WATTnow

Be Enlightened

With Transnet's billions will logistics sector improve?

Flightless female mosquitoes may reduce deaths

Guatemala makes biofuel at 31 cents a litre

Official Magazine of

SAIEE

March 2010

Attitudes in South Africa must change

Transnet's plans to spend R52-billion over the next four years on buying new rolling stock and locomotives, improving the signalling system and maintaining the railway network can only be good for the country if it leads to greater efficiency and reliability.

South Africa needs an efficient transport infrastructure and currently the combination of an inefficient railways network and log-jammed roads are certainly taking a toll on our economic performance as a whole.

My questions are: Will Transnet and its subsidiaries be transformed into a more efficient and more profitable entity once all this money is spent? Will its trains leave on time and reach their destination on time too?

Ideally, Transnet needs to adopt the same sort of zero-tolerance that Japan, Germany and Switzerland have demonstrated when it comes to running their rail networks.

If Transnet – and many other state-owned utility corporations for that matter – were to focus on efficiency, maintenance and training then, and only then, would this expenditure be of sustainable nature.

So far all that Transnet has managed to show us is that it is unable to keep its trains running on time, it's unable to maintain its rolling stock or signalling systems, it's reduced rather than expanded its network and is now going to spend R52-billion on rectifying the problems it created.

Will this money make Transnet's entire operation more efficient and reliable because, if not, then we are just throwing good money after bad.

I know that some people say that South Africa's transportation infrastructure is better than anything else in Africa but that's not the point at all.

With road maintenance declining, huge amounts of money being spent on railways that don't perform efficiently and with a logistics service that is having to work within an infrastructure that is rapidly deteriorating surely it's time to change attitudes.

Let's face it, our roads are getting worse because the maintenance work is not being done. Our electricity distribution infrastructure needs billions spent on it because it has not been properly maintained either.

Can you spot the common thread? Lack of maintenance.

And I haven't seen any sign from government at a national, provincial or local level that they are doing anything at all to change the mindset of their representatives who are responsible for running our country.

Walk into any government institution and look around and you will see a general lack of efficiency and the deeply rooted attitude of , Oh well, I know it's not perfect but it's good enough.

Good enough just doesn't cut it any more.

What I'm looking for from Transnet is some assurance that the billions they spend over the next five years will give us a railways network that really works well.

What I am looking for is that every local and provincial authority in this country starts caring for the existing infrastructure assets with the same sort of dedication that a mother cares for her sickly infant.

What I ask is that our government leaders start seeing South Africa's infrastructure as a prized asset and then start taking the lead in keeping it in a completely flawless and mint condition.

Yet somehow I don't get the feeling that anyone in government shares or shows that sort of dedication or concern. They just keep doing something that's Good enough.

And I find that deeply disturbing.

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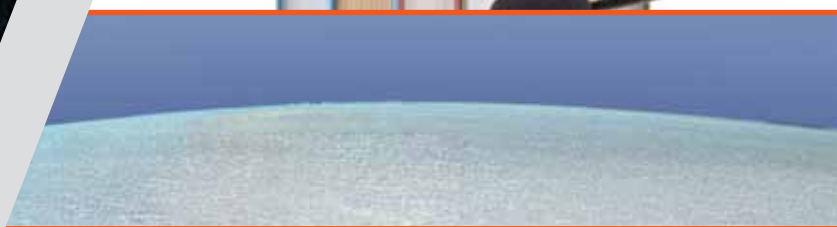

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Sony Ericsson's Qwerty keyboard touchscreen phone

Sony Ericsson Vivaz Pro phone adds a Qwerty keyboard to the touch screen that helps users communicate quickly and efficiently via email, SMS or social networking updates.

The Vivaz Pro is capable of producing and broadcasting high definition video and its open platform also allows users to personalise their entertainment experience by downloading great applications through PlayNow and the Symbian Developer Community.

According to Sonja Shear, market unit head at Sony Ericsson South Africa, the Vivaz™ Pro meets the increased consumer demand for Qwerty devices without compromising on any of the phone's entertainment features such as the human curvature of the device.

Designed to mirror the shape of the human body, the Vivaz™ Pro offers:

- Full slide-out keyboard for faster typing
- E-mail, Twitter, Facebook, blogging and chat connectivity
- A 3,2 inch (8,2 cm) 16:9 wide touchscreen
- High definition video
- PlayNow – immediate online access to applications, games and music.

The new phone will be available in selected markets from the second quarter of this year.

Lightning seminar could help save lives

Effective and proper lightning protection of a modern plant or other sensitive infrastructure such as communications, IT and electrical systems, is a complex engineering challenge according to lightning specialist Ian McKechnie of Innopro.

"The 'cook-book' approach to lightning protection will not protect company assets such as the computer infrastructure, the telecommunications network or the other vital equipment used in the course of business," says McKechnie. "Most importantly, it won't protect human life either," he adds.

Effective application of sound engineering techniques can reduce and manage the risks associated with lightning.

"The application of effective lightning protection and earthing solutions for infrastructure and industry through a systematic and holistic engineering approach is therefore of critical importance," he says.

With this in mind, Innopro, in association with the School of Electrical and Information Engineering at the University of the Witwatersrand, are again presenting the popular, well received and updated one-day industry-briefing seminar on Best Practices in Lightning Protection and Earthing of Structures and Systems.

The seminars, presented by Ian Jandrell and Ian McKechnie, both directors of Innopro, will be held in Centurion in May this year.

Ian Jandrell is CBI-electric Professor of Lightning, and Head of the School of Electrical and Information Engineering, at the University of the Witwatersrand while Ian McKechnie is an Honorary Research Fellow in the same School.

These seminars are accredited for Continuing Professional Development (CPD) with the Engineering Council of South Africa (ECSA) by Wits University, and attendees will earn one credit in the compulsory Category 1.

McKechnie says that the briefing seminars are aimed at industry practitioners at all levels and will be beneficial to anyone involved in the design, management, insurance, risk assessment and/or maintenance of infrastructure and systems that can be damaged by lightning and related electromagnetic interference.

He says that a formal technical qualification is not a prerequisite for attendance or for gaining benefit from the seminar.

Pre-booking for the seminars is essential as there is limited space. People interested in attending can contact Innopro on 012-667-5151, or by email at training@gafrica.com.

The 'I-shift' - Volvo's new transmission system

With the I-Shift, Volvo Trucks has received a positive response from drivers and transport companies all over the world. So much so that today 60 percent of all Volvo FH trucks are sold with I-Shift and it is standard in the world's most powerful series production truck, the Volvo FH16 700 HP.

Sven-Erik Tibb, chief project manager for the development of the I-Shift at Volvo Powertrain, tells the story behind the I-Shift.

Tibb says the I-Shift's predecessor, Geartronic, was not an optimised solution and an automatic transmission was needed to enhance driver comfort and driving ease. At the same time, the development of electronic systems really took off at the end of the 1990s. More and more of these improved systems were used to control both the engine and the rest of the truck and this created new opportunities to develop an electronically controlled transmission.

"The goal was to produce an 'automated mechanical transmission' (AMT) aimed at European long-distance and distribution vehicles with a maximum weight of 40 tons. The prerequisites were improved functionality, reliability, smooth gear-shifting and economical driving," says Tibb.

The challenge, he says, was to design a control system for the transmission that could perform the gear-shifting using electronics, valves, cylinders, sensors and software. All of this then had to be combined with the mechanical systems. What's more, the transmission had to be unsynchronised and this imposed further demands on the design.

It took Tibb and his team of 30 people three-and-a-half years to complete the project, and more than 150 000 hours went into designing and building the gearbox.

