust which Messer Cutting Systems and First Cut share."

Another fundamental First Cut relationship involves its agreement with the Bolt and Engineering Distributors (BED.) Group, whereby First Cut is a primary distributor to the fabrication and other sectors; while BED. focuses on the mining industry, where they are well-established.

"We truly appreciate these initiatives that First Cut has engaged in - and how they work to strengthen our products' overall market offering and distribution in South Africa," Emholz enthuses.

COLLABORATIVE PRODUCT DEVELOPMENT

He explains: "GSI's safety knowledge - together with First Cut and Messer Cutting System's expertise - has resulted in the development of a trio of new products.

We are delighted to play our part in this collaboration, which will be rolled out globally, yet with a 'proudly South African' flavour. This is indeed an illustration of the seriousness with which both First Cut and Messer Cutting Systems have approached this relationship."

Zeller adds: "We are very enthusiastic about the features and potential uptake of these new products in the market. This demonstrates that First Cut and BED. are truly value-adding partners, helping us find solutions for the mining and industrial sectors."

"We are very excited about developing these new products for the mining and industrial sector," notes Poole. "This is a key development for Messer Cutting Systems and First Cut: one which speaks to connection, cohesion and deep mutual trust. We are honoured to play our part in developing innovative new solutions for the industry."

"Having seen the opportunities here in South Africa, Messer Cutting Systems is very keen to promote our footprint and traction accordingly. Furthermore, the excellent, value-adding collaboration between Messer, First Cut and its partners is also a significant opportunity for us to learn from the local market.

Additionally, the global distribution of the three new products we have jointly developed will further strengthen our position as a leading international welding equipment and consumables supplier of choice," concludes Emholz. wn

How renewable energy helps keep the lights on

While the debate about South Africa's power supply rages on, renewable energy is making strides to support the national grid. According to Eskom Transmission's load forecast data over the last two years, the country's daily peak load sits at around 34 GW. The challenge is to maintain grid stability and provide for the country's energy needs.

Asante Phiri, Head of Operations and Maintenance: Southern Africa, at Enel Green Power South Africa (EGP RSA), one of South Africa's primary independent power producers (IPPs), outlines how renewable energy works with the national grid and how it is being used to help meet the country's current energy demand.

As of late January this year, the Renewable Energy Independent Power Producer Programme (REIPPP) has 5 901 MW of renewable energy connected to the grid. The majority of this, approximately 3 163 MW, is wind power, followed by solar, at 2 212 MW, and the remainder is 500 MW of concentrated solar power (CSP). These figures are expected to rise with upcoming commercial and industrial projects.

These new commercial and industrial projects are partly driven by President Ramaphosa's recent announcement that projects under 100 MW do not require a generation licence. This paves the way for companies to take on projects of this nature without going through the process of applying for a generation licence.

Renewables supporting the national grid

Providing support to the national grid is not a simple operation. The fundamental difference between renewable and non-renewable energy is how electricity is generated. In a traditional thermal plant, coal is burned to create steam. Steam drives a turbine, which drives the generator.

With renewable energy, another source is used to drive the generator, for example, wind. Solar panels work slightly differently, but electricity is still produced, and the electrons flow throughout the grid and become indistinguishable from each other.

Renewable energy does face one challenge that it needs to overcome in providing power. As there is no control over the sun and the wind, access to those resources is lost if the sun doesn't shine and the wind doesn't blow. So, there's variability in terms of the power supply. This makes it challenging for the person controlling the national grid because they need a certain level of stability to maintain the integrity of the grid. However, if battery technology is integrated into the system, surplus supply can be stored and used when needed, i.e. in times of low wind or solar resources.

To control the overall dynamics of the grid, the traditional assets in the system work hand in hand with the renewable energy source. When the sun is shining and the wind is blowing, Eskom can lower the output of their generators. This

will allow the renewable energy plants to generate, and when the renewable energy production is low, Eskom generators can fill in the gap.

This is a very technical process and is run by highly skilled personnel because Eskom needs to maintain the integrity of the grid at all times. If imbalances arise in the grid, it could cascade to a point where a blackout occurs in a region or even in the country, and when this happens, it's a complex process to get the grid running again.

Global warming and renewable energy

Sectors that consume the most energy are generally mining, material beneficiation and materials manufacturing. Due to global warming, many countries and companies within those countries have committed to reducing their carbon footprint, and countries have signed the international treaty on climate change, namely the Paris Agreement.

Many investors are also keen to know the environmental and social governance (ESG) standing of the projects or companies they invest in – how these companies are tackling issues such as climate change. This is where renewable energy fits in because it allows companies and countries to rise to the challenge of meeting the requirements of the Paris Agreement and the requirements of the investors by allowing them to use clean and sustainable energy.

CAN SA BE POWERED SOLELY BY RENEWABLES?

With advances in technology and the resources we have in the country, it is envisioned that there could be quite a high contribution from renewable energy; however, Integrated Resource Plan (IRP) does make provision for other forms of technology.

Battery technology is developing fast, which is exciting; however, South Africa has a way to go before it can be solely powered by renewable energy.

If a country has good hydro resources (hydro dams), it is easier to have a fully renewable power system. And if there is storage in the system, like many batteries, are built into the system, then powering the country solely with renewables is theoretically possible.

CAN THE EXISTING RENEWABLE PLANTS PROVIDE MORE POWER TO THE GRID THAN THEY ALREADY ARE?

Many renewable plants connected to the system have installed capacity that is slightly higher than what they are contracted to produce. This is to cater to the technical capabilities that the plants need to meet the requirements for keeping the grid stable and is referred to as grid code compliance.

So while some IPPs have extra power at their plants, they are not currently able to supply this to Eskom due to grid code compliance. This essentially means that most IPPs are currently providing the maximum they can technically and legally provide.

In conclusion, the energy supply is a dynamic and technically complex process, especially in a country where the circumstances are so unique. However, with advances in technology and hopefully more and more support from renewable energy suppliers such as EGP RSA, the prospect of a national grid with higher levels of renewable energy penetration is not necessarily an ambition too far off in the future. wn

Hydrogen, the new energy rush for Africa

With rapidly improving technology and decreasing costs for fuel cells, green hydrogen is becoming a more appealing fuel alternative in Africa

Green hydrogen will be one of the largest economic opportunities over the next 30 years. Driven by international actions to combat climate change, it has the potential to revolutionise numerous value chains in the energy industry and across both the mobility and manufacturing sectors. With rapidly improving technology and decreasing costs for fuel cells, green hydrogen is becoming a more appealing fuel alternative in Africa.

At the core of green hydrogen production is the availability of renewable energy that is not being utilised for its prime role as electricity supply. For Europe, the lack of spare renewable energy capacity will be a roadblock for the hydrogen economy and so the search is on for viable locations for production. Pilot projects have started in Chile and the Middle East, but the greatest opportunities lie in Africa with many European backed schemes at various stages in the planning process.

Backed by Africa's extensive renewable energy resources – the International Renewable Energy Agency estimates that renewable energy capacity in Africa could reach 310GW by 2030. The hope is that development of green hydrogen projects will not only address continent-wide energy demand, increasing energy security and contribute to domestic energy independence, but will provide an environmentally sustainable fuel alternative for years to come. The big question, however, is whether that hydrogen production will benefit the African energy transition or be shipped back to Europe.

SOUTH AFRICA'S HYDROGEN VALLEY

In South Africa, the government is attempting to match the synergies between platinum mining, renewable energy, and hydrogen production to form a hydrogen hub. Platinum is a key component in Polymer Electrolyte Membrane (PEM) electrolysis used to produce hydrogen at scale and in fuel cells themselves. The hydrogen valley will serve as an industrial cluster, bringing various hydrogen applications in the country together to form an integrated hydrogen ecosystem.

The initiative is part of the work being done to support the implementation of the National Hydrogen Society Roadmap, which was recently approved by Cabinet, as well as phase 3 of the country's Economic Reconstruction and Recovery Plan.

Speaking at the launch, the director-general of the South Africa Department for Science and Innovations, Dr Phil Mjwara, said the establishment of a hydrogen valley was an important national initiative. "The implementation of phase 3 of the Economic Reconstruction and Recovery Plan is driven by the core elements of 'reconstruct' and 'transform', and this entails building a sustainable, resilient and inclusive economy," he said. "The establishment of a South African hydrogen valley is therefore seen as an opportunity that has great potential to unlock growth, revitalise the industrial sector, and position South Africa to be an exporter of cost-effective green hydrogen to the world. Hydrogen therefore remains an integral part of our Economic Reconstruction and Recovery Plan."

South Africa's proposed hydrogen valley will start near Mokopane in Limpopo, where platinum group metals (PGMs) are mined, extending through the industrial and commercial corridor to Johannesburg and leading finally to Durban. The hydrogen valley will be used to establish, accelerate, and embed niche innovations through upscaling and replication. Hydrogen and fuel cell

technologies offer an alternative source of clean electricity, while hydrogen allows for energy to be stored and delivered in usable form.

The feasibility study, conducted by Engie, identifies nine hydrogen-related projects across the mobility, industrial and construction sectors that could be used as a springboard for the establishment of the hydrogen valley. One project will focus on converting heavy-duty diesel-powered trucks to fuel cell-powered trucks, which will support increased consumption of hydrogen in the transport sector.

The projects will also facilitate the commercialisation of publicly funded intellectual property, while contributing to the beneficiation of PGMs in targeted geographic areas. Hydrogen and fuel cell technologies offer an alternative source of clean electricity, while hydrogen allows for energy to be stored and delivered in usable form. Using hydrogen as an energy carrier could potentially reduce South Africa's dependence on fossil fuels that cause global warming, while reducing the country's reliance on imported oil.

NAMIBIA TO DEVELOP HYDROGEN HUB

In West Africa, an ambitious project to produce 300,000 tonnes of green hydrogen each year is taking shape. The Namibian Government has appointed Hyphen Hydrogen Energy to develop the country's first large-scale, vertically integrated green hydrogen project in the Tsau //Khaeb national park. The project, worth an estimated $9.4 billion, will produce either pure green hydrogen or in derivative form such as green ammonia.

"The first phase, which is expected to enter production in 2026, will see the creation of 2 GW of renewable electricity generation capacity to produce green hydrogen for conversion into green ammonia, at an estimated capital cost of $4.4 billion," Marco Raffinetti, Hyphen CEO, says. "Further expansion phases in the late 2020s will expand combined renewable generation capacity to 5 GW and 3 GW of electrolyser capacity, increasing the combined total investment to $9.4 billion."

Once fully developed, the project will provide a major boost to Namibia in terms of foreign direct investment and job creation. The $9.4 billion investment amounts to the same order of magnitude of the country's current GDP and will see 15,000 direct jobs created during the four-year construction of both phases, with a further 3,000 jobs created permanently during the operational phase. More than 90 per cent of all these jobs created are expected to be filled by Namibians. In addition to taxes, Hyphen will pay concession fees, royalties, a sovereign wealth fund contribution and an environmental levy to the government.

"The Tsau //Khaeb national park is among the top five locations in the world for low-cost hydrogen production, benefiting from a combination of co-located onshore wind and solar resources near the sea and land export routes to market," Raffinetti adds. "Namibia's world class natural resources, combined with a progressive, pro-investment and visionary government under the leadership of President Hage Geingob, has enabled the country to move with incredible speed to position itself as the leading edge of Africa's ambitions to enter the green hydrogen production space.

"This collective deep technical expertise across the entire green hydrogen value chain, combined with our financial strength and experience in developing, fundraising, and implementing infrastructure projects in Africa, will be crucial in successfully delivering a project of this magnitude and complexity." wn

Addressing Security Challenges Could Help Mozambique Amplify Gas Market Growth

Mozambique's gas resources have the potential to meet both regional and international gas demand. However, delays in the development of gas projects due to political instability in the southern African country continue to restrain market expansion.

The growth of Mozambique's gas market in 2022 and onwards will be a game-changer for Africa's hydrocarbon market. When gas production across Africa needs to ramp up to meet growing energy demand, factors such as inadequate funding in new E&P activities and diminishing production in legacy projects are challenging the ability of African hydrocarbon producing countries to expand gas output.

However, large-scale projects and investments made in Mozambique – with its 100 trillion cubic feet of reserves - can help expand Africa's gas market. They will help set the continent on a trajectory towards becoming a global energy hub, according to the African Energy Chamber's (AEC) Q1 2022 Outlook, The State of African Energy.

Supply vs demand levels between 2022-2025 suggests a sufficient Liquefied Natural Gas (LNG) supply to satisfy growing demand as new projects come online in 2022, such as the Coral Floating Liquefied Natural Gas project (FLNG) in Mozambique, states the AEC's Outlook. The Coral FLNG, comprising approximately 450 billion cubic metres of gas in the Coral South Field in Area 4 in the Rovuma Basin off the coast of Mozambique, will enable the southern African country to produce 3.4 million tons per annum (mtpa) of gas for export to Europe and Asia in 2022.

Additionally, TotalEnergies's 12.8 mtpa Mozambique LNG project and Eni and ExxonMobil's 15.2 mtpa Rovuma LNG project can potentially transform the regional gas market, positioning Mozambique as a highly competitive gas exporter. Despite both projects being delayed, progress is being made to get these developments back on track.

According to the Energy for Growth Hub, Mozambique's gas could bring in $50 billion in foreign investments and enable the government to reap $95 billion in revenues over the next 25 years with the right policies and investments in place and capital attractive political environments.