The gearbox was originally dubbed the P4200 but the name changed to I-Shift because it describes what it does. It is an intelligent shifting system for the trucks. The features of Volvo's advanced gearbox include"

- Improved fuel consumption, smoother gear changes and improved comfort and safety.
- The main section of the gearbox contains three base ratios, an integrated splitter, and reverse gears. The splitter and range gears are synchronised, while the base unit has no mechanical synchromesh. Instead, revs are synchronised with the help of the engine's and the transmission's control units before the next gear is engaged. This results in a faster gear change.
- Using Volvo's specified oil, the maximum oil and filter change interval is 400 000 km or every third year, resulting in lower operating costs for truck owners.
- Gearchanging can be done manually or automatically. The Performance mode provides maximum power and best drivability in automatic, while Economy mode gives priority to fuel consumption. In manual operation, gearchanging is done with a button on the gear lever.
- The clutch is automatic and is operated using compressed air. The clutch control unit is integrated into the gear changing system and has only one air connection. Due to the high performance of the I-Shift transmission, no clutch pedal is needed.
- The gear selector has no mechanical contact with the gearbox. Instead, movement of the gear lever, which is integrated into the driver's seat, activates sensors in the gear selector. The gear control system, integrated into the base unit, contains an electronic control unit, solenoid valves, gear-changing cylinders, shift forks and sensors.
- The I-Shift is developed together with the engine and Volvo engine brakes (VEB/VEB+). With 16 litres of displacement, VEB+ provides impressive maximum braking effect of 425 kW. For applications where a retarder is needed, the gearbox can be combined with Volvo's compact hydraulic retarder giving a braking power up to 400kW.

A host of new technologies come with Canon's new SLR

Canon's new EOS 550D single lens reflex camera has a host of special technologies that provide high quality photographs, making it an excellent choice for amateur and professional photographers.

Key to the new 550D is Canon's CMOS processor technology that works in combination with its own DIGIC processors to provide advanced noise reduction circuitry at each pixel site. In comparison with CCD technology, the lower power consumption characteristics of Canon's CMOS sensors also contribute to longer battery life.

Signal conversion in Canon's CMOS sensors is handled by individual amplifiers at each pixel site. Unnecessary charge transfer operations are avoided, vastly speeding up the process of getting the signal to the image processor. Noise is reduced, power consumption is limited and faster frame rate potential is increased.

Image data captured by the CMOS sensor is processed by Canon's purpose-built DIGIC image processors before being written to the camera's memory card. DIGIC technology uses advanced image processing algorithms to ensure precise, natural colours, tonal graduation, accurate white balance, and advanced noise reduction. Ultra-fast processing speeds result in highly responsive camera operation and near-instant start-up times.

DIGIC chips work with a high speed image buffer – reading, processing, compressing and writing image data fast enough to keep the buffer clear during long continuous shooting bursts. And because DIGIC integrates all key processing functions, power consumption is kept to a minimum.

The 550D uses iFCL system for focus, colour and luminance information to determine consistently exposed shots. All focus points provide distance information to the metering system to determine proximity to the subject and allow the algorithm to weight the exposure accordingly.

The EOS 550D has a metering sensor with 63 zones compatible with all nine autofocus points. Typically, metering sensors are more sensitive to red subjects, which can lead to over-exposure. The EOS 550D combats this with the dual layer sensor, which has one layer sensitive to red and green light and one that is sensitive to blue and green light. The metering algorithm then compares the level of the two layers and adjusts the meter reading accordingly.

The EOS integrated cleaning system combats sensor dust using:

- Internal camera mechanisms that have been specifically designed and manufactured to reduce dust generation. The redesigned body cap prevents dust generation through wear on the cap itself.
- Anti-static technologies, including a special fluorine coating, are applied to the low-pass filter covering the front of the sensor so as not to attract dust.
- A self-cleaning sensor unit uses high frequency vibrations to shake dust from the infrared filter for a period of about a second after each start up. For instant shooting after power up, this feature is disabled immediately as the shutter release is depressed

Canon has also developed an internal dust-delete data system, which can map the position of visible dust on the sensor. This can then be deleted automatically after the shoot with the latest Digital Photo Professional software.

The EOS 550D features a 7,7cm (3.0") 3:2 clear view LCD screen with pixel resolution of 720 x 480 pixels with 1040k dots. This allows high-quality viewing of images and ultra-accurate focus checks in playback. Thanks to a wide 160° angle of view, the clear view LCD can be viewed in a wide range of environments with ghosting and reflections being eliminated by Canon's dual layer anti-reflective coating. This combination of features enables photographers to shoot from awkward angles.

The EOS Movie function allows the EOS 550D users to record 1080p HD movies with manual control and selectable frame rates. Thanks to the large (22.3 x 14.9mm) integrated CMOS sensor, photographers have greater ability to control depth of field.

The exposure of the movie can be controlled in manual mode, allowing full control of shutter speeds and apertures. It is possible to select frame rates from: 30 (29.97), 25, and 24 (23.976), with 60 (59.94) and 50 available at resolutions of 720p. Programme mode also allows photographers to easily shoot HD video without worrying about exposure settings – ideal when capturing split-second action as it unfolds.

In situations where the subject is further away, the EOS 550D's movie crop function records with the central 640x480 pixel area of the sensor, creating an effective magnification of up to seven times the focal length of the lens.

Picture style presets simplify in-camera control over image quality and can be likened to using types of film, with each one providing a different colour response. Within each selectable preset, photographers have control over sharpness, contrast, colour tone and saturation.

The camera's factory default configuration

is set to deliver immediately usable JPEG images without need for additional menu settings. Picture style presets applied to a RAW image can be revised with Canon's Digital Photo Professional software.

The six presets are:

- Standard – for crisp, vivid images that don't require post-processing
- Portrait – optimises colour tone and saturation and weakens sharpening to achieve attractive skin tones
- Landscape – for punchier greens and blues with stronger sharpening to give a crisp edge to mountain, tree and building outlines
- Neutral – ideal for post-processing
- Faithful – adjusts colour to match the subject colour when shot under a colour temperature of 5200K
- Monochrome – for black and white shooting with a range of filter effects (yellow, orange, red and green) and toning effects (sepia, blue, purple and green)

The user-defined picture styles can be used to store up to three customised pre-sets, or any of the pre-sets available for download from Canon's web site at www.canon.co.jp/Imaging/picturestyle/file/index.htm.

Digital Photo Professional software provides high speed, high quality processing of lossless RAW images.

Processing with Digital Photo Professional allows real-time display and immediate application of image adjustments, giving control over RAW image variables such as white balance, dynamic range, exposure compensation, noise reduction and colour tone – plus the ability to view auto focus points on an image.

The lens aberration correction tool allows precise correction of different types of distortion caused by certain cameras. Images can be recorded in camera with sRGB or Adobe RGB colour space. Images can also be rotated and trimmed allowing users to correct framing and horizons as part of the RAW processing.

Digital Photo Professional supports sRGB, Adobe RGB, ColorMatch RGB, Apple RGB and Wide Gamut RGB colour spaces. ICC (International Colour Consortium) profiles can be attached to TIFF or JPEG images when converted from RAW.

This allows faithful reproduction of colours in software applications that support ICC profiles, such as Adobe Photoshop. For improved efficiency, a set of image adjustments can be saved as a recipe and applied.

Brainstorming starts as the PneuDrive Challenge gets underway

The Annual PneuDrive Challenge – a competition for engineering students at seven different universities – got underway in March with a team of specialists from Festo SEW Eurodrive visiting the University of Johannesburg's Mechanical Engineering faculty.

In presentations that lasted for nearly two hours, students under Professor Japie van Wyk were informed about the objectives of the competition and the requirements that have been laid down for entries. Students were particularly attentive and interacted well with presenters from the PneuDrive team.

They have every reason to be, as the winners of the competition get an all expenses paid trip to the Head Offices of Festo and SEW Eurodrive in Germany while the winning university receives products to the value of R100 000.

The University of Johannesburg has shown its commitment to the competition by making it part of their design curriculum.

The PneuDrive Challenge Design project will count towards 50 percent of the students' examination mark in their Design module.

"This was received as great news because after two years of running the competition, our challenge is still to get universities to buy into the educational and learning value that the competition can provide," says Rene Rose, marketing manager at SEW Eurodrive and member of the PneuDrive Challenge team.

Rose acknowledges that the design of curricula activities, subjects, time tables and the formal assessment of learning content is not an envious task to balance.

Sixteen teams of four students each are going to generate design entries as part of the project. The winning entry will be forwarded to the PneuDrive Challenge as the main entry for the university.

"We're confident that the UJ entry is going to be of a very high standard and we are very pleased with the level of commitment the university has shown" says Rose.

According to Prof Japie van Wyk, UJ is hoping that their entry will be the one that may challenge the dominance that the University of Stellenbosch seems to have established over the competition.

The competition is open to students within mechanical, electronic or mechatronic engineering.

An important concern raised by some mechanical engineering students was that because they focus on a specific engineering discipline in their studies, they do not have sufficient knowledge of electrical or mechatronic engineering to be able to complete the competition requirements.

This is a valid concern that emphasises the need for teams of students to access the knowledge they lack by working in teams with friends and colleagues who can help bridge any of the knowledge gaps, as well as to identify mentors that can advise and help them source appropriate design or manufacturing solutions.

Professor van Wyk raised an important point, saying that he hoped the competition would encourage students to move beyond engineering theory and to acknowledge the importance of starting to learn about group dynamics.

How students interact with each other, and their strengths and weaknesses in a team activity, is an element of life that is seldom taught at a formal level – yet it is these skills that play a large part when students venture into the business world.

The crucial element in all engineering projects is teamwork and this hidden learning opportunity is a direct additional benefit of the PneuDrive Challenge.

Members from Festo and SEW Eurodrive emphasised that students have full access to a wealth of knowledge and skills within both companies and they are free to pick the brains of specialists within both com-panies who are passionate and experienced in drive engineering, pneumatics, electronics, project engineering and the viable marketing of business ideas.

Full details of the competition are available on the PneuDrive Challenge website. (http://www.pneudrive.co.za/). Contact address for editors and readers: http://www.sew.co.za or http://sew-eurodrive.com. Phone: (+27 11) 248 7000, Fax: (+27 11) 248 7289 rrose@sew.co.za

The PneuDrive Team – From the left, Brian Abbott and Ernst Smith of Festo, Philip van Rensburg, Norman Maleka and Rene Rose of SEW Eurodrive. The Festo bus with its collection of pneumatic products and gadgets is always an interesting stop-off point for students.

Eskom

Create innovate and win!

Now is your chance to show off your creative talent and help save electricity in the Eskom Energy Efficient Lighting Design Competition 2010. With the energy challenges facing this country, there is increased demand for energy-efficient light sources in homes.

Energy-saving tips

Adopt these energy-wise habits:

- Turn off the geyser if you're going away for longer than 48 hours.
- Switch off the television, computer, and similar appliances when you're not using them.
- Replace regular light bulbs with energy-saving ones – they use a quarter of the electricity and last six to eight times longer.

SAVE AND WIN

Put on your creative cap and design a lampshade that can accommodate an energy-efficient globe, or submit an innovative energy efficient design, system or product. The idea is ultimately to turn a brilliant design into one that finds its way into our homes.

Your design should be visually and aesthetically pleasing, and environmentally friendly. It should also be functional, practical and user-friendly.

The closing date for entries is 30 July 2010 and you can participate in the student or professional category.

PRIZES

Category A: Students (individual)

First prize: R30 000
Second prize: R20 000
Third prize: R10 000
Prize for the winner's educational institution: R10 000
Ten most promising previously disadvantaged designers: R1 000 each

Category B: Professional

Innovative energy efficient lighting design: R30 000

Top 20 regional finalists: R5 000 each

For more information go to www.lighting-design.co.za, call the competition organisers on (012) 997 1334 or e-mail amroux@mweb.co.za.

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Each with own spa bathroom complete with heated towel rails, carved into solid rock, allows for elevated self indulgence while mesmerizing yourself into the healing energies of quartz crystal rock.

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South Africans fly the flag at CeBit 2010

By Barry Dwolatzky, director JCSE at Wits University and joint coordinator of the South African Pavilion at CeBIT

With over 4 150 exhibitors from more than 70 countries, the CeBIT tradeshow is certainly the world's premier annual ICT tradeshow. When CeBIT opened in Hannover, Germany, and thousands of international visitors flocked through the gates, the national flag flew proudly over the South African Pavilion in Hall Six.

Almost every country with products or services to offer in the field of ICT were represented at CeBIT and in Hall Six alone pavilions representing Iran, Spain, Russia, Tunisia, Serbia, Poland and regions such as Brussels and North-Rhine Westphalia were displaying their products and technologies.

South Africa's participation at CeBIT is organised by the Department of Trade and Industry (the dti) through its SAVANT programme with support from the SA Consulate General in Munich. The SA Electrotechnical Export Council (SAEEC) and the Jo'burg Centre for Software Engineering (JCSE) are also at CeBIT in support of the local ICT sector. Seven small and medium companies were given an opportunity by the dti to showcase their products at CeBIT this year.

Thulani Mpetsheni, of the dti says, "CeBIT provides a huge opportunity for South Africa to show the rest of the world what an innovative and vibrant ICT sector it has developed. The at CeBIT represent the tip of the iceberg when it comes to the many other exciting products and services available from South Africa."

Greg Vercellotti, of Johannesburg-based Dariel Solutions that provides specialised software development services to clients in South Africa was at CeBit to explore the possibilities of linking up with other international companies as partners so they can export these applications to Europe and other parts of the world."

Redline Telecommunications is part of the Parsec Group and managing director Rynier van der Watt says that as the leading supplier of free space optics in Africa and other parts of the world. The technology uses infrared laser links to provide a 'last mile' wireless link much like fibre cable running through the air.

Parsec's products have been installed in over 30 countries but Van der Watt says that his stand at CeBIT was intended to secure re-seller partners in other parts of the world who can promote, sell, install and support the product."

In the field of information security, Pretoria-based SensePost has a lot to offer international clients and partners. Sales manager Shane Kemp says:, "We have been to CeBIT before. Last year we participated in the SA National Pavilion and it proved really valuable because I was able to reconnect with some of the companies and international partners we have worked with in the past We are back again this year hoping to establish new partnerships with foreign organisations."

Three Western Cape companies were also part of the SA Pavilion in 2010:

- Candor Technologies, which offers a print on demand services;
- IQ Retail, developers of integrated point-of-sale and accounting software;
- QWIX, which offers a warehouse management and asset tracking solution.

More information on South African ICT sector and its involvement at CeBIT can be viewed at www.savant.co.za and www.jcse.org.za

Transnet spending billions to improve logistics in South Africa

Transnet is planning to spend about R52-billion over the next four years on its locomotives, wagons, signalling system and rail network in an effort to get more freight moved by rail than along the already over-crowded and overloaded national, provincial and local roads.

Transnet Freight Rail's (TFR) acting chief executive, Tau Morwe says the new locomotives will be added to the coal and iron-ore export corridors while 100 new diesel locomotives and 50 revamped diesel engines will be introduced for the general freight business.

The iron-ore line from Sishen to Saldanha will be expanded to carry 60-million tons, up from the current capacity of 43-million tons and the coal line to the Richard's Bay Coal Terminal will be increased to carry 81-million tons.