According to the United Nations Development Programme, Mozambique can also utilize its energy reserves to curb energy poverty as the percentage of its population living with no access to reliable energy continues to increase from 19.6 million in 2007 to over 21 million in 2017.

"Mozambique's gas reserves have the potential to address energy poverty across the entire southern African region by helping neighbouring countries such as Zimbabwe, Botswana, Malawi and South Africa meet gas demands.

However, political instability in the country and a lack of investment in enabling infrastructure will need to be addressed for Mozambique to become one of the top-10 global LNG exporters," stated NJ Ayuk, Executive Chairman of the AEC.

Despite having vast gas reserves, Mozambique's progress in development and monetization remains slow. This highlights a growing need for the government to create a conducive political environment that allows investors and international majors to participate in the market. In this regard, the AEC's annual investment summit, African Energy Week (AEW), which will take place in Cape Town from 18 – 21 October 2022, will discuss measures the Mozambique government can implement to fast-track the development of its gas industry.

AEW 2022 will host panel discussions and high-level meetings about the role of Mozambique's gas industry in addressing energy poverty across the African continent and how the country can set up a capital-attractive regime to boost its market.

For more information click here. wn

Importance of Power Quality

In modern times, the supply of electrical energy is crucial for everybody, including businesses, households, medical facilities, and datacentres. It isn't just availability that's important, but also getting the best quality supply to your facility. Power supply companies, power grid operators and municipal utilities have a duty to ensure the reliable and seamless operation of power grids. Damage must be prevented within their network but above all, in customer installations.

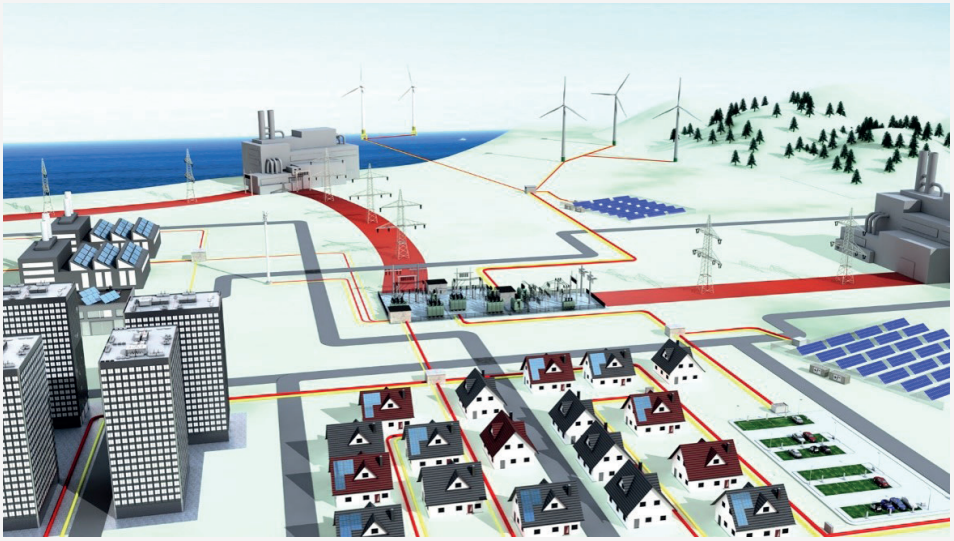


Figure 1: Representation of the Modern Electrical grid

Thus, power supply companies have a responsibility to:

- Ensure power supply is guaranteed without disruption,
- Ensure the best possible quality of power supply across their network,
- Prevent failure in their grid or damage to the customer's installations,
- And to comply to the relevant power quality standards.

This task of supplying good quality power is also becoming increasingly difficult as grids begin consisting of multiple decentralised modern renewable energy sources. The supply of power by means of solar photovoltaics or wind turbines are subject to daily and seasonal fluctuations in weather conditions which often has an impact on the grid or local supply system.

Furthermore, it also becomes difficult for the power company to supply the highest level of power quality if the load demand puts strain on the supply system i.e., inductive loads by means of large motors, etc. Fluctuating consumption can also damage supply sources and lead to problems on the consumer's side. Heavier irregular loads, for example heat pumps or charging systems for electrical vehicles, contribute to the change from typically more constant power loads.

The increased use of sensitive electronics also brings with it new requirements. Digitalisation, Industry 4.0, smart homes and the Internet of Things enlarge the proportion of electronic systems in the power grid, in commercial and industrial installations, and in the private residential sector. These electronics react especially sensitively to the slightest disruption to power quality.

Often site inspections reveal scenarios where equipment has been damaged due to poor power supply quality or where fluctuating loads led to damage at power providers' equipment.

The exact causes of such failures can only be determined if there is a clear overview of the quality in the power grid. It is therefore important to consider employing a power quality monitoring device, which could help detect failures early, lead to quick preventative action and assist in improving overall health of the electrical system.

Modern power quality measurement devices can measure various factors in the power quality field, and it is important that the device complies to the relevant South African standard, i.e., SANS 61000-4-30, for accurate reference measurements.


DEHN
YOUR TRUSTED PARTNER FOR SURGE AND LIGHTNING PROTECTION

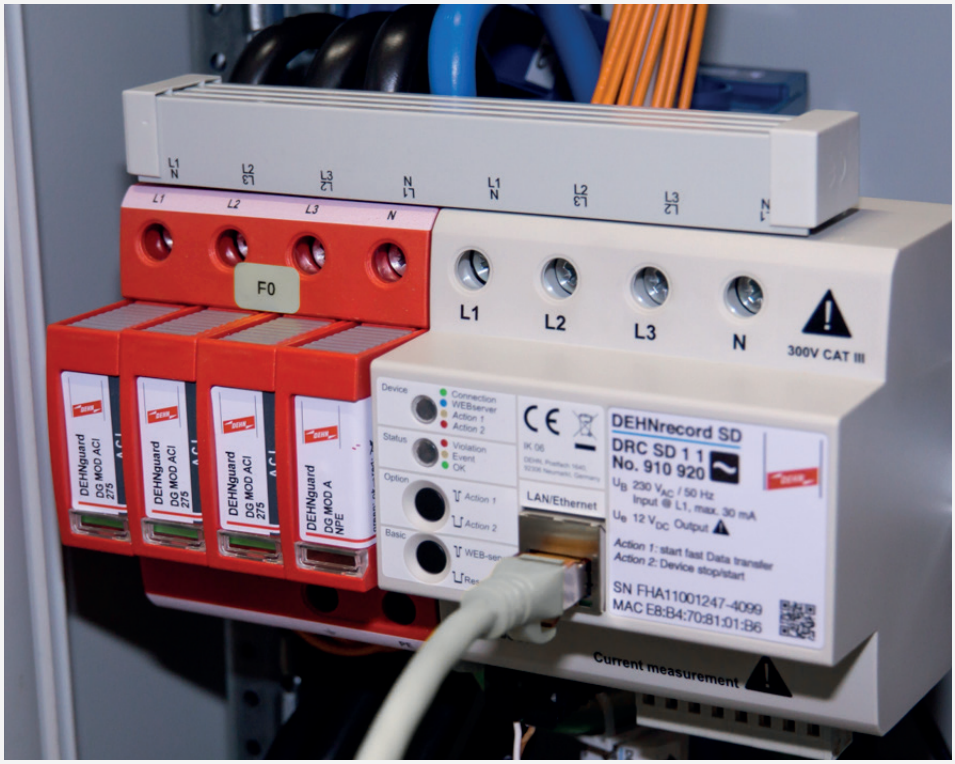


Figure 2: Example of a smart PQ Measurement Device capable of measuring Surge and Lightning Impulse

Within this standard the certification known as "Class A" is given to power quality measurement devices that are highly capable due to passing all the given requirements. This class of devices is often also required for legal and trade purposes. Typically, the following should be considered:

- Detailed amplitude values of the sine wave,
- Frequency (which should be 50Hz in South Africa),
- Flicker (a measurement that indicates flicker in light sources),
- Voltage drops or overvoltage,
- Interruptions in supply,
- Asymmetry (where sine waves are shifted),
- Harmonics, and
- Sudden voltage changes.

In recent developments, some manufacturers have gone beyond these requirements and created devices that can measure switching surges, lightning induced surges (8/20µs) and lightning impulse currents injected into the electrical system (10/350µs). This is typically done by measuring impulses on the earth cable of the electrical system and is useful for detailed root cause analysis, assisting with insurance claims when damage to the system was caused by elements outside the owner's control.

Detailed overview of power quality within an electrical system is measured by means of PQ measurement devices and can prove to be beneficial for the longevity of equipment, ensuring up-time within a facility during production and assist in keeping the power grid stable. Moreover, being able to monitor and react to power quality deviations remotely with the use of an internet connected smart PQ measurement device is convenient and reduces delays. Considering the challenges in increasingly modern grids, it becomes clear how important smart power quality monitoring is during electrical design and specification for new installations. wn

For more information visit
www.dehn-africa.com

icomm
intelligent communications

OUR SERVICES

Digitial Strategy

Traditional PR

Social Media

... CONNECTING THE DOTS

Do you have something to say about your company, but can't find the words? Introducing icomm, a dynamic PR, digital services and content creation business. We're here to help you say the right thing, to the right people, at the right time.

Here's what you need to know about us:

- A 15-year track record of brand awareness excellence
- Technical and business-focused content skills that can't be beaten
- The ability to help you deliver a consistent brand story and messaging – regardless of the platform
- A dedicated and enthusiastic PR partner with a focus on personalised service delivery

START 2022 OFF ON THE RIGHT FOOT!

Visit www.icomm-pr.co.za for more information and get in touch to qualify for your 10% SAIEE member discount!

icomm@pr.co.za | www.icomm-pr.co.za

Zest WEG E-House Solution Powers Large Platinum HIG Mill

A purpose-designed electrical house (E-House) from Zest WEG is driving one of the largest new High Intensity Grinding (HIG) mills in the southern hemisphere, which was recently installed at a platinum mine in South Africa's North West province.

The size and operational parameters of the mill place demanding requirements on the equipment in the E-House, according to Tyrone Willemse, senior proposals manager at Zest WEG. Constructed in South Africa incorporating a range of products - produced and distributed by Zest WEG, the E-House design also delivers world class standards of safety and fire protection.

"The key benefit of the prefabricated E-House concept is the time it saves the customer and the high level of quality that can be ensured through its construction and testing under ideal workshop conditions," he says. "The process is also streamlined as the complete project falls under a single provider, who takes full responsibility for delivering on-time and on-budget."

This E-House includes the HIG mill's variable speed drive (VSD) and all its associated auxiliary circuits and starters. A range of WEG transformers and motors are also part of this project. With its extensive in-house expertise, Zest WEG generates fully detailed designs for its E-Houses, using 3D computer assisted design (CAD) software.

"For this application, the E-House consists of a medium voltage (MV) room and a low voltage (LV) room," he notes. "The MV room houses the well-known WEG MVW01 VSD, with an integral oil type 12 pulse transformer manufactured locally at our transformer manufacturing facility in Wadeville."

Willemse explains that the WEG MVW01 makes use of high voltage insulated-gate bipolar transistors (IGBTs), which lower the amount of power electronics needed. This also reduces the mean time to repair (MTTR), so that operations can be quickly restored in the event of a major fault on the system.

"The WEG MVW01 powers a WEG 3.75 MW MGR eight pole 3.3 kV directly-coupled squirrel cage induction motor," says Willemse. "This motor is specially designed to be vertically mounted to meet the HIG mill's operation and maintenance requirements."

Both the motor and the VSD were designed to meet the aggressive torque requirements during some phases of the mill's operation. The combination comfortably handles the torque requirements that periodically exceed 170% for more than three minutes, giving the customer the necessary flexibility. The LV room contains the motor control centre (MCC) that feeds all the auxiliary circuits of the mill.

"Importantly, we have installed the newly arc-proof type-tested IEC 61641 WEG board, which has the best rating for personal protection," he says. "In the event of an internal arc, the MCC is fitted with an explosion duct that transfers any explosion safely out of the building."

Another aspect of the safety features is a comprehensive fire detection and suppression system that meets the customer's demanding standards. The two rooms are fitted with their own fully

The E-House solution from Zest WEG during manufacturing

The low voltage (LV) room of the E-House with the internally arc type-tested IEC 61641 MCC.

The medium voltage (MV) room houses the well-known WEG MVW01 VSD.

automated room-flooding suppression systems, which can flood the space with gas that douses electrical fires but is not dangerous to humans.

"The system can detect smoke at a very early stage, and can also check against false triggering," he says. "More than two smoke detectors must react, activating a loud bell for evacuation or cancellation, before flooding takes place."

The LV room also houses WEG CFW11 LV VSDs, which feed premium efficient WEG motors. The E-House's small power and lighting circuits are fed by one of Zest WEG's locally manufactured SANS780-compliant transformers.

The Five Biggest New Energy Trends In 2022

Today, nearly everyone accepts that to slow the damage we are doing to our planet and environment, humans must transition away from the use of fossil fuels. This has led to many science and business innovations as we search for new sustainable or renewable alternatives to coal, oil, and gas.

By Bernard Marr

Although it would be nice to think everyone wants to do their part to save the world, there are strong financial incentives too. The value of the renewable energy market is set to grow from $880 billion to nearly $2 trillion by 2030. And the growing awareness of the importance of environmental and social governance (ESG) issues means there are tremendous political incentives, too.

2022 is set to be a record year in terms of the scale at which the switchover from fossil fuels to renewable sources will occur. It's also a year in which we will see new and exotic energy sources emerge from laboratory and pilot projects and start to become a part of everyday life. So let's take a look at what is predicted to be some of the most impactful trends in the new energy sector over the next 12 months...

AI IN THE ENERGY SECTOR

As with every sector, artificial intelligence (AI) has transformative effects across energy and utilities. It is used to forecast demand and manage the distribution of resources, to ensure that power is available at the time and place needed with a minimum of waste. It often can't be stored for long periods and has to be used close to the time and location where it is generated. This is particularly important in the renewable energy industry.

The World Economic Forum predicts that AI will play an essential role in the world's transition to clean energy. These gains in efficiency will be created by more accurate forecasting of supply and demand. Additionally, a switch is taking place away from centralised models of power generation and distribution

towards decentralised models, where more power is generated by smaller, localised power grids (for example, solar farms) and coordinating the integration of these networks requires complex AI algorithms. The strategy here is to create an "intelligent coordination layer" between the power infrastructure and homes and businesses where power is consumed.

In 2021 we can expect more innovation from startups putting AI to work in novel ways; for example, Likewatt in Germany has created a service called Optiwize that calculates power consumption and carbon dioxide emissions to allow consumers to monitor the effects of their power consumption in real-time and make more educated decisions about their own energy supplies. Other companies are developing predictive maintenance technology to drive efficiency in the operations of renewable energy creation.

GREEN HYDROGEN ENERGY

Hydrogen is the most abundant material in the universe and produces close to zero greenhouse gas emissions when burnt. These are two of the qualities that make it a fascinating potential energy source. Traditionally, though, the difficulty has been that converting it into a form that can be used as fuel involves the consumption of fossil fuels and creating carbon emissions. Brown hydrogen, for example, is derived from coal, while grey hydrogen is derived from natural gas.

On the other hand, green carbon is created by a process involving electrolysis and water, and generating the required electricity from renewable sources like wind or solar power effectively makes the process carbon-free. This year, several major European energy companies, including Shell and RWE, committed to creating the first major green hydrogen pipeline from offshore wind plants in the North Sea throughout Europe. Although it won't be complete until 2035, the European Union has committed to smaller projects aiming to create 40GW of renewable power for green hydrogen generation by 2030.

This means we can expect a ramping-up of innovation and projects concerned with this fuel source throughout 2020 – one example is the world's first hydrogen-powered e-bike created by Dutch designers Studio MOM and Australian hydrogen fuel startup LAVO.

Another is the at-home electric vehicle charging solutions using hydrogen fuel created by US startup ElektrikGreen.

THE INTERNET OF ENERGY

The internet of things (IoT) is concerned with generating and distributing power. IoE is closely tied to energy decentralisation – the move towards a more sustainable power infrastructure where energy is used as closely as possible to the time and place where it is created.

This new paradigm in energy infrastructure involves a significant level of automation to manage the new technology platforms and the financial framework required by markets to facilitate energy trading and distribution.

Artificial intelligence will play a significant role here, as will other emergent technology trends such as blockchain, which will enable transparent and secure records of trades and payments.

As with IoT, IoE involves edge and cloud architecture, with sensors and scanners both processing information close to the source (where power is generated or used) and via remote data centres. This technology layer will allow utility companies to conduct real-time, data-driven decision-making and predictive maintenance to drive efficiency while also improving customer experience and satisfaction.

ADVANCED ENGINEERING IN RENEWABLES

The technology used to generate renewable energy is constantly improving, thanks to the enormous pressure to generate power more economically, efficiently, and safely.

In 2022 we will see further advances in engineering, bringing us more powerful and adaptable photovoltaic panels used for solar power generation and turbine blades used in hydro and wind power generation.

The blades created by US startup Helicoid, for example, use novel arrangements of structural fibres to create turbines that are stronger, more resistant to damage by environmental erosion and impacted less by structural fatigue. This improves their efficiency by making them less affected by downtime and in need of less frequent replacement and repair.

In solar, companies including Dutch startup Lusoco are finding new ways to engineer photovoltaic panels using different reflecting and refracting materials – including fluorescent ink - to concentrate light onto the solar cells, leading to more efficient energy harvesting.

This results in lighter, cheaper, and less energy-intensive panels to produce and install. New materials are also being developed that convert energy more effectively. These include the monocrystalline silicon ingots created by Norwegian Crystals, produced via a super low-carbon hydropower process. Improvement to engineering processes will be a strong trend driving increased efficiency and reliability throughout the renewable energy sector in 2022.

BIOENERGY

Energy derived from biomass or biofuel has the potential to generate far more of the power used by human society than it does today, and in recent years we have seen a strong trend toward attempting to unlock this potential. Thermal, chemical, and biological processes create more efficient forms of fuel from biological matter (such as wood, crops like sugarcane, or even waste materials). This includes fermentation to produce bioethanol and biodiesel.

Although the classification as renewable is somewhat controversial, the International Energy Agency predicts that bioenergy will account for 30% of renewable energy production by 2023.

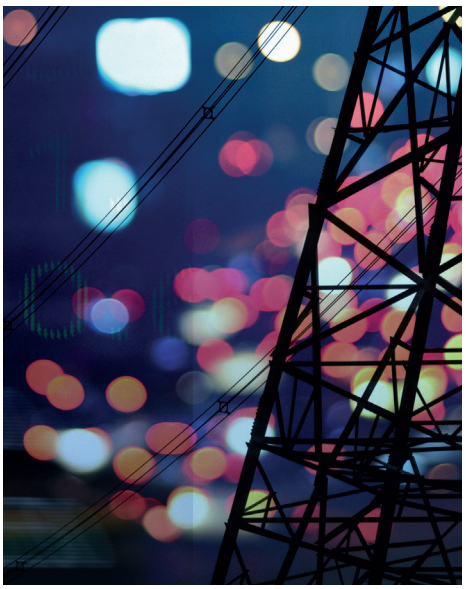
It is considered by the Intergovernmental Panel on Climate Change (IPCC) to be fundamental to plans to restrict global warming this century to 1.5°C.

2022 will see an increase in projects looking at new methods of converting biological matter into energy and practical applications for that energy.

Brewer Heineken has unveiled plans to power its production site in Phnom Penh, Cambodia, on waste rice husks produced by local farmers.

Sewage waste discharged from cargo ships will be converted into biogas fuel for use in the transport industry in a project led by the Baltic Sea Action Group in 2022.

French startup BeFC has created paper biofuel cells that convert glucose and oxygen into electricity to create new forms of non-toxic, recyclable, and eco-friendly batteries for use in low-power applications such as IoT sensors and transmitters. wn



ACTOM – OFFERING A GREENER FUTURE FOR AFRICA!

LEVEL 1 BBBEE

PROUDLY SOUTH AFRICAN

ACTOM

ACTOM (Pty) Ltd: 2 Magnet Road, Knights, 1413 | PO Box 13024, Knights, 1413
Tel: +27 (0) 11 820-5111 | Fax: +27 (0) 11 820-5044 | www.actom.co.za

2022 Renewable Energy Outlook

- NEW AVENUES ARE OPENING

In 2021, the renewable energy sector remained remarkably resilient, primarily driven by solid core fundamentals combined with a supportive policy environment. Rapid technology improvements, decreasing costs of renewable energy resources, and the increased competitiveness of battery storage have made renewables one of the most competitive energy sources in many areas.

By Jaya Nagdeo, Deloitte Research Center for Energy & Industrials

Despite suffering from supply chain constraints, increased shipping costs, and rising prices for essential commodities, capacity installations remained at an all-time high. Wind and solar capacity additions of 13.8 GW in the first eight months of 2021 were up 28% over the same period in 2020.[1]

Cities, states, and utilities continued to take action to power the transition to renewable energy, with several setting ambitious clean energy goals, increasing renewable portfolio standards, and enacting energy storage procurement mandates.

As of mid-November 2021, 48 out of 55 US large investor-owned utilities had committed to reducing carbon emissions, many by 2050 (see the Deloitte 2022 power and utilities industry outlook). Additionally, states enacted more than 70 renewable energy and climate-related policies through mid-October 2021.[2]

Renewable energy growth is poised to accelerate in 2022 as concern for climate change and support for environmental, social, and governance (ESG) considerations grow and demand for cleaner energy sources from most market segments (residential, commercial, and industrial consumers) accelerates.

At the same time, the Biden administration's vision to fully decarbonise the US economy is helping spur activity in the renewable sector that will likely drive further growth.

Provisions in the recently approved Infrastructure Investment and Jobs Act (IIJA) could promote renewable energy growth, as could the Build Back Better (BBB) Reconciliation Act, still under consideration in Congress. The following five trends are expected to move to the forefront in 2022, opening new avenues in the renewable energy growth story.

GROWING INTEREST IN NEXT-GENERATION CLEAN ENERGY TECHNOLOGIES

Activity is heating up in next-generation technologies, and renewable energy industry stakeholders are considering investments in them, which can eventually help to more confidently integrate variable renewables such as wind and solar into the electric grid. For an industry that has primarily focused on solar and wind, private investment and pilot projects combined with federal research support could help expedite the commercialisation of emerging technologies such as green hydrogen, advanced batteries, and other forms of long-duration storage.[3]

These technologies can provide zero-carbon electricity and longer-term seasonal electricity storage, ease grid congestion, stem renewable curtailment, boost reliability, and facilitate the integration of solar and wind into the grid while supporting 100% clean energy goals.

A major driving force behind the rise of green hydrogen has been the decreasing costs of renewable energy—a critical input in the production process. In 2022, as renewable energy penetration on the grid increases, green hydrogen development is also expected to grow, owing to its potential to act as long-duration and seasonal storage of fuel available on-demand to generate power.

The recently approved IIJA allocates $9.5 billion for clean hydrogen projects and proposes regional clean hydrogen hubs to expand hydrogen infrastructure.[4]

The BBB Reconciliation Act being considered in Congress includes a hydrogen tax credit,[5] and would likely encourage the technology's growth if passed. Launched recently, the US Department of Energy's (DOE) "Energy Earthshots" initiative aims to reduce the costs of green hydrogen and long-duration energy storage by 80% and 90%, respectively, by 2030.[6]

States, municipalities, and energy companies also respond to this opportunity and ramp up renewable hydrogen production for multiple use cases. Los Angeles aims to be the first green hydrogen hub to drive down the fuel's cost premium over natural gas. In May, HyDeal North America—a commercialisation platform by the Green Hydrogen Coalition to launch green hydrogen ecosystems—launched a new initiative, HyDeal LA, which aims to cut green hydrogen fuel costs to $1.50/ kg by 2030 from the current $3 to $6/kg.

As its first project, it will partner with the Los Angeles Department of Water and Power (LADWP) to convert Utah's coal-fired Intermountain Power Project into a combined-cycle gas turbine facility, burning natural gas and green hydrogen to provide power to LADWP's service territory.[7]

Interest is also high in a host of evolving mechanical and battery storage

technologies offering long-duration energy storage options and supporting the grid. The DOE's Energy Security Grand Challenge includes Pacific Northwest National Laboratory's Grid Storage Launchpad—a facility for experimenting with extended duration storage options, which can help strengthen grid resilience.[8]

The industry is also exploring new long-duration energy storage solutions to help smoothly integrate renewables into the electricity grid. In August 2021 alone, private investments of about $650 million were made in several energy storage companies exploring new technologies.[9] One such company was Form Energy, which recently unveiled a breakthrough, long-duration energy storage iron-air battery that can provide over 100 hours of energy at the cost of $20/kWh—about one-tenth the cost of the more common lithium-ion batteries in use today. It received a $240 million financing round with investors, including steel company ArcelorMittal.[10]

Solar championing new configurations

After an 85% cost decline over the past decade,[11] solar photovoltaic (PV) systems are among the most cost-competitive energy resources in the market. The solar industry will likely boost efforts to explore new configurations and business models as it flexes its competitive muscle. And 2022 could well see the industry growing solar-plus-storage buildouts, exploring floating solar PV modules, and expanding solar community projects to new markets.

Pairing storage with solar offers cost synergies, operational efficiencies, and the opportunity to reduce storage capital costs with the solar investment tax credit. We will likely see increasing demand for solar paired with energy storage for multiple use cases, including minimising curtailment risk and enabling solar to look more like baseload power.[12] If all of the large-scale battery projects planned for 2021 to 2025 become operational, the share of US battery storage co-located with solar would increase from 24% to 50%. Similarly, solar projects co-located with battery storage would increase from 3% to 14%.[13] This is well supported in a recent Deloitte survey (see "About the Deloitte survey"), where 62% of the power and utility executive respondents are either building or procuring grid-scale solar that includes storage. To develop better technologies, the DOE Grid Modernization Laboratory Consortium and three national laboratories are setting up a demo project to identify synergies between the technologies in hybrid configurations,[14] which could help develop optimised power plant designs.