The bigger problem for TFR is that it simply is not carrying enough cargo. According to the Council for Scientific and Industrial Research's (CSIR's) most recent logistics survey, road transportation accounts for more than R1,4-billion tons of goods while railway networks carry a paltry 204-million tons.

In terms of metropolitan freight, road transportation accounts for 798 million tons of goods whereas railways carry only eight million tons of goods or 0,5 percent of the total rail freight in the country.

The CSIR and Imperial Logistics compiled the survey entitled Logistics Value and Costs – Driving Macro and Micro-economic Change towards Global Competitiveness and Sustainability.

Referring to a recent World Bank report on logistics competitiveness, South Africa is now ranked 28th, down from its 2007 rating of 24th, but its Logistics Performance Indicator score has improved from 3,53 to 3,46.

Logistics costs relative to gross domestic product (GDP) are at the lowest level since the survey started in 2003 and are now equivalent to 14,7 percent of GDP at R339-billion, a drop of 1,2 percent since the previous survey was done in 2007.

However, the survey points out that the worrying thing is that transport costs – although they only increased by 2,4 percent last year – account for 50,4 percent of the total logistics costs. Moreover, inventory carry costs were much higher too, increasing by 21,2 percent compared with the previous year and constituting 18,6 percent of the total logistics costs.

More than 1,6-billion tons of freight was moved through the metropolitan, rural, corridor and bulk-mining regions of South Africa and road transportation was responsible for 1,4-billion tons compared with rail carrying just 200-million tons.

And that is where the problem lies for TFR. The company has lost huge market share to road transportation companies and, without extensive improvements to the railway network, it will continue to lose market share.

To exacerbate matters, the damage that these heavy trucks are causing to South Africa's total road network is also a cause for concern. Already, the Automobile Association of South Africa has estimated that the country will have to spend R480-billion on repairing and upgrading its provincial and rural road network to a useable state.

The South African National Roads Agency has already spent in the region of R35-billion on the Gauteng Freeway Improvement Programme (GFIP) for the roads networks around Johannesburg and Pretoria.

All in all, about 185 kilometres of roads around Gauteng have been upgraded and 80 percent of the first phase of the project will be completed by the time the FIFA World Cup starts in June, says Alex van Niekerk, GFIP's project manager.

He says that most of the highways will have four lanes open in both directions on the N1 between Johannesburg and Pretoria and along the R21 from OR Tambo to Pretoria.

But, as the logistics survey points out, the role of rail transportation has to be increased dramatically if South Africa wants to remain globally competitive. According to the report, deteriorating road

quality can have many negative effects on vehicle maintenance costs and this translates directly into higher logistics costs and therefore higher prices.

And in a world where logistics play a crucial role in global competitiveness this can have serious consequences for South Africa's importers and exporters. The survey warns that the percentage of bad and very bad roads in the secondary road network of South Africa increased from eight percent in 1998 to more than 20 percent in 2008 and it is continuing to deteriorate.

This too, is a reflection of provincial and local authorities, which claim that they do not have the money to fix the roads. But experts point out that most of the local and provincial authorities have also not got the expertise to repair the roads as so many engineers and technicians were retrenched or lost to more lucrative positions in commerce and industry.

So the condition of the secondary and rural roads networks will decline unless the national roads authority or the national government intervenes.

There are other contributory factors to the roads freight mess that currently faces South Africa. According to the logistics survey, total vehicle maintenance and repair costs can increase by as much as 121 percent for a truck travelling on a road that's in a bad condition and this has a direct impact of ten percent on total logistics costs.

To complicate matters, the average volume of fuel consumed per capita in South Africa's transport sector is much higher than the world average. This is partly due to the fact that the largest concentration of production and consumers is situated 600 kilometres from the coast.

This adds substantially to the costs of road transport, as it means additional fuel is used and more greenhouse gases are produced.

Over the past decade, the oil price has fluctuated fairly radically, from a low of $17-a-barrel to a high of $147,27-a-barrel in January 2008. These fluctuations are problematic. In 2008 the average price of oil was $91,48-a-barrel, 42,5 percent higher than in 2007, where it was at $64,20-a-barrel.

Some economists are predicting that the oil price will more than double from its current level by 2015 and, because South Africa has such a high dependence on road freight, this will have a dramatic impact on logistics costs and, ultimately, the cost of goods to consumers.

For instance, if the fuel price were to triple then transport costs alone would rise, as a percentage of GDP, from 7,4 to 12,8 percent.

The average distance travelled by trucks carrying goods around South Africa can be broken down as follows:

- Metropolitan areas: 798 million tons over a distance of 78 kilometres.
- Rural areas: 395 million tons over a distance of 174 kilometres.
- Corridors: 213 million tons over a distance of 604 kilometres.

This compares with rail transportation:

- Metropolitan areas: eight million tons over a distance of 290 kilometres.
- Rural areas: 49 million tons over a distance of 531 kilometres.
- Corridors: 45 million tons over a distance of 691 kilometres.
- Bulk mining: 100 million tons over a distance of 698 kilometres.

It's quite clear that because the railway network is carrying so little of South Africa's cargo and fulfilling such a tiny percentage of its logistics needs, the country is losing its global competitiveness. Unless Transnet and its subsidiary TFR do something dramatic to improve rail transportation, the competitiveness for South African companies will decline even further.

Referring to the deteriorating condition of South Africa's roads, the logistics survey points out that over and above the higher maintenance and repair costs and overall operating costs of vehicles, transport operators face other hazards. For instance, cargo can be damaged while being transported and the operator may be held liable for these damages. Furthermore it increases the risks of accidents with a corresponding effect on loss of life or long-term injuries or disabilities for drivers and passengers.

The report suggests that the problem of deteriorating roads can be solved by:

- Improved packaging of products being transported by road.
- Using newer vehicles that are better able to handle poor road conditions.
- Spending money to improve the road network.

Although the report stops short of saying that the logistics industry should be able to rely considerably more heavily on the rail freight network, it is clear that if the railways network were efficient and reliable, it would reduce logistics costs for all operators and would speed up delivery times between the major ports of Cape Town, Port Elizabeth and Durban to the main consumer centres in Gauteng.

So, clearly, TFR has a huge task on its hands to take over considerably more of the freight being carried by road and get it back onto rail.

But TFR seems to be fraught with its own problems:

- In November last year its chief executive Siyabonga Gama was suspended because he awarded a contract to General Nyanda Security Risk Advisory Services (GNS), which is apparently directly connected to Communications Minister, Siphiwe Nyanda. The contract was awarded to GNS in a confined process – without tendering – and was initially valued at R18,9-million in 2007 though this has since escalated to R55-million. The contract was for securing cables and containers against theft.
- Transnet has dismissed two senior security managers linked to the award of the above contract, having first suspended the managers pending a full investigation.

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SAIEE

www.ieee-icc.org/2010

- Transnet has announced plans to invite privately-owned companies to take over and operate some of the company's branch lines as part of a plan to boost productivity and efficiency by 8,4 percent in the coming financial year. This is part of a five-year plan, dubbed Quantum Leap, unveiled by Transnet's acting chief executive, Chris Wells.
- It also plans to spend about R93-billion on infrastructure expansion and is hoping to achieve growth in volumes of freight carried by 10,3 percent this year, with overall growth of seven percent a year for the next five years. Transnet has spent R74-billion over the past five years on its rail network and other operations and will spend a further R93-billion over the next five years.
- The focus on growth in TFR is on containerised freight and bulk minerals including manganese, coal and magnetite in the local market and iron-ore and coal for the export market.
- TFR's general freight and container volumes have dropped by 20 percent and 15 percent respectively over the past 12 months.
- The cost of Transnet's multi-product petroleum pipeline has risen by R2,75-billion to R15,4-billion, mainly because of significant engineering costs associated with construction, buying and expropriating land, higher steel costs and back-up power generation.
- Transnet's board has approved 'in principle' the proposed public-private partnership framework that is aimed at working with mining groups to carry more minerals by rail rather than on the roads. Groups such as Eskom carry most of the coal used at power stations by road rather than using rail transportation or conveyor belts.

The public/private partnerships involved mainly coal, iron-ore and manganese and according to Jan Havenga, head of the Centre for Supply Chain Management, the estimated capital investment in rail was about R200-billion.

Moreover, the company intends to spend more than R1,2-billion over the next five years on increasing security in a desperate attempt to stop widespread cable theft and vandalism that has contributed to significant service disruptions for the company.

Cable theft and vandalism has, according to Morwe, led to the cancellation of trains, disrupted the movement of minerals and general freight on the network and is one of the reasons that large customers have switched to road transportation to carry large volumes of cargo.

There were 1 505 cases of theft and vandalism on TFR's lines last year, down from 2 703 in the previous year and 1 786 the year before. So cable theft and vandalism remain a major problem for Transnet's freight business. The company has budgeted R500-million to combat cable theft for the current year.

The logistics report has called for improvements to the railway network in order to maintain an efficient logistics infrastructure and says that the deterioration of South Africa's roads is another reason that Transnet needs to invest in, and improve, the entire railways network.

It points out that the average repair and maintenance costs for transport operators rise from 96 cents per kilometre on good roads to R2,11 on bad roads – an increase of 121 percent and the real problem is that the roads network is continuing to deteriorate.

So the reality of the logistics situation in South Africa is really quite simple:

- The railway network is carrying far too small a share of freight and, without substantial expenditure on improving the rail network, this share will continue to fall.
- The road transportation of freight continues to grow but in the process, more trucks on our roads are causing the roads to disintegrate; making road transportation increasingly costly.
- The provincial and local authorities are unable to properly maintain roads because they lack the necessary skills and/or the budgets to do so and there seems to be no focused attempt to increase expenditure on secondary and rural road maintenance. As a result, the roads will continue to go from the bad state they are in right now to an even worse state in the future.

And each of these factors has two direct consequences for the entire country:

- First, the cost of goods at a retail level rises because of higher logistics costs
- Second, South Africa's global competitiveness decreases exponentially because, while producers are capable of remaining competitive, the high costs of transportation make the end price prohibitive in world terms.

Surely it is now time for the government – through its parastatals such as Transnet, through its police force and through its provincial and local authorities – to step in and do something to halt the decline in logistics services throughout South Africa.

For there is no doubt that if immediate steps to improve freight services – both on our roads and on our railway network – are not taken now, South Africa will lose its global competitiveness and that will impact directly on economic growth and prosperity.

Watt's Says

Hello Paddy

I quite enjoyed reading your article on the inside cover of the January 2010 Watt Now.

To introduce myself, I am an Electrical Engineer, Certified Energy Manager and have passed the Certified Measurement and Verification exam.

I was reading another blog about Sustainable Cities and the complexity of the problem. The author of the blog was reading about complexity theory and discovered that stories are the answer.

I haven't figured out how story telling can be the solution to energy efficiency, the electricity price hikes and theft in South Africa, but I will leave it to you to ponder on. I am, however, very convinced that story telling is a big part of the solution because Jesus told stories and I really respect the way that Jesus did things.

Thinking about stories, there was a very sad story of three kids who were badly burnt in Port Elizabeth recently. It appears they threw a wire over a 66kV line.

I am an Electrical Engineer but I have discovered that the solutions are not always as simple as connecting some wire together, there are a lot of soft issues, people issues, attitudes, etc.

That's all for now.

Here's to a bright future for South Africa, it will take time, and we need to encourage each other to continue doing the right thing and leading the way.

Yours sincerely
Bruce Munnings
for Africoast Engineers SA (Pty) Ltd

Dear Paddy

I have nothing against so-called renewable sources of energy, if they can be proved to be cost effective but people tend to forget one major disadvantage, which is that, with regard to wind, solar and tidal energy, the sources are not controllable and are extremely variable. In particular I dispute the validity of her claim that "The total wind plant bill for 21 000 MW would amount to R374bn at current exchange rates".

Consider her 'cost analysis' for Ireland's renewable energy plan. Clearly the 500 MW figure, of the wind plant that she refers to, is the output that it would provide when operating at maximum capacity (ie at maximum usable wind velocity). This is what the 21 000 MW figure refers to in the case of the nuclear plant. The figures have to have the same meaning otherwise she is comparing 'oranges with apples'.

Without wanting to be too precise or technical, consider Eskom's last annual report. In this it is stated that the load factor (Actual energy output, divided by the maximum possible energy output) for the year was 67% and I think we can safely assume that a nuclear plant could achieve at least as much. What about wind energy?

I don't pretend to know much about wind generation but I understand that a load factor of more than about 30% is unlikely to be achieved except, perhaps, in places like the North Sea. In South Africa, however, I would be surprised if wind turbines could achieve an annual load factor of as much as 20%.

At about 20% then, it seems that we would need wind turbines with a demand capacity of around 70 350 MW to equal the energy capacity of the 21 000 MW nuclear plant at the said load factor, so the cost has now gone up to about R1.25 trillion – already R250bn more than the nuclear plant. But that isn't all – what do we do with all the energy availabld when 'it' is blowing a gale and what do we do when there is no wind at all?

It seems we would have to store the surplus energy when wind speeds are high, so that we would have enough when the wind dies down. To do this we would theoretically need something like 21 Drakensberg Pumped Storage Schemes, each with a water storage capacity large enough to cope with the longest possible period of low or zero wind speed. I have no idea of the cost of such schemes but they don't come cheap.

Then too, pumped storage is 'energy hungry'. I am not sure of the exact figure (it remains hidden in the Eskom report) but for every 100 units of energy that goes in, one can only expect to get about 75 out again. So perhaps we should add another R374bn to our capital cost to make sure we collect enough energy; and don't forget about the huge cost of connecting all the wind turbines and the pumped storage schemes to the national grid.

I truly believe that nuclear energy is the only practical and cost effective way out of our climate change dilemma. 'We' shouldn't only 'think' new power plants but should also 'think' converting existing coal burning plants to nuclear wherever possible and practical.

Nuclear plants for the production of hydrogen for road and rail transport is another imperative. If only the UN could live up to its name and arrange for the experts to get together and standardize on some designs, after which the mass production of nuclear reactors, auxiliary equipment and fuel should be given top priority. If this were done, there might be some hope for mankind's future.

Yours faithfully,
D.C. Bohler (Former Eskom engineer and now pensioner)

Hallo Paddy

I enjoy your editorials (and Features), and I am generally in agreement with the sentiments expressed. –However, I feel you are somewhat harsh, perhaps a little out of line, when you accuse certain

parties of virtual theft from EsKom. I refer particularly to your view, shared by many ill-informed critics, that BHP Billiton are getting subsidised EsKom power, at the expense of the general public

You will be aware that Eskom Tariff Policy is a specialist field, and it would be wrong for a non-specialist to pronounce judgement on this matter, to try and distinguish between the many classes of consumers.

If my memory serves me correctly, and I only draw on information in the public domain, the BHP Agreement came into being some time before 1985.

At that time the whole viability of the Richards Bay aluminium smelter project was in the balance and at existing tariffs for that Eskom would charge Billiton for electricity made the smelters a no-go.

Do remember that at that time BHP [It was actually Alusaf - Ed] was all South African, in the Gencor stable. Now also recall that at that time with the last of a series of major stations well past midway mark in construction, Eskom had a signifiancant amount of over-capacity on generation.