A SECOND TREND IS THE EXPANSION OF COMMUNITY SOLAR PROJECTS

to new markets in the United States. Twenty-two states, plus Washington, DC, have enabling policies for community solar.[15] With more than half of US households unable to purchase rooftop solar due to lack of sufficient sun, credit access, homeownership, or other factors, these programs allow residential customers to enjoy the benefits of shared solar power. Further, this model is uniquely positioned to aid in the pandemic recovery, as it provides new employment opportunities and helps achieve energy cost savings. New York State recently announced plans to build 40 community solar projects, part of New York Power Authority's larger goal to reach 75 MW of community solar projects by 2025.[16] These projects are expected to create more than 1,250 short-and long-term jobs.[17] Newer community solar markets such as Illinois, Maine, and New Jersey are also adding capacity, expanding community projects' reach beyond historically active states such as New York and Massachusetts.[18]

Although a nascent technology, floating solar photovoltaics (FSPV), is gaining attention in the United States, several developers are exploring these projects either separately or as hybrids with hydro, which could benefit from a shared substation and transmission. In Massachusetts, BlueWave Solar is planning to build floating solar panels on ponds and reservoirs, which could help address the shortage of land for solar projects, especially greenfield sites.[19] The state also offers a compensation rate add-on of $0.03/ kWh for FSPV projects under its Solar Massachusetts Renewable Target (SMART) program.[20] Once successfully implemented, such projects could carve a new growth path for the solar energy industry.

TRANSMISSION INFRASTRUCTURE IS BECOMING A KEY PRIORITY, ESPECIALLY FOR OFFSHORE WIND

Transmission development, which is vital for connecting new, often remotely located renewable energy capacity to electricity consuming centres is expected to be an essential part of the renewable energy industry's plan in 2022. Policy and regulatory support, investments, and innovation will likely help unlock progress, often impeded by siting and permitting delays. Transmission projects, especially interregional, have remained a significant challenge for renewable growth as they face difficulty in gaining regulatory approval from every state they cross, refusal from landowners, and opposition from environmental groups. About 844 GW of proposed capacity—90% of renewables or energy storage—is stuck in transmission interconnection queues.[21] This holds especially true for offshore wind, which is poised for significant growth and must be connected to coastal infrastructure. Both are enhancing the capacity of existing lines, and building new lines could be vital in solving the transmission challenge. 76% of the power and

SAFE™ HOUSE
Suppliers you can trust

OUR GOAL IS TO ENSURE SAFE & COMPLIANT PRODUCTS IN SOUTH AFRICA

The SAFEhouse Association is a non-profit, industry organisation committed to the fight against sub-standard, unsafe electrical products and services imported and manufactured in South Africa.

PROUD MEMBERS OF THE SAFEHOUSE ASSOCIATION

ABERDARE · Crabtree · APEX · voltex · M·E·S · ARB Electrical Wholesalers · CED
eurolux · HellermannTyton · Build it · THREE-D AGENCIES · LESCO · SELECTRIX · WACO
SWAN · ECA · Stone-Stamcor · ABB · SW PRODUCTS · LivingBrands · GENTECH
THE LIGHTING WAREHOUSE · ACDC EXPRESS ALBERTON · Lumax · Shuttle · ZEBBIES · LEDVANCE · PIOLED LIGHTING
AQS LIQUID TRANSFER · AxFlow · D4 · MILNEX 587 · Switch Technique · BEKA Schréder · FLASH

For more information contact: connie.jonker@safehousesa.co.za | barry.oleary@safehousesa.co.za | **safehousesa.co.za**

utility respondents to a recent Deloitte survey are planning or depending on new transmission projects to boost renewable energy access.

Regulatory and policy support to help streamline the permitting process for interstate transmission lines can help move renewables to demand centres. The Federal Energy Regulatory Commission (FERC) in June 2021 established a task force in partnership with the National Association of Regulatory Utility Commissioners (NARUC) to address transmission barriers. In July, the agency also began the rulemaking process improves transmission planning, cost allocation, and interconnection processes for renewable energy projects.[22] Actions taken through this collaboration and rulemaking are expected to shape future transmission development.

The recently approved IIJA's Transmission Facilitation Program authorises the DOE to effectively act as an anchor tenant by owning up to 50% of the planned capacity on specific transmission projects, thus expediting their development. Additionally, FERC will be granted the authority to accelerate permits in DOE-designated transmission corridors, in some cases overruling state regulators.[23] In the case of offshore wind, the administration is streamlining the environmental review process by improving interagency coordination.

Investments will also be crucial to support transmission capacity planning and expansion. In April 2021, the DOE announced $8.25 billion in loans for efforts to expand and improve the nation's transmission grid.[24] Additionally, states are playing their part by designing new approaches for expanding the transmission network. In April, PJM Interconnection, a regional transmission organisation, launched the State Agreement Approach seeking potential solutions for the development of offshore transmission infrastructure.[25] As part of the IIJA, the Biden administration will allocate about $27 billion for investment in grid strengthening and modernisation, including transmission.[26]

Finally, different siting approaches and increasing existing line capacity are also being tested. In progress, a siting approach involving building underground high-voltage direct-current transmission lines along existing transportation corridors linking the Midcontinent Independent System Operator Corporation (MISO) with PJM Interconnection's electricity markets.[27] Once completed, this approach can become a model for new interregional transmission projects. Many utilities are also testing grid-enhancing technologies that can track power-line capacity in real-time, cost about 5% of the total relative unit cost of building new transmission, and boost existing power transfer capacity by up to 40%.[28]

SUPPLY CHAIN STRATEGIES CONTINUE TO EVOLVE

The renewable energy industry is likely to continue to evolve supply chains, as profits have suffered recently amid logistics-related cost pressures and US-China trade tensions. In 2021, the solar industry remained under pressure, and prices increased yearly for the first time in seven years due to supply shortages of components (semiconductors, modules), raw materials (polysilicon, commodities), and labour, as well as rising shipping costs.[29] For example, in May, SolarEdge faced a 100% increase in ocean freight costs from the previous year, impacting its margins.[30] Moreover, the United States seeks to avoid overreliance on a limited number of supply sources for clean energy imports, as detailed in our recent article on the renewable energy transition.[31] This, along with other trade actions, including the import ban on a critical solar panel material from a Chinese company,[32] and the risk of Section 201 and Section 301 tariff extensions, could further impact the renewable energy supply chain.[33]

In 2022, US renewable energy developers will likely continue to seek alternative suppliers, including domestic manufacturers, where available, reassess supply needs, and develop substitutes to help alleviate these pressures. Efforts to support renewable energy supply chains address the clean energy components themselves and the raw materials.

A recent executive order supports the development of an end-to-end domestic supply chain for advanced batteries and seeks to strengthen supply chains for multiple critical production materials.[34] Provisions discussed for inclusion in the BBB Reconciliation Act being considered in Congress contain additional domestic source requirements that could impact developer's supply chain strategies.[35]

In 2022, many solar installers and developers will likely also ramp up their compliance monitoring activity to adhere to the Solar Energy Industries Association's Solar Supply Chain Traceability Protocol. This set of guidelines is intended to trace the origin of solar materials, especially to prove their procurement is free of unethical labour practices.

The United States has increased domestic turbine component production with more than 500 manufacturing facilities in 40 states in the wind sector.[36] But the industry still depends on offshore manufacturers for many components. Advanced energy manufacturing tax credits are being considered in the BBB legislation before Congress to boost domestic production further.

SAIEE TRAINING ACADEMY

ONLINE & CLASSROOM

IN-HOUSE TRAINING

Does your staff need to upskill?

Are there more than 10 of your staff who need CPD credits?

If YES - contact us.

The SAIEE Training Academy offers in-house CPD training courses. We come to you!

Contact us today!

T&C's apply

SAIEE TRAINING ACADEMY

T 011 487 9047

E zanele@saiee.org.za

W www.saiee.org.za

- UPSKILL TODAY

Wind turbine manufacturers are exploring a shift to smaller and lighter permanent magnet generators that use fewer rare earth elements (REEs); gearless, REE-free designs for wind turbines; and replacing permanent magnets with high-temperature superconductors.

Additionally, developers are exploring substitute materials and different manufacturing practices for renewable energy components to reduce dependence on foreign markets. The alternative pathway for solar PV (with silicon) could be scaling up perovskite solar-cell manufacturing with existing silicon cells to reduce silicon demand and boost efficiency. In June 1366 Technologies and Hunt Perovskite Technologies merged to form CubicPV to build high-efficiency tandem solar modules with a target to deploy 2 GW by 2022.[37] In addition, manufacturers are developing low- or no-cobalt cathodes to offset the high costs of battery production and address ethical concerns around current cobalt mining.

CIRCULAR ECONOMY CRITICAL FOR THE RENEWABLE ENERGY INDUSTRY'S SUSTAINABLE GROWTH

In 2022, end-of-life (EoL) management strategies for renewable energy industry products and materials will likely capture attention as early installations approach the end of their useful life. This could help reduce waste, increase resource security, and provide additional financial value and sustainability credentials.

As solar, wind, and battery installations are expected to climb to new highs, waste generation in the renewable energy industry will likely soar and require urgent solutions. By 2030, decommissioned PV modules could total one million tons of waste,[38] and there could be 80 metric kilotons of lithium-ion batteries (LiBs) to recycle[39] in the United States. In the case of wind, about 8,000 ageing wind blades are expected to be removed in 2022 alone,[40] and the accumulated blade waste through 2050 could total about 2.2 million tons.[41] Technology, infrastructure, and processes for EoL management are continuously being assessed.

Industry stakeholders, regulators, and policymakers have started exploring solutions for extending life and increasing the performance, recovery, and reuse of products and materials. For instance, First Solar has developed in-house PV recycling capabilities in the United States,[42] and Good Sun and Recycle PV Solar LLC sell used crystalline silicon PV modules and balance of system equipment at discounted rates for secondary uses.[43]

Some states, including New Jersey and North Carolina and Washington, DC, enacted PV module recycling policies in 2020, while others, including Rhode Island, Hawaii, and California, have pending PV module recycling legislation.[44] Momentum is also building to find ways to recover material from wind blades. Last year, GE Renewable Energy announced a multiyear deal with Veolia North America for a blade recycling program that involves shredding blades at Veolia's Missouri facility and using the output as raw material for cement.[45]

Other ways to recycle old blades can include repurposing them for pedestrian bridges and playgrounds or creating products such as warehouse pallets, flooring material, or parking bollards.[46]
The case for building a circular economy for batteries involves deeper collaboration among industries and between businesses and policymakers, given battery demand in a range of applications. A secondary market for repurposed EV LiBs includes bulk energy storage system applications. However, regulations for reusing and recycling batteries are in early development, and incentives are required to attract private investors. Currently, no federal policy directly addresses decommissioning or mandates or incentivises reuse/recovery of LiBs. At the state level, North Carolina and California have policies that address reuse and EoL management options for LiBs.[47] These policies signal a growing trend to prioritise sustainable material management practices.

RENEWABLE ENERGY INDUSTRY IS READY TO BRANCH OUT

The year ahead promises new growth paths for the renewable energy industry, with some potential headwinds. The industry will likely explore new avenues against a backdrop of potentially supportive policies from an administration focused on combatting climate change.

Next-generation clean energy technologies will likely continue on a path toward commercialisation, buoyed by support from investors and DOE programs. The ability of these technologies to address multiple use cases, as they ease renewable integration, has boosted their appeal.

As the solar power industry aims to lead the energy resource competition, it will likely continue to explore new ways to create value, such as expanding the solar-plus-storage market. At the same time, state expansion of community solar policies and experiments in floating solar PV projects could mark new frontiers for solar growth in the United States.

Building new interstate transmission lines and boosting existing line capacity utilisation will be critical to bringing these renewable energy resources to energy consumers. FERC has begun to address these goals, supported by proposed rules to improve the

transmission planning process. The IIJA provides FERC with greater transmission approval authority—similar to existing rules for natural gas pipelines. This, along with investments in technologies such as dynamic line ratings, can help develop transmission infrastructure.

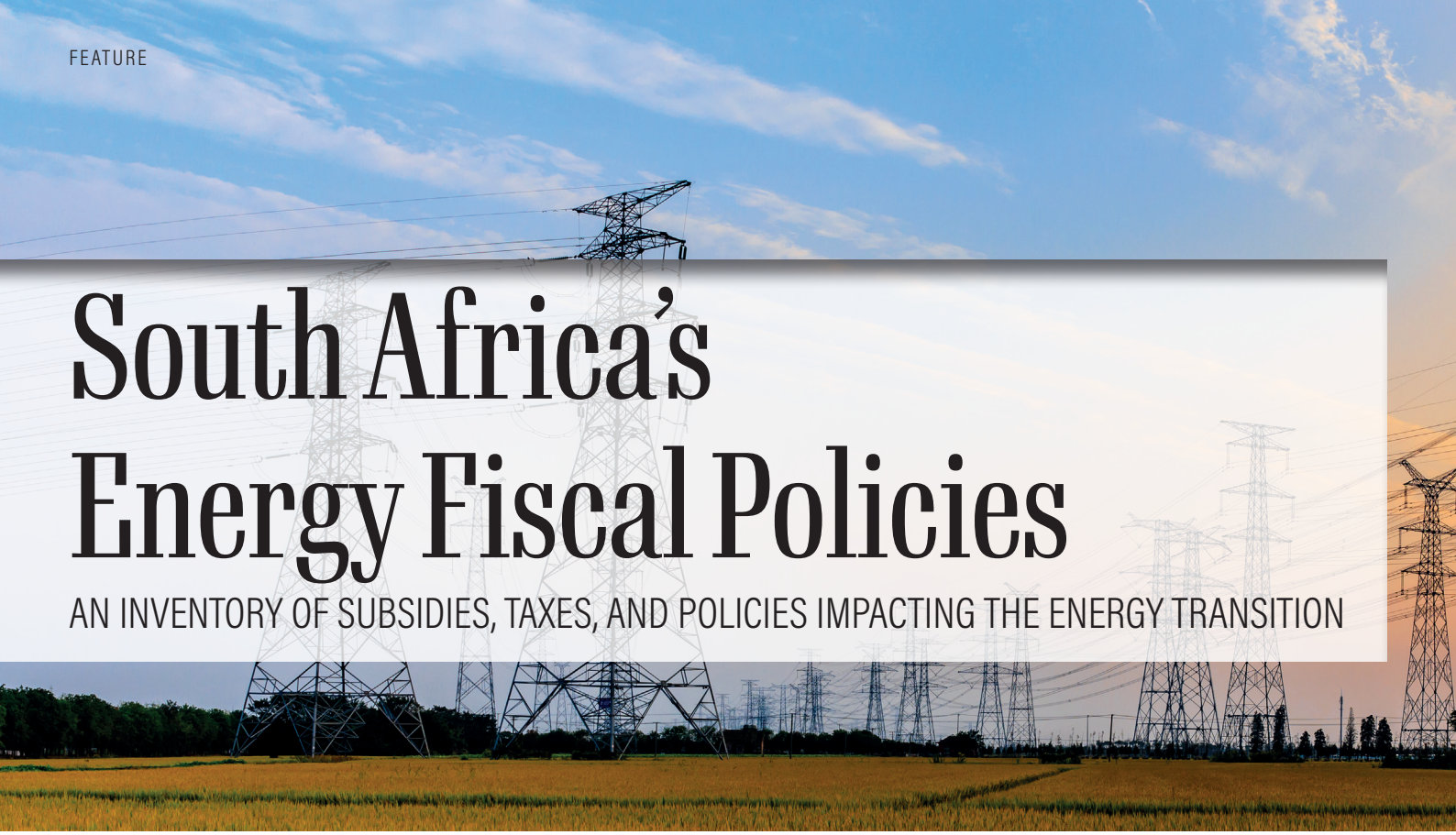
Significant industry focus on supply chain security will likely continue as stakeholders explore multiple options to tackle recent disruptions, especially for solar. Some developers will likely also resort to strategies such as renegotiating power purchase agreements, while others take a wait-and-see approach.