Now also recall that in those years Eskom used to meet with industry, to address common problems. And it seems a win-win deal was structured.

As I understood it at that time, Eskom agreed to a special tariff for BHP, applicable in depressed times. In boom times for commodities, which would also be boom time for Eskom, Standard tariff would apply.

[The deal was that the price of electricity per unit would be based on world price of aluminium as reflected on the London Metals Exchange - Ed]

Thus, BHP got it's smelter under way, and Eskom got a market for its surplus generating capacity. As far as I recall, no complaints from government then and for twenty years and more everything in the garden was rosy.

Now it seems the Eskom situation has become so politically charged that no one in the know will come forward and provide the facts.

There is another myth, also relating to Eskom's tariffs, which needs clarification. Do industrial concerns, mines, factories, smelters pay less for power than domestic consumers?

[The simple answer to that is yes – Ed]

I have always been under the impression that there is not much difference in the charge for a unit, a kWh, but add in the maximum demand charge applicable to large customers, and you will find that Industry pays almost double the amount the domestic man pays.

Since this is a serious allegation against Eskom, why are they so tardy in refuting it or placing the true facts on the table?

[Precisely my point – Ed]

Another thought on smelters. Why did BHP Billiton, and two partners, walk away from the chance to establish an aluminium smelter at Coega? [It wasn't Biliton it was Alcan and it was cancelled for a number of reasons but the main factor was uncertainty regarding electricity supply and pricing – Ed]. Surely at the discount prices Eskom was throwing around, the go-ahead should have been given? Eskom again features in the decision, this time because no guarantees could be given for certainty of supply. So the story goes.

Cross border supplies of electricity is too complicated a matter to be debated in the popular press. One can suspect that where there is smoke there is fire, specifically in the case of Zimbabwe. But, is it generally known that at one stage, maybe still, we paid more for Cahorra Basa power than the cost of producing it in South Africa. Are there any among us who would have reneged on this contract ?

Poor old Eskom. They are punch drunk and groggy, and all because they carry other peoples' burdens! Trust my contribution is rewarded with some debate.

Travy Brick

Hi Paddy,

I am finding that certain aspects of the electricity pricing debacle do not quite make sense.

Eskom has announced that their current "average" selling price is around 35c per kWh. Let us accept that as a baseline wholesale-level figure, and assume that it is an approximate break-even costing figure for the existing plant, where it must cover both generation and distribution costs. (That the retail electricity price charged to domestic- and small-business users is roughly twice that figure – maybe more – we can at present leave aside as a separate issue.)

Applying the standard compound interest formula, with a price inflation of 35% per annum for three years yields an Eskom selling price, in three years time, of about 86c per kWh.

Various news reports have indicated that Eskom will be buying power from Independent Power Producers (IPPs) at prices ranging from slightly below R1 per kWh, up to about R2.90 per kWh, depending on the generating medium. Since all electricity, once fed into the grid, is indistinguishable my question is: Who is to pay the difference?

Does this mean that as usual Joe Sucker, the consumer will be effectively subsidising the profitability of the IPPs? In passing, a recent newspaper report on the subject of cellphone tariffs, made the point that basing a business plan on an exorbitantly expensive tariff does not automatically legitimise that tariff.

Can anyone help me out of my bewilderment?

Regards,
Tony Fisher
Retired SAIEE member

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Course Brochure

Short Course on

Energy Efficient and Solid State Lighting - Presented in CAPE TOWN

P001592

BRIEF DESCRIPTION

With approximately 20% of all electricity consumption being used for lighting and the potential doubling in electricity prices over the next three years, it is essential that we understand lighting and what is necessary to achieve ***Cost Effective (sustainable) Energy Saving through Improved Lighting Installations.*** This will require better light sources, improved luminaire and installation design, sophisticated lighting control and a better understanding of vision and visibility. The rapid introduction of new lamp technologies such as CFL, LED and OLED, requires a good understanding of the true pros and cons of each technology and the potential improvements and cost reductions over the next few years. Cost of ownership is not just about luminous efficacy (Lumens per Watt), life expectancy, installation and maintenance cost, cents per Lumen; but a combination of all these. We have to also consider the ***Quality of Light***, which includes colour appearance and colour rendering qualities, task / ambient lighting, luminance contrast and many other factors. In this course we will briefly revisit the fundamentals of light and lighting, discuss the current and future CFL and LED technologies, introduce you to lighting design principles and design programs such as Dialux, do pay-back period and cost-saving calculations, measurement of light and lighting, specifications and standards and future developments. Special lighting applications such as PV lighting and "smart lighting" will be introduced.

COURSE STRUCTURE

The course will briefly revisit the principles of light and lighting, but spend most time on modern competing technologies such as fluorescent (especially Compact Fluorescent Lamps – CFL's) and High Brightness Light Emitting Diodes (HB LED's) – including local and international trends, standards and market penetration. Measurement of photometric. colorimetric, electrical and thermal quantities get more important by the day. The following are the main topics to be presented; but sufficient time will be available for questions:

- Light principles: Photometry and Colorimetry. Lumen, Lux, Candela, Candela / m^2 , CCT, CRI, Luminous Efficacy and Efficiency. Electrical and thermal quantities.
- Light sources: Natural, incandescent, gas discharge. Solid State: HB LED, OLED. Competing sources: Fluorescent, CFL, HID, HB LED, OLED, etc.
- Electrical control of lamp operation: Electronic control of lamp current, dimming, switching, etc. AC and DC operation.
- Replacing legacy lamps with "modern" lamps and/or luminaires: "Light" comparison, electrical power/energy comparison, cost comparison (life cycle). Actual calculations.
- Lighting design: Principles and methods. Indoor / Outdoor. Lumen method. Isolux diagrams. Street lighting. Standards. Dialux / Relux.
- Light and lighting measurements; and measuring equipment.
- Electrical Measurements: Volts, Amps, Watt.hours, Power Factor, Harmonics, EMI.
- Lighting books, journals, standards, societies and conferences.
- Exhibition & demonstration of components, equipment and instruments.
- Question & Answer sessions.

PRESENTER

Prof. Wilhelm Leuschner
Pr Eng D Eng MIESSA MIESNA SMIEEE SMSAIEE
Wilhelm Leuschner has spent his professional and academic career in the fields of Light and Lighting. He is a professional engineer with his M Eng and PhD degrees in light sources and day lighting principles respectively. He has developed numerous university modules in light and lighting and presented numerous short courses and popular talks in the field; as well as doing consulting. He has established a well-equipped radiometry and photometry laboratory with all essential equipment and instruments.

WHO SHOULD ENROLL?

Any person involved in light and lighting: Lamp and luminaire designers and manufacturers, Lighting designers, Lighting installation and energy managers, Entrepreneurs in the field of lighting, Green building designers and operators, people interested in the unique features and possibilities of using solid state lighting (white and coloured LED's).

COURSE DATE

15 – 16 April 2010 – CAPE TOWN

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The University of Pretoria is an accredited tertiary service provider and 2 CPD points will be awarded for attending the course.

COURSE FEES

R3000.00 (Payable before commencement of the course.)

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The Department has been (and still is) one of the largest engineering departments in the country; with three undergraduate accredited degree programmes in electrical (heavy current), electronic (low current) and computer (information, communication and telecommunications) engineering.

These subjects are all backed by extensive post-graduate and research activities in the cutting-edge sub-fields of the three main disciplines. The Department is the home for a number of centres of excellence and institutes, such as CEFIM, CeTEIS, CEM, CNES, EE and DSM Hub and endowed chairs such as the Sentech and Grintek Chairs.

National hub for the Post-graduate Programme in Energy Efficiency (EE) and Demand Side Management (DSM) - EE and DSM hub

The University of Pretoria has been awarded the privilege and responsibility to host the South African National Hub for the Postgraduate Programme in Energy Efficiency and Demand Side Management by the South African National Energy Research Institute.