At the other end of the supply chain is the industry's goal to enhance sustainability by recovering and recycling renewable energy waste. With PV module recycling legislation pending in some states, this trend will likely pick up in the coming years and create new opportunities for the renewable energy industry.

We will also be watching progress on the implementation of the IIJA, which includes investment in wind, solar, battery, and EV supply chains; green hydrogen; long-duration energy storage; transmission; and other sectors critical to renewable energy growth.

In addition, we'll be monitoring the progress of the BBB Reconciliation Act, which could greatly benefit the renewable energy industry with PTC and ITC extensions for wind and solar and expansion of tax credits to other assets such as standalone energy storage, transmission, and green hydrogen. The industry will likely benefit as fresh capital becomes available, the transmission process is streamlined, and new technologies are commercialised. wn

Endnotes



South Africa's Energy Fiscal Policies

AN INVENTORY OF SUBSIDIES, TAXES, AND POLICIES IMPACTING THE ENERGY TRANSITION

Energy fiscal policies in South Africa have historically been framed around distributive aims, particularly in the post-Apartheid state. Broadly speaking, and depending on the type of energy fiscal policy, these policies can promote domestic energy production and increase energy security and access to affordable energy. Subsequently, this may drive economic development, which positively impacts sectors such as education and health.

By Richard Bridle Chido Muzondo, Max Schmidt Tara Laan, Anjali Viswamohanan & Anna Geddes

This report aims to assist the South African government by identifying whether or not its energy fiscal policies are aligned with its stated objectives for the energy sector. Fiscal policies denote overall government spending, including subsidies, taxes, and grants.

The report is a tool to support the government and foster informed discussion among national stakeholders.

Understanding energy subsidies is essential for several reasons:
Subsidies are key economic policy levers that governments can use to influence energy production and consumption. If subsidies are in place that acts against stated policy objectives for political or legacy reasons, transparency and debate can hold governments to account to align subsidies with stated government policy.

Subsidies come at a high cost to the public budget. They are often linked to health and environmental public objectives, so it is essential that the impacts of subsidy policy are monitored and debated.

Fossil fuel subsidies increase the consumption of fossil fuels, worsening local air pollution and greenhouse gas (GHG) emissions.

Monitoring and reporting of fossil fuel subsidies are included in the Sustainable Development Goals indicators and International Institute for Sustainable Development modelling has shown that fossil subsidy reform could reduce South Africa's carbon emissions by nearly 3% by 2030 (Kuehl et al., 2021; United Nations, 2021).

However, the extent to which fossil fuel subsidies still exist in South Africa is disputed. Under its G20 commitments, the South African government had claimed that it has no inefficient fossil fuel subsidies that encourage wasteful consumption (Schmidt, 2010). Reports state that its stance has not changed since then (Asmelash, 2017). This report aims to shine a light on the current

status of energy subsidies and present a basis for debate about their role in the energy sector.

A few critical sector-specific subsidy trends include the following:

- Our subsidy inventory found ZAR 172 billion (USD 10.4 billion) of energy subsidies in total in FY 2020/21.1
- Government bailouts—including the ZAR 56 billion (USD 3 billion) bailout for South Africa's state-owned utility Eskom in FY 2020/21—have strained the government budget. In this context, bailouts were provided to Eskom due to the utility's increasing debt sheet. Bailouts to other state-backed and energy-intensive enterprises included South African Airways and South African Express, worth ZAR 5.5 billion (USD 333 million) and ZAR 300 million (USD 18 million).
- Oil and gas: There remain subsidies for the consumption of fossil fuels. The highest-value oil and gas subsidy that has been quantified in this report was on value-added tax (VAT) exemptions provided for the sale of gasoline, diesel, and illuminating paraffin. This subsidy has increased from ZAR 23.89 billion (USD 1.79 billion) in FY 2017/18 to ZAR 34.67 billion (USD 2.4 billion) in FY 2019/20.
- The Free Basic Electricity access program and the national electrification program, which have increased by 10% and 3.3%, respectively, from FY 2018/19, are the two most significant electricity subsidies, costing ZAR 11.65 billion (USD 707 million) and ZAR 4.57 billion (USD 280 million) in FY 2020/21.
- Nuclear energy: Support for the nuclear industry continues. Significant questions remain over the future role of nuclear power. South Africa's existing nuclear reactor, which is owned and operated by Eskom, provides 5% of South Africa's electricity generation (International Energy Agency [IEA], 2020). In its 2021 expenditure estimates, the Department of Energy estimated that 11.9% (ZAR 3.4 billion, or USD 0.2 billion) of its budget over the medium term would go toward funding entities such as the South African Nuclear Energy Corporation under the Nuclear Energy Regulation and Management program (National Treasury Department, South Africa, 2021).
- Renewables: Renewable energy subsidies are difficult to estimate, but subsidies will fall as technology costs decline. Our estimates for renewable energy only quantify a government subsidy for a solar water heating project for which support was provided in FY 2018. However, the cost of power purchase agreements for renewable energy projects will have created subsidies for renewable energy generation.

Fossil fuels are an essential source of government revenue. South Africa imposes taxes on fossil fuel consumption, production, and incomes and charges for some externalities and fuel-related costs (such as transport). In 2019–2020, total revenue from fossil fuels was ZAR 100.5

billion (USD 6.95 billion), constituting 2% of GDP and 7.4% of general revenue. Among large emerging economies, South Africa's revenue from fossil fuels as a proportion of total revenue is similar to Brazil's, higher than China's, and lower than India's and Russia's (based on 2017 data).

The South African government is aware of the merits of environmental taxation. In 2006, the government developed a framework for market-based instruments for implementing Environmental Fiscal Reform (EFR) (National Treasury, 2006). Environmental taxes are in place for carbon and nitrogen oxide emissions (albeit with many exemptions), air travel, passenger vehicle purchases based on emissions, electricity generated from coal, and incandescent light bulbs (National Treasury & SARS, 2020). However, current environmental taxation does not match the social costs associated with the combustion of fossil fuels. Societal costs associated with air pollution and GHG emissions from fossil fuels in South Africa are estimated to be a minimum of ZAR 550 billion (USD 33 billion) per year.

Comparing fossil fuel subsidies, tax and non-tax revenues, and externalities reveals that social costs are five times higher than revenues, with an annual net cost to society of ZAR 550 billion (USD 33 billion). The social costs estimated were climate change and air pollution-related deaths, and lost working days from fossil fuel combustion. While there is uncertainty about these estimates, the overall finding that social costs far exceed revenues is likely to be correct or even understated. Externalities would be higher if it had been more comprehensive, including more external costs (e.g., medical expenses, partially lost working days, or productivity) or more of the fossil fuel supply chain (e.g., extraction and transport of fuels).

To achieve its clean energy transition goals, South Africa has implemented some support policies and subsidies for renewable energy. The growth in renewables (mostly wind and solar) in South Africa is primarily due to a series of independent power producer (IPP) procurement rounds launched in 2011 under the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP).

The key findings and recommendations from this work are summarized below:

Finding 1: Fossil fuel subsidies are too high.

Recommendations:

- Reforming/reducing bailouts provided to Eskom. Bailouts distort

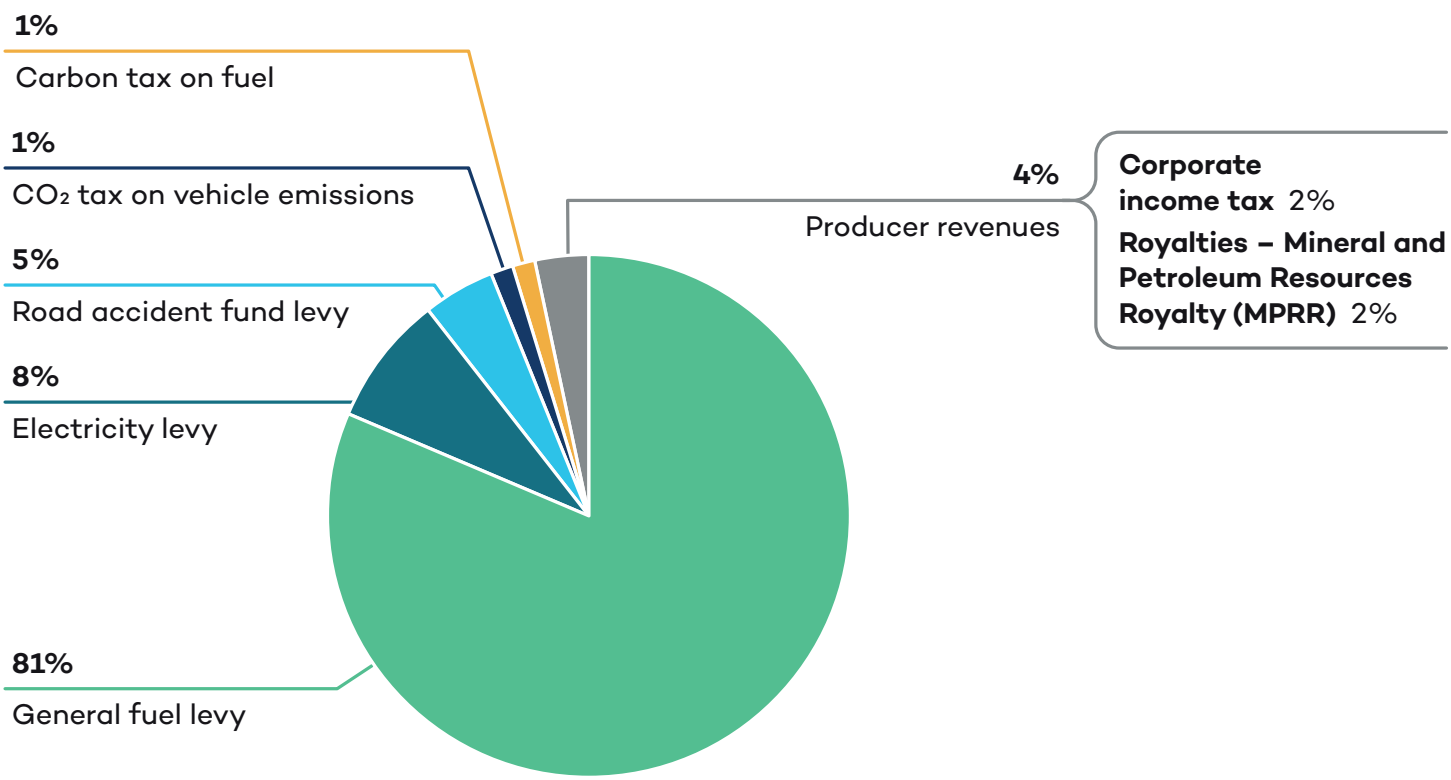


Figure ES1. Key fossil fuel revenue sources, consumer (left) and producer (right) 2019– 2020
Source: Authors' diagram using data from National Treasury & South African Revenue Service (SARS), 2020.

the price of electricity generated from coal, failing to account for its actual cost (externalities) and similarly making the price of electricity generated from coal seem cheaper than it actually is.

- Ending the exemptions to the carbon tax. Such a tax should be applied across the economy and at a proportional level to the external cost of the emissions.
- Transparency on energy fiscal policies is essential to understanding the government's signals, ensuring effective reporting, and increasing accountability. Improved transparency on subsidy and tax data allows ministries to monitor, evaluate, and revise fiscal policies accurately to meet policy objectives better. Transparency in data and reporting is also a key enabler in equipping civil society and government watchdogs to monitor decision making and hold ministries accountable.

Finding 2: The social costs of fossil fuels exceed subsidies and revenues.