The official launch of the Programme took place in June 2008 at the University of Pretoria.

The postgraduate research programmes are aimed at attracting a large number of qualifying under-graduates from across the country, as well as an increasingly strong contingent of international students. The University of Pretoria has established post-graduate degree programmes specialising in energy efficiency and DSM.

Analytic techniques from engineering and optimisation are the main tools in the quantitative study of energy efficiency related topics such as power system scheduling, power system efficiency with alternative energy resources and co-generation, motor and transportation efficiency, fuel efficiency, and energy efficient architecture and housing.

The study extends to demand side management schemes, smart load control and computer networks, and energy efficient lighting.

These research topics are clustered among different research groups across a number of departments within the University of Pretoria. The topics include:

- Power and energy systems.
- Industrial electronics.
- Electric drive and transportation.
- Control and computer network systems.
- Solid state lighting.
- Process integration in chemical engineering.
- Fluid dynamics and heat transfer in mechanical engineering.
- Architecture and housing.

The Director of the Energy Efficiency and Demand Side Management Hub is professor Xiaohua Xia, who joined the Department as a Professor in Control Systems in 1998. He received the PhD degree from Beijing University in 1989.

Over the past 12 years, Prof. Xia has completed over 26 funded research projects, of which 18 have been awarded, all with him as the principal researcher, with a total funding exceeding R30 million. He has been extremely successful in attracting inter-governmental funds, once from the Swedish/RSA, once from the UK/RSA, twice from the Sino/RSA and thrice from the Franco/RSA scientific agreements. Prof. Xia has published over 130 research papers. Most of his publications are of the highest quality, published in the most reputable journals and conferences in the field. Prof. Xia is honoured as an IEEE fellow, the highest grade of membership of this largest professional organisation in electrical, electronic engineering, as well as an NRF A-rated scientist.

He has been awarded as an outstanding academic achiever from the University since 2004. He was elected a fellow of the South African Academy of Engineering in 2005. He has been nominated to chair the Technical Committee of Nonlinear Systems -- one of the most important specialised TCs. He was also invited to sit on the Technical Board -- the highest technical decision making body in IFAC.

A typical example of the research done by the HUB is the industrial energy optimisation platform and its applications in industrial energy projects:

Project 1. Optimal Control of the Conveyor Belt Systems of a Colliery

The energy usage and planning of conveyor belt systems of mines are optimised. Constraints such as the loading capacities of conveyor belts, stock piles, production requirements and electricity tariff structures are included in the optimal control model. The obtained optimal controller potentially reduces the cumulative active energy costs of a conveyor belt by up to 49%.

Project 2. Optimal Load Management for a Rock Winder System

The right rock winder system from a gold mine consists of winders and conveyor belts. The aim of the project is to minimise energy cost of the rock winder system in terms of time-of-use tariff and maximum demand charge. Production targets, physical system constraints, possible delays, tariff structures and the total energy usage and costs are parameters to achieve trade-offs of different issues.

Project 3. Optimal Scheduling of a Pumping System

A water pumping system in a water supply system is studied. By combining the constraints of reservoir capacities, water demand, time-of-use tariff, voluntary load shedding requirement, an optimal pumping scheduling plan is found and up to 50% load can be shed in peak time and 12% electricity consumption is achievable. Maximal demand charge and the potential of the Market Participation Programme can also be studied in the model.

The HUB is also investigating sustainable, energy-efficient lighting through the use of Solid Sate Lighting.

Project 4. Optimal use of High Brightness Light Emitting Diodes (HB LED's) for retrofit lamps and new luminaire designs

Lighting currently constitutes approximately 20% of all electrical energy consumption in the world. Through projections it has been calculated that the world can save 125 GW of generating capacity by 2025 through LED lighting.

However, luminous efficacies of more than 150 lumen/Watt for production HB LED's (with good colour appearance and good colour rendering), must be achieved by 2015 to make this possible. Luminous efficacies of 200 lumen/Watt have already been achieved in laboratories.

For more information, please visit: http://eehub.up.ac.za/.

Smart buildings cut energy consumption

By Neil Cameron – Johnson Controls

The Smartgrid is well established as a concept. It's the energy utility of the future with which companies and consumers will be able to dynamically interact to sell or acquire energy. It introduces greater control and choice, can minimise costs and supports the drive toward preservation of the environment. In South Africa, Eskom's announcement of successive price hikes for the next three years makes smart management of energy consumption crucial - and the realisation of the Smartgrid concept an attractive goal. But Smartgrid needs smart buildings.

This is not a futuristic ideal. The technology is available and the system is reliable. Now it's a question of adoption.

Facility owners, engineers and managers, as well as those concerned with financing the operation and maintenance of buildings in South Africa, need to look carefully at these solutions urgently because the cost of energy is going to have a dramatic impact on the operating costs of a building, shopping centre or factory.

The technologies that need to be deployed include sensing and measurement solutions that interconnect building systems and equipment (boiler, chiller, other meters), advanced control methods, improved interfaces and strategic automated decision support programmes that are used as a management tool.

The benefits these technologies provide include lower energy consumption, better load management, enhanced equipment maintenance and lower energy costs. Moreover, the systems are backed by detailed audits that can be used for trend analysis to ensure that energy efficiencies are constantly being impoved.

The system offers a platform, much like a stock exchange, where corporates, industry and consumers can bid for and purchase energy. With smartgrid technology, building owners can actually sell any excess energy back to the national grid. The pricing issue must still be determined, it does mean that any firm or property that has smartgrid technology in place will be able to sell their excess electricity to Eskom, contributing in a small way to increasing supply stability.

To be Smartgrid-ready, smart buildings must be able to:

- Co-ordinate the onsite generation and storage of energy
- Control usage
- Connect to the Smartgrid through meters or via Internet connection
- Bundle technology and services into utility-scale programmes to minimise surcharges

The building has to be made to be smart enough to react when pricing thresholds are reached, drawing power from an internal source if this is less expensive than peak utility costs, or enabling better load balancing.

This requires an integrated network that reaches into IT systems; building maintenance systems and plant and equipment such as air conditioning, boilers and chillers and so forth. And the system must be controlled by equally smart software that has predefined decision parameters and react accordingly.

To cut costs and energy consumption intelligently, you have to know what to measure and where to place controls to achieve the greatest sustainable gain, where small changes or intelligent intervention can make the greatest difference, and how new systems and approaches can enhance building performance.

This needs to be in place before any benefits of a smartgrid can be achieved. Johnson Controls Metasys building management solution can report on energy production and use, and provide the management team with an insight into real-time, historical or even trend information on energy demand, operational efficiencies and how best to optimise energy use.

For instance, the building management system can use demand limiting to shed loads during 'peaks' or use load rolling to shed non-critical loads and maintain specified consumption. The critical inputs required to enable the use of this system include an accurate demand profile detail scale of tariffs charged, input power meter, and target loads with size and time limits.