Recommendations:

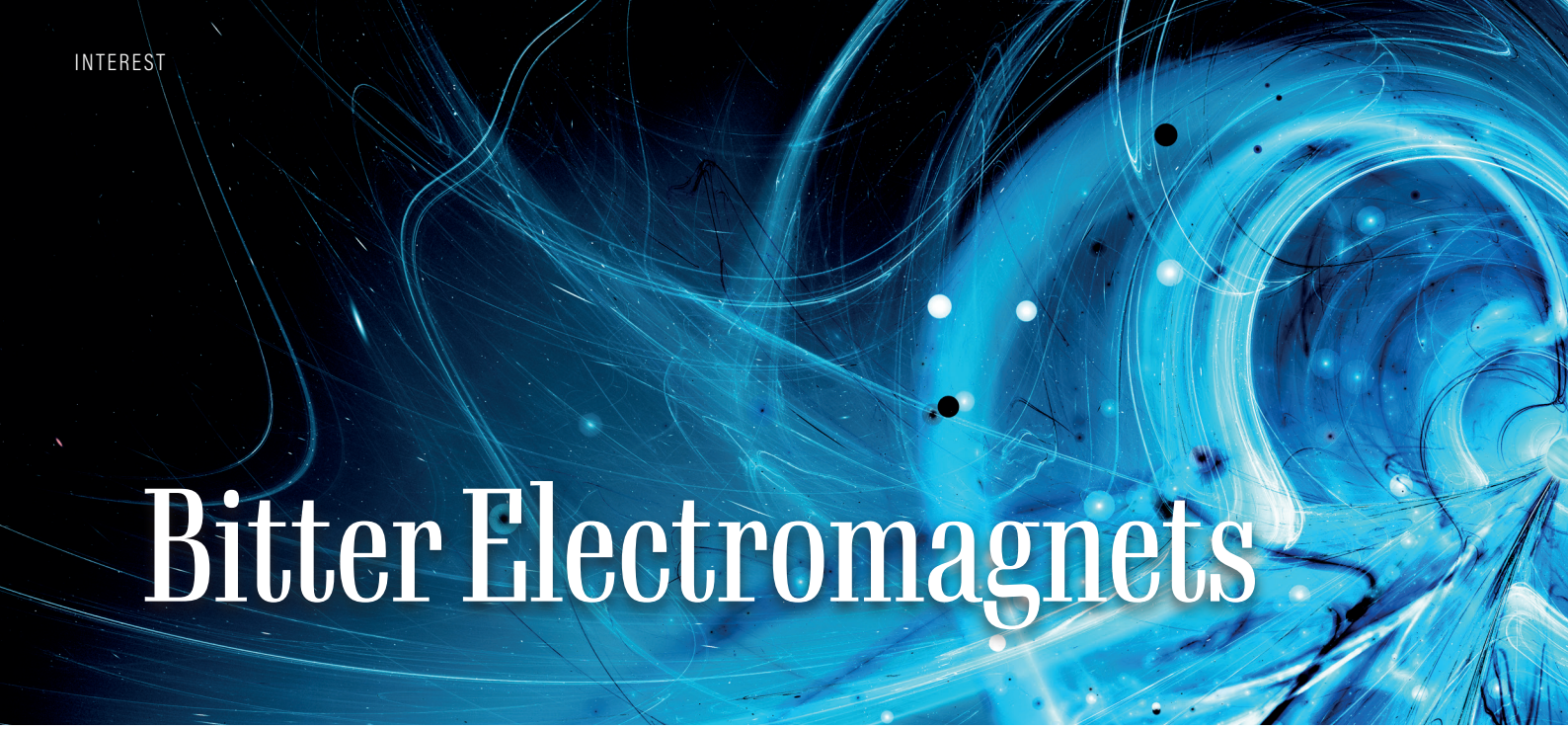
- There is a need for a review of current energy fiscal policies. Government should review energy fiscal policies and align them with the requisite action needed to align with its Paris Agreement commitments. The prices of fossil fuels must reflect social and environmental costs.
- The revenue generated by the efficient pricing of fossil fuels could be used as targeted support for vulnerable households. Efficiently targeting subsidies and taxes on fossil fuels creates an additional revenue source that can be used to support lower- and middle-income households facing higher energy prices.
- Increasing fossil fuel taxes is an important stage in the energy transition. Revenue generated from fossil fuel subsidies and taxation can be invested into the energy transition in ways that stimulate jobs and economic growth while funding a just transition for fossil fuel sector workers and communities.

Finding 3: Renewables can deliver cheap electricity under the right policy settings.

Recommendations:

- A critical factor in the current power shortages is stalled investment in renewable energy. Maintaining a predictable and effective renewable energy procurement process based on the IPP model will help the industry grow. The REIPPPP process alone is not sufficient to transform the electricity system. Any coherent reform plan must also include a transformation of Eskom. The electricity sector can be transformed through the combination of public and private investment in renewable energy.
- Explore alternative business models for utility-scale renewable energy.
- Maintain policy certainty through regular Integrated Resource Plan (IRP) and Integrated Energy Plan (IEP) updates. The government departments should focus on ensuring that the IRP and IEP are kept up to date with emerging technology and reflect the external costs of technologies to meet environmental and economic goals and spur the growth of South Africa's clean energy transition. wn

Download the full report here.



Bitter Electromagnets

Electromagnets are not known by their taste. Bitter electromagnets were invented in 1933 by physicist Francis Bitter in the quest for achieving ultra-high-strength magnetic fields.

By Dudley Basson

In ordinary electrical machinery, magnetic field strengths (flux densities) of one to two tesla are commonly employed. The SI unit tesla is quite large for practical use, so the CGS unit Gauss is sometimes used. One Tesla = 10000 Gauss.

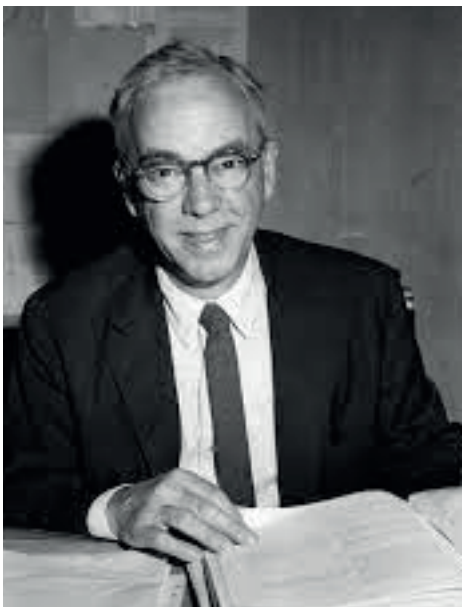
A limiting factor in the production of high strength fields is the cooling of the coil. This can be partially overcome by using super-cooled superconducting niobium-titanium windings, as is done at the CERN Large Hadron Collider, where fields of 8,36 T are employed. The other major limiting factor is physical restraint to prevent the magnet from self-destruction.

The coils of an electromagnet will be subject to Lorenz forces.

- The field within the coil axis exerts a radial force on each turn of the windings, tending to push them outward in all directions. This causes tensile stress in the wire.
- The leakage field between each coil turn exerts an attractive force between adjacent turns, tending to pull them together. This force was used in a previous definition of the ampere.

Bitter electromagnets consist of a stack of copper discs with a hole at the centre, heavily perforated, and with a slit to be connected as a helix. The holes and separators allow every helix part to be water-cooled. The discs must be axially restrained against Lorenz's force. The large holes are for bolts to keep the discs aligned and restrain the magnet from self-destruction.

The Bitter magnet does not make use of a ferromagnetic core. Usually, the strength of an electromagnet can be multiplied by the magnetic permeability of the core material, using the familiar $B = \mu H$, but this is only effective up to the magnetic saturation of the core material, after which it has no effect.

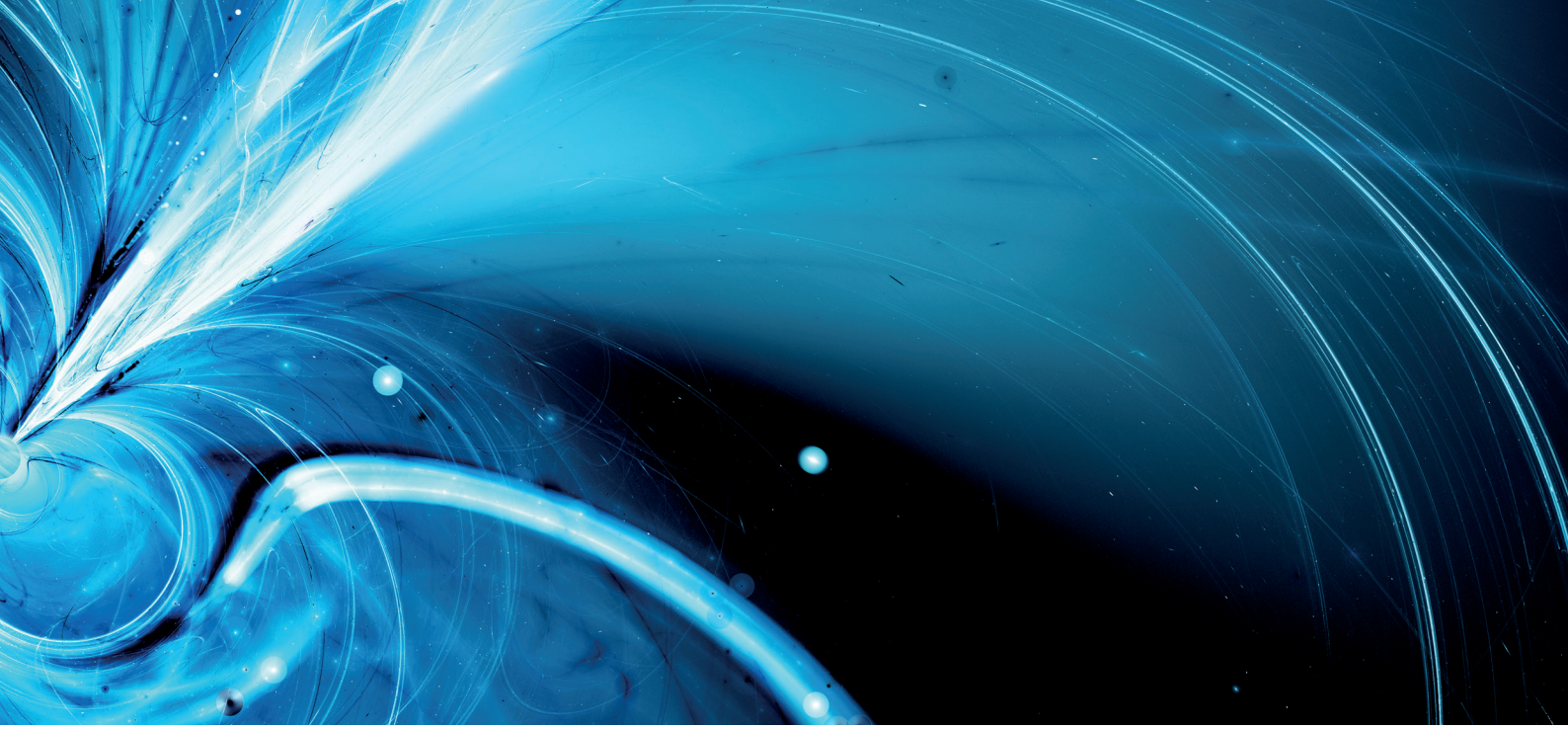


Francis Bitter
1902 - 1967

This limits the contribution by the ferromagnetic core to about 2 T.

Bitter electromagnets are classified as resistive magnets as opposed to superconducting magnets. The current supply to the Bitter stack is pulsed to allow cooling between pulses.

Bitter electromagnets are prohibitively expensive due to the vast electrical power input required.



As of 31 March 2014, the strongest continuous field achieved by a room temperature magnet was 37.5 T produced by a Bitter electromagnet at the Radboud University High Field Magnet Laboratory in Nijmegen, Netherlands.

The previous world record for a sustained magnetic field stood at 45 T in 1998. This was achieved using a Bitter electromagnet surrounded by a super-cooled magnet winding known as a hybrid superconducting–resistive magnet.

The Bitter magnet contribution is 33,5 T, and the super-cooled coil is 11,5 T. The Bitter magnet required 30 MW of power, and the superconducting magnet was kept at a temperature of 1,8 K. A considerable flow of water was required to remove the heat.

In 2019, Materials scientist Dr David Larbalestier and his collaborators at the US National High Magnetic Field Laboratory (NHMFL) in Florida, US, ran intense electric currents through coils made of a cuprate superconductor.

This generated magnetic fields with low energy consumption, creating the world's most powerful superconducting magnet, capable of generating a record sustained magnetic field intensity of 45,5 teslas.

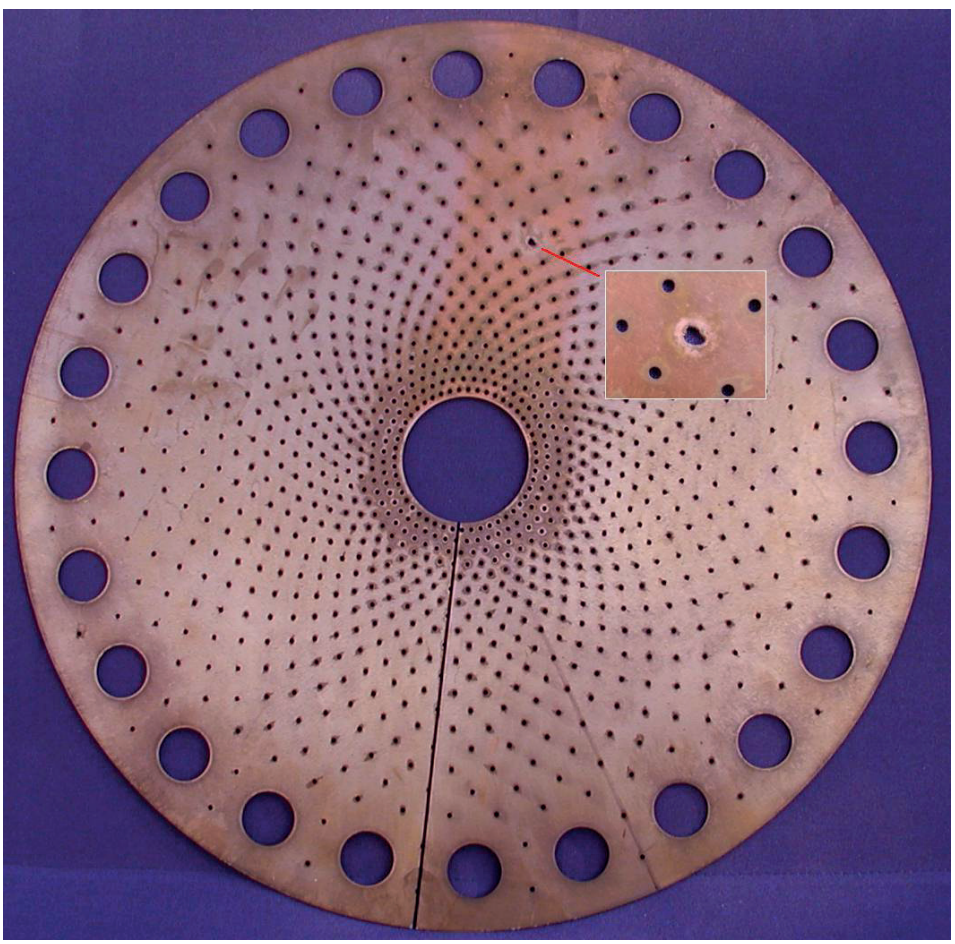


Plate of a 40cm 16 T electromagnet which can carry 20kA.

The 45,5-tesla test magnet validates predictions for high-field copper oxide superconductor magnets by achieving a field twice as high as those generated by low-temperature superconducting

The 1,2 GW motor generator system which powers the outer coils on the LANL 100 T pulsed magnet.

The LANL 80 tesla pulsed test magnet before and after 10 pulses

magnets. The magnet uses a conductor tape coated with rare-earth REBCO on a 30-micron thick substrate, making the coil highly compact and capable of operating at the very high winding current density of 1260 amperes per square millimetre. Operation at such a current density is possible only because the magnet is wound without insulation, allowing rapid and safe quenching from the superconducting to the normal state.

In March 2012, scientists at the Los Alamos National Laboratory campus of the National High Magnetic Field Laboratory successfully produced the world's first pulsed 100,75-tesla non-destructive magnetic field.

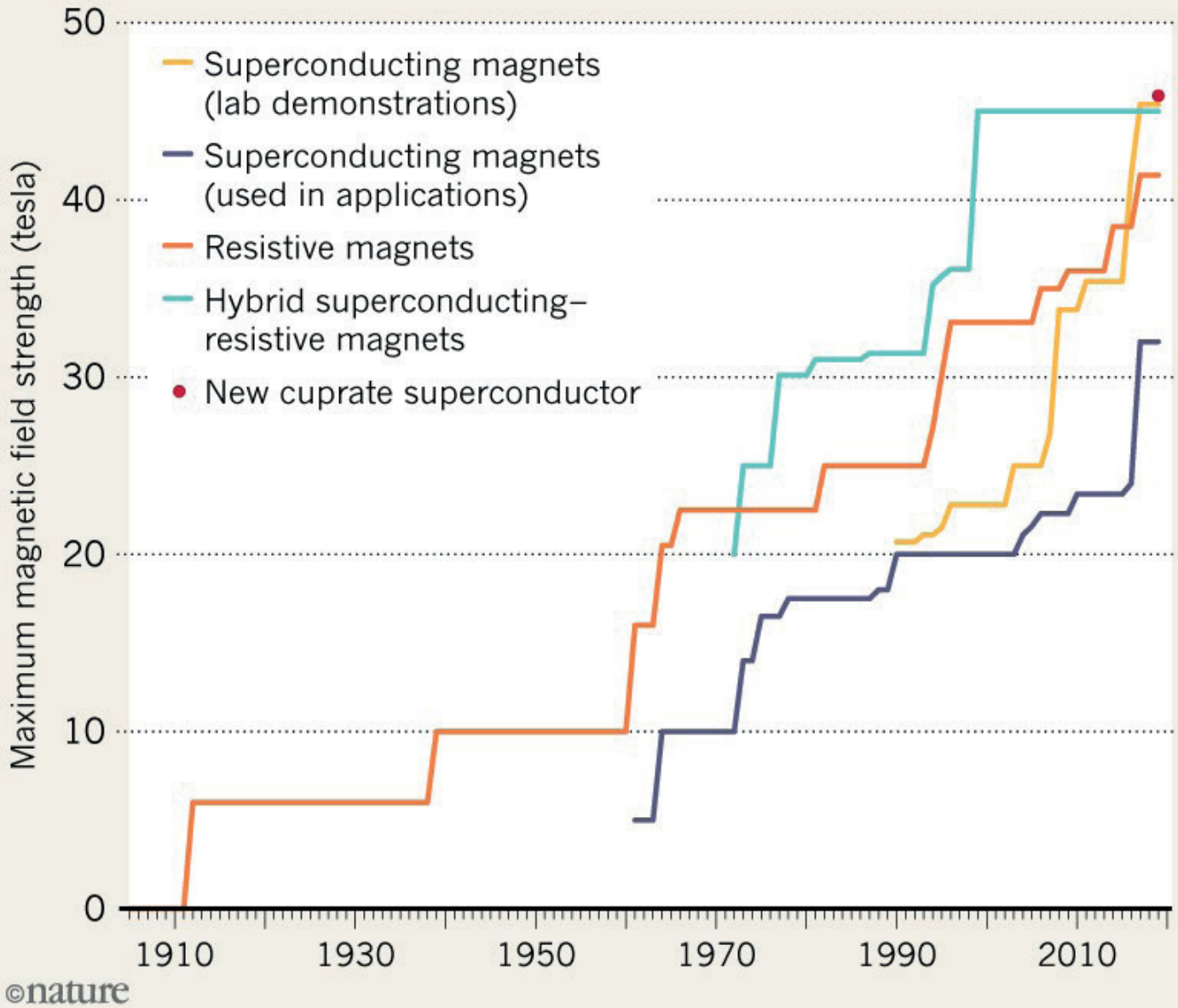
The achievement was decades in the making, involving a diverse team of scientists and engineers. Watch the video here.

The LANL Pulsed Field Facility, where the LANL 100 tesla multi-shot magnet is located, forms part of the National High Magnetic Field Laboratory (NHMFL). Pulses of 15 milliseconds are achieved.

The magnet consists of an outer coil set and a smaller coil inserted into the high field region of the outer coil set. The outer coil set is driven by a 1,2 GW motor generator (in operation, the generator is essentially shorted across the outer coil set).

RECORD-BREAKING MAGNETS

A new magnet has reached a field strength of 45.5 tesla, exceeding the maximum strengths achieved so far by other superconducting and resistive magnets.



A 2,6-megajoule capacitor bank drives the smaller inner coil. The 8164 kg magnet coils are immersed in liquid nitrogen to reduce resistive losses and for cooling. The magnet takes about an hour to cool down following a magnetic pulse.

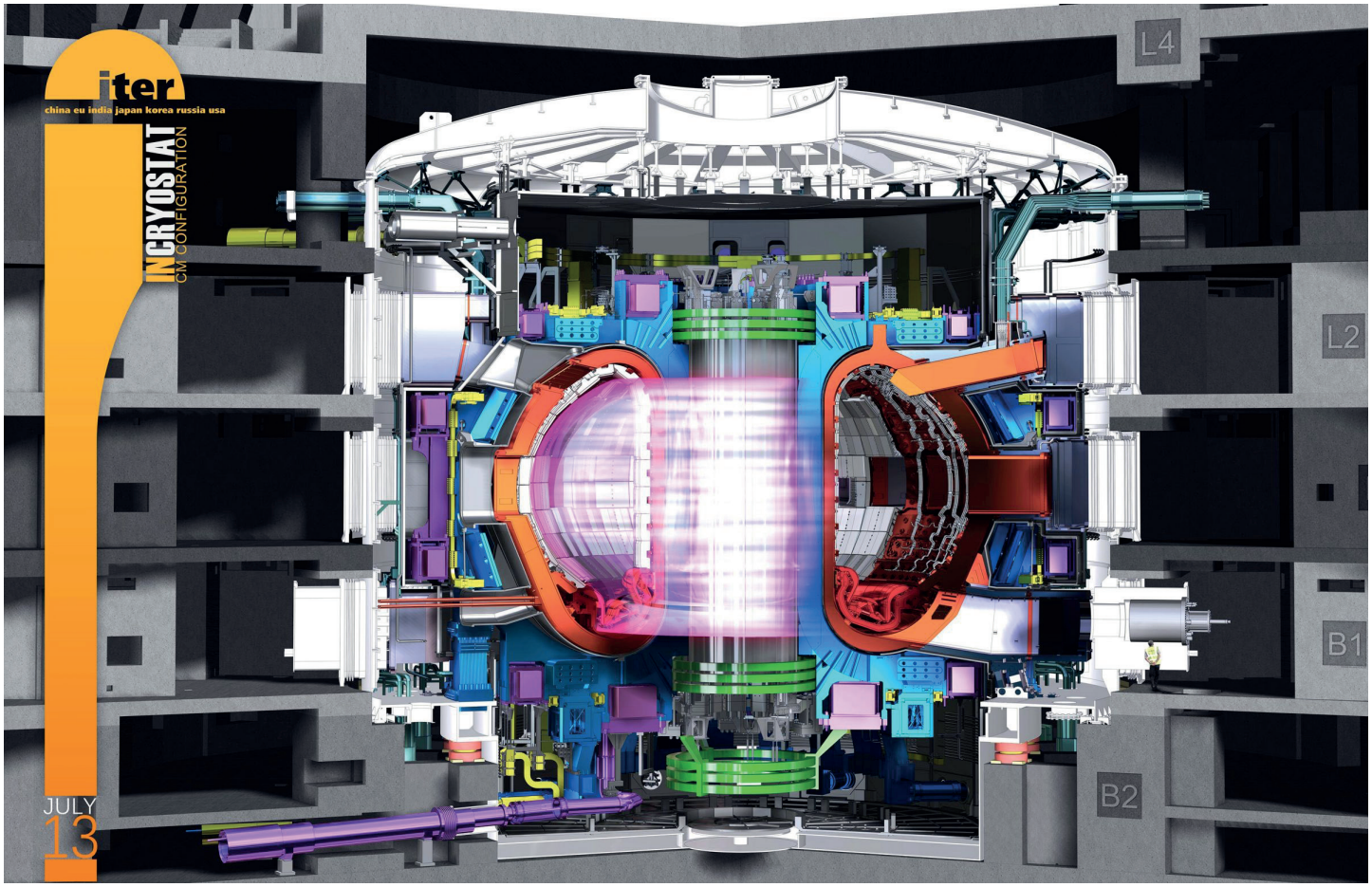
Watch the video of the 100,75 T-test here.

Only single pulse explosive magnets, which sustain fields for a fraction of a second at a time, have achieved higher intensities.

In southern France, 35 nations are collaborating to build the world's first tokamak to prove the viability of nuclear fusion as a source of carbon-free energy.

ITER is an acronym for International Thermonuclear Experimental Reactor and Latin for 'path' or 'route.'

The ITER tokamak will be the largest and most powerful fusion reactor. Designed to produce 500 MW of fusion power from 50 MW of input heating, it will be the first nuclear fusion device to create electrical energy in history.



Cutaway illustration of the ITYER tokamak showing the toroidal magnet cavity which will contain the 13 T magnetically constrained toroidal plasma.

The extreme temperature of the plasma, 150 MK, cannot be contained by biological material, so a toroidal magnetic field of 13 T will be used for containment. Output heat from the plasma will be absorbed by the walls of the container and transferred for steam raising and turbo alternator power generation.

ITER's First Plasma is scheduled for December 2025.

The superconducting magnet coil sets use niobium-titanium and niobium-tin conductors.

Watch the video of the delivery of the first gigantic solenoid of the ITER tokamak.
Watch the astonishing progress on ITER.

Watch a technical tour of the ITER worksite.

An extremely strong magnetic field can be produced as a short pulse using an explosive device. An explosively pumped flux compression generator (EPFCG) is a device used to generate a high-power electromagnetic pulse by compressing magnetic flux using a high explosive.

An EPFCG can only generate a single pulse as the device is physically destroyed during the operation.

Click here for information on the generation of a 1200 T pulse.

This was a 40-microsecond pulse produced by Shojiro Takeyama and his team at the University of Tokyo in April 2018.

Terrestrial magnetic experiments pale in insignificance when compared to magnetism in the cosmos.

A class of neutron stars known as magnetars can produce magnetic fields in the gigatesla range up to 100 GT.

A magnetar is a highly complex astronomical object. Protons, not electrons, produce the magnetic field.

The nearest magnetar to the Earth is thousands of light-years away, and no new magnetars are expected to develop closer than this.

Magnetars have a mass greater than that of the Sun and a size of about 20 km. They are invisible to optical observation but can be detected in X-ray and gamma-ray wavelengths and, like black holes, can produce immense gamma-ray bursts at their formation.

Gamma-ray bursts were first thought to come from within our galaxy, but it

was subsequently found that they come from all directions from other galaxies, travelling millions of years to reach us. Gamma-ray bursts are also produced by pulsars and soft gamma repeaters, which could possibly be a form of a magnetar.

Planet Earth also has a magnetic field, which varies between 25 and 65 micro-teslas at different locations of the Earth's surface, with maxima at the magnetic poles. The magnetic field source has been a matter of discussion and speculation but is now thought to be due to a dynamo effect between the inner core and the mantle.

The dynamo theory describes how a rotating, convecting, and electrically conducting fluid can maintain a magnetic field over astronomical time scales. It uses magnetohydrodynamic equations to investigate how the fluid can continuously regenerate the magnetic field using kinetic energy to produce magnetic energy. Presumably, a small initial magnetic field would have been required to start the process.

Click here for a detailed treatment of the dynamo effect.

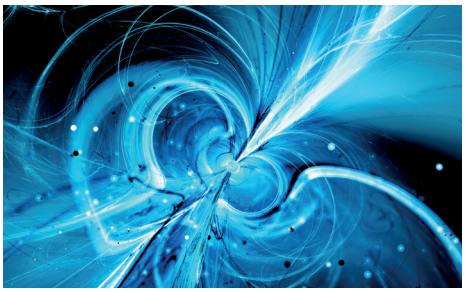
Click here for a description of the Earth's magnetic field.

The Earth's magnetic field has a complex history and has exchanged poles several times. These switches would have had profound consequences for many life forms.

The Glatzmaier model of dipole reversal is a matter of extreme complexity.

Explosive and suicidal electromagnetic devices are not the last word in ultra-high-strength electromagnets. The world of wonder material graphene opens up new vistas. Multiwalled carbon nanotubes can have phenomenal current-carrying capacities of over 10^9 amps/mm^2.

This opens up possibilities for single straight nanotube conductors providing nanoscale sustained flux densities in the kilo-tesla range without problems with cooling or Lorenz forces. wn



At home, a tap started dripping. To stop the drip, I knew I needed to change the washer, but I still hoped it would somehow magically stop by itself.

By Andrew Cooper
Pr.Eng, B.Comm, CEM, CMVP

Surprise! The drip got worse. It only stopped after I made a decision and actually replaced the washer.

It is the same with energy conservation. Compressed air leaks do not suddenly seal themselves up. Old lighting does not magically use less energy. Inefficient engines or burners do not suddenly emit fewer Greenhouse Gases (GHGs). All the hope in the world will not change this.

Changing this requires a decision. A decision to conserve energy and reduce GHGs in everything we do daily and then act on that decision. Have you made this decision yet? If not, what are you waiting for?

Decide to implement an energy and GHG management system, where employee engagement and awareness and the energy aspects of operations, maintenance, HR, finance and procurement are integrated into that system.

You could realise annual energy cost savings of 8-10% by doing this.

This means a company with an annual energy expense of $20 million could lose $2 million each year if it does not have an energy management system. What is 8-10% of your annual energy expense? Are you willing to lose that money every year?

In addition, all that wasted energy results in unnecessary GHG emissions. How much money will you waste buying carbon offsets for those unnecessary emissions? More importantly, are you willing to let those avoidable emissions compound the global climate crisis we face?

Implementing energy and GHG management system is the right thing to do. It will help you mitigate your impact on climate change and improve your bottom line.

I've heard plenty of excuses to avoid the decision. "But we don't have the people for that", "But we could not get any funding", "But nobody was interested in energy management". But! But! But!

It's not about excuses. It's about making a decision and committing to that decision. It's about making it happen. I have a personal acronym... GOYA is short for 'Get Off Your Arse' because that is what you have to do to get it done.

Now is the time to GOYA and take action. Not when global temperatures reach critically high levels.

Not when legislation or carbon taxation force you to make a decision. Now is the time.

An old Chinese proverb says, "The best time to plant a tree was 20 years ago; the second-best time is now". I want to suggest that "The best time to conserve energy, optimise efficiency and reduce GHGs was 20 years ago; the second-best time is now".

The waste will only stop when we all decide to take action. Make that decision. What are you waiting for? wn

SAIEE 2022 COUNCIL

President	P Moyo	Deputy President	Prof J de Kock
Senior Vice President	P Motsoasele	Junior Vice President	V Ramnarain
Immediate Past President	Prof S Maharaj	Honorary Treasurer	J Machinjike
Honorary Vice President	J Buisson-Street		

PAST PRESIDENTS

S Bridgens, V Crone, G Debbo, Dr H Geldenhuys, S Gourrah, Dr A Hay, J Macjinjike, T.C. Madikane, I McKechnie, A Mthethwa, Prof P Naidoo, P van Niekerk.

FELLOWS

T Eichbaum, Prof C Gomes, Prof A Lysko, P Madiba, C Matlala, A Mtshali, Prof D Nicholls, Prof J Pretorius, Prof J Walker

SENIOR MEMBERS

R Buthelezi, T Cornelius, J Hunsley, J Motladiile, Dr F Manganye, P O'Halloran, M Soni, M Rikhotso, V Shikoana, Prof M Sumbwanyambe

MEMBERS

Dr C Carter-Brown, Dr L Masisi, C Mohloki, Prof F Nelwamondo, Prof C Nyamupangedengu, S Vhulondo

SECTION CHAIRPERSONS:

Building Services		bssection@saiee.org.za
Electronics & Software	W Stucke	essection@saiee.org.za
Historical Section	S Bridgens	
Power & Energy	E Malatji	pesection@saiee.org.za
Rotating Machines	Prof W Doorsamy	rmsection@saiee.org.za
Systems	T Ramagofu	systemsection@saiee.org.za
Telecommunications	A Lysko	telsection@saiee.org.za

CHAPTER CHAIRPERSONS:

Cybersecurity Chapter:	M Govender	cybersecuritychapter@saiee.org.za
Entrepreneurship Chapter:	Y Mabuto	entrepreneurchapter@saiee.org.za
Lightning Chapter	A Beutel	lightningchapter@saiee.org.za
Load Research Chapter:	M Soni	lrchapter@saiee.org.za
Railway Chapter	K Motupa	railwaychapter@saiee.org.za
Women in Engineering:	M Makololo	womeninengineeringchapter@saiee.org.za

SAIEE CENTRES

Eastern Cape Centre
Chairman | Philip Nicholson
E | ecc@saiee.org.za

Free State Centre
Chairman | Joseph George
E | bc@saiee.org.za

Central Gauteng Centre
Chairman | Sicelo Mabusa
E | cgc@saiee.org.za

Kwa-Zulu Natal Centre
Chairman | Shepherd Nkosi
E | kznc@saiee.org.za

Mpumalanga Centre
Chairman | Morné Rossouw
E | mpc@saiee.org.za

Northern Cape Centre
Chairman | Ben Mabizela
E | ncc@saiee.org.za

Southern Cape Centre
Chairman | Steyn van der Merwe
E | scc@saiee.org.za

Vaal Centre
Chairman | VACANT
E | vc@saiee.org.za

Western Cape Centre
Chairman | Heinrich Rudman
E | admin.wcape@saiee.org.za

MAY 2022

17/05/2022	IOT Standards and Application
18/05/2022	Legal Liability: Mine Health and Safety Act
24/05/2022	Project Management for Engineers
24/05/2022	KZN Centre Webinar: Cable Theft - a manufacturer's perspective
25/05/2022	Power Systems Protection
26/05/2022	SAIEE Presidents Invitation Lecture 2022

JUNE 2022

01/06/2022	Writing Good Technical Specifications
01/06/2022	Road to Registration
01/06/2022	SANS 10142-1 Edition 3
02/06/2022	Fundamentals of Developing Renewable Energy Plants
06/06/2022	Design of Economical Earthing Systems for Utility Installations
08/06/2022	Fundamentals of Financial Evaluation for Projects
09/06/2022	Cable Jointing and Selection
13/06/2022	Legal Liability: Mine Health and Safety Act
14/06/2022	Finance Essentials for Engineers
20/06/2022	Transformer Construction, Operation, Maintenance, Testing and Protection
23/06/2022	Partial Discharge Detection and Measurement
28/06/2022	KZN Centre webinar: Greenhouse gas-free High Voltage Products for Sustainable Power Grids
29/06/2022	Legal Liability: Occupational Health and Safety Act (OHS Act)

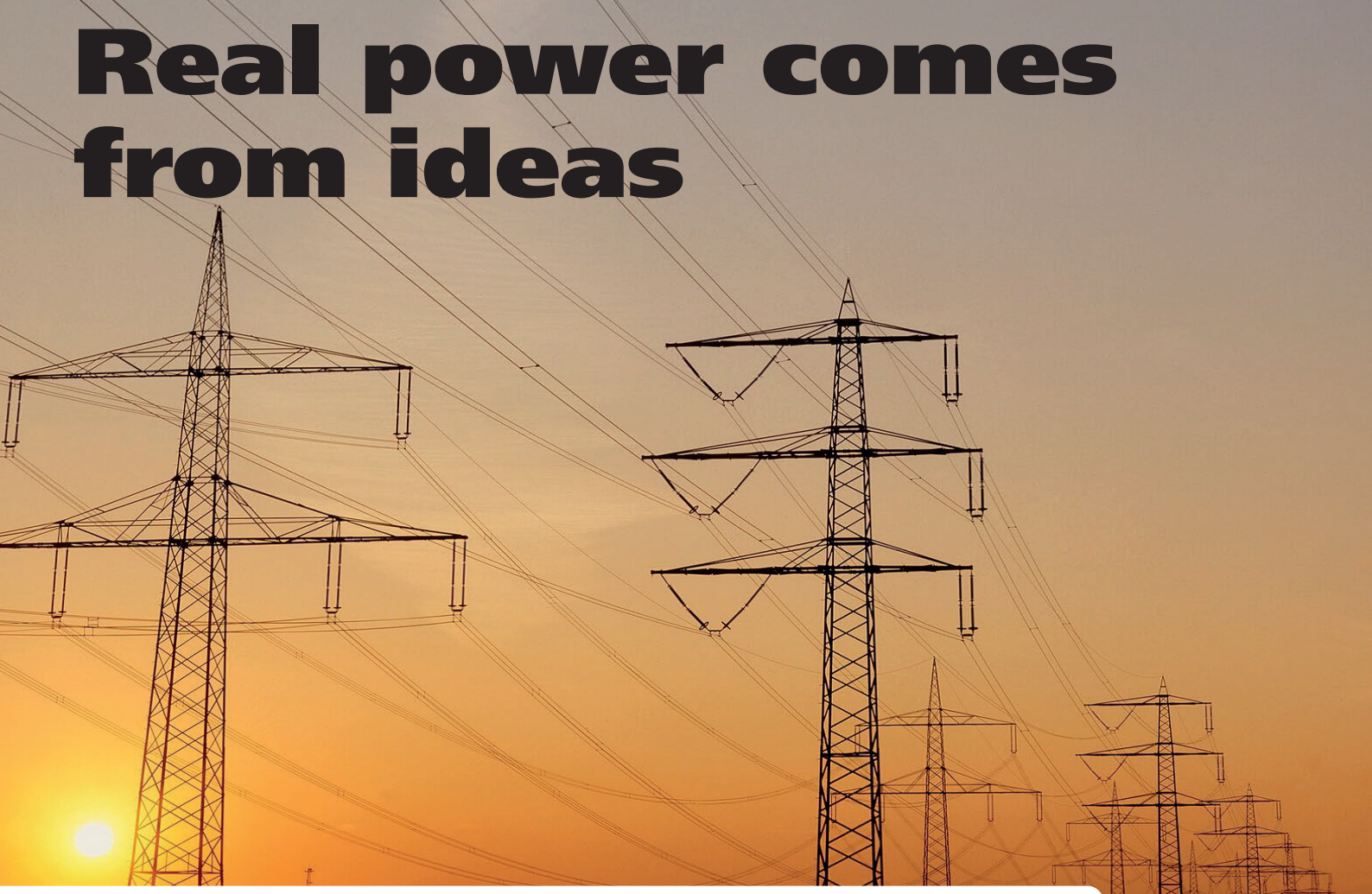
To organize a webinar on the SAIEE Platform, please complete the **Webinar Booking form.**

Section & Chapter, Centre Webinars

SAIEE Academy Online Training

SAIEE Academy Classroom Training

Real power comes from ideas



We've got what it takes

Operators use our pumps, valves, actuators and automation products across all primary and secondary processes in more than 1,000 power stations. KSB products help you manage boiler feed water, condensate and cooling water systems. Around the world, more than 170,000 of our pumps and some three million valves are already in action helping to generate energy.

KSB has been serving customers with innovative solutions for more than 140 years. Our know-how and experience across a wide spectrum of pump and valve technology make us the ideal partner for the consultants, plant engineering contractors and opera-tors of high-performance power stations.

KSB Pumps and Valves (Pty) Ltd
Tel: +27-11-876-5600
www.ksb.com/ksb-za

Your B_BBEE Partner

Boiler feed pumps

High Pressure Globe Valves

KSB ENERGY

KSB