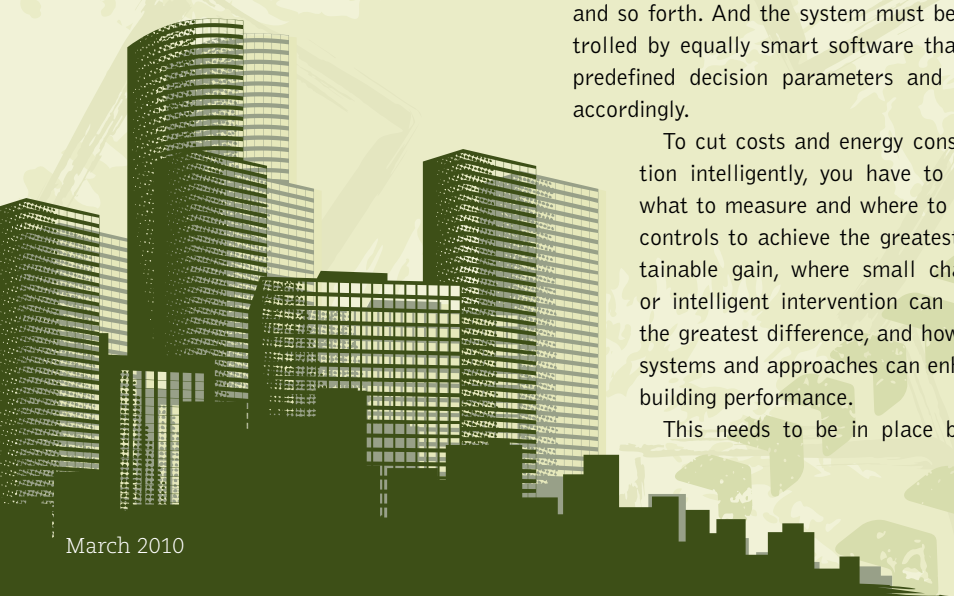
Optimising start and stop times is another part of the equation because, by shaving 30 minutes off the start time of a chiller, an hour off stop time, or switching off for 20 minutes during the day when full function is not required, means that signficant savings are achieved. And those savings represent money in the company's bank account.

And then there are the simplistic solutions. For instance, simply placing a CO_2 sensor in the right place can cut expenses, ensuring accurate rather than 'best guess' operation of air conditioning equipment, which is expensive to run unnecessarily.

When it comes to the co-generation of energy, by making use of waste heat from industrial or other processes for instance, can be very beneficial. Just as using natural gas, or a standby generator (run at peak usage times) can contribute to energy savings or additional revenue for the company as this energy can be sold into national or local grid.

Johnson Controls' cutting edge building management solutions already enable customers around the globe to save millions of dollars due to the energy efficiencies. South Africa needs to follow suit and property developers, building managers and retail centre owners need to start deploying smart solutions throughout all their buildings in the country.

Efficient energy management is no longer a nice thing to have, it's an essential element for every business in this country.



Henry du Preez Training Program

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Henry du Preez graduated with a BSc Electrical Engineering from the University of the Witwatersrand and then earned his Master in Business leadership from the University of South Africa. He also holds a GED Electrical Engineering and a Government Certificate, electrical and mechanical.

Du Preez has more than 48 years' experience in the heavy engineering industry and in the mining sector and specialises in electrical machinery and transformers. He is a fellow of the South African Institute of Electrical Engineers.

He has worked as an engineer in the mining and construction sectors and has extensive experience in maintenance and consulting work where he has been active for the past 18 years.

For 16 years Du Preez worked within the repair and service sector specialising in large AC and DC machines and transformers. For 12 years he has run his consulting service within the electrical and mechanical sectors mainly focused on repairing, testing and servicing transformers, AC and DC machines and rewinding of large generating equipment

He has produced a number of presentations and papers for numerous technical conferences and regularly attends technical conferences in South Africa and abroad. He has visited a number of companies in Europe, America, India and Japan.

Currently Du Preez provides services to companies in South Africa and in other parts of Africa as well including Uganda, Kenya, Mali, the Democratic Republic of Congo, Namibia, Botswana, Zambia and others.

Motor management

"Power shortages, sky-rocketing electricity costs and ever-increasing fuel prices are playing havoc with the industry that rely on electricity and as a result, electricity has to be used as efficiently as possible," he says.

"This means that it is essential for companies to use motors that are not only highly efficient but are more cost effective. This is particularly important when motors are repaired or, if it is not worth the cost of repairing them then a high-efficiency new machine makes a more sensible investment for any company that requires it," he adds.

"How do you measure efficiency in motors? How do you ensure that only those motors with acceptable efficiency levels are repaired? Can high efficiency motors be repaired?" asks Du Preez.

He says that efficiency, proper maintenance and high quality repair services are important factors that influence the total cost of ownership of any motors. As a result, Du Preez is now offering a specialised training course that will give people a basic understanding of the operation of AC and DC motors and the factors that assist in obtaining the best, most economical performance from these motors.

The training course will cover the selection, installation, maintenance, repair and efficient operation of electric motors. "Considering that up to 70 percent of electricity in South Africa is used to power electric motors of one form or another, it's essential that these motors are kept in good working order," he says.

Transformers

The history of transformers can be traced back to the early 1880s. A transformer is a static piece of equipment with complicated electromagnetic circuits. But they are also an essential part of the distribution and use of electrical energy.

"The transformer has proved itself to be a remarkably reliable and efficient piece of equipment provided that it is correctly selected and maintained," he says.

"And basic theory of the transformer makes a good starting point when selecting the right transformer for a particular application," he says.

Du Preez emphasises that testing and maintenance are critically important for transformers to work properly over a sustained period and therefore these essential elements are covered comprehensively in the transformer training course.

If required, special features and design elements can be included in the course provided there is enough interest and support from delegates wanting to attend this course.

Henry du Preez Training Program

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- Repair
- Testing

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Electronic waste a huge problem for developing countries

Sales of electronic products in countries like China and India and across continents such as Africa and Latin America are set to rise sharply in the next ten years. Unless action is stepped up to properly collect and recycle materials, many developing countries face the spectre of hazardous e-waste mounting up in landfill sites with serious consequences for the environment and public health, according to a group of United Nations experts.

A landmark report has been released by United Nations Environment Programme entitled 'Recycling – from E-waste to Resources' used data from 11 representative developing countries to estimate current and future e-waste generation – which includes old and dilapidated desk and laptop computers, printers, mobile phones, pagers, digital photo and music devices, refrigerators, toys and televisions.

The report was released at a meeting of the Basel Convention and other world chemical authorities prior to UNEP's Governing Council meeting in Bali, Indonesia.

In South Africa and China for example, the report predicts that by 2020 e-waste from old computers will have jumped by 200 to 400 percent from 2007 levels, while in India, e-waste is expected to increase by 500 percent over the same period.

According to the report, people in China will have discarded seven times more mobile phones and other e-waste than they did in 2007.

By 2020, e-waste from televisions will be 1,5 to 2 times higher in China and India while in India e-waste from discarded refrigerators will double or triple.

China already produces about 2,3 million tons (2010 estimate) domestically, second only to the United States, discarding about 3 million tons of e-waste. And, despite having banned e-waste imports, China remains a major e-waste dumping ground for developed countries.

Moreover, most e-waste in China is improperly handled, much of it incinerated by backyard recyclers to recover valuable metals like gold -- practices that release steady plumes of far-reaching toxic pollution and yield very low metal recovery rates compared with state-of-the-art industrial facilities.

"This report gives new urgency to establishing ambitious, formal and regulated processes for collecting and managing e-waste in China," says the United Nations Under-Secretary-General Achim Steiner, executive director of UNEP.

"China is not alone in facing a serious challenge. India, Brazil, Mexico, South Africa and others also face rising environmental damage and corresponding health problems because much of the e-waste recycling is left to the vagaries of the informal sector.

"In addition to curbing health problems, boosting developing country e-waste recycling rates can have the potential to generate job opportunities, cut greenhouse gas emissions and recover a wide range of valuable metals including silver, gold, palladium, copper and indium," he says.

The report was issued at the Simultaneous Extraordinary Meetings of the Conferences of the Parties to the Basel, Rotterdam and Stockholm Conventions on enhancing their cooperation and co-ordination (ExCOP).

It was co-authored by the Swiss EMPA, Umicore and United Nations University (UNU), part of the global think tank StEP (Solving the E-waste Problem), which includes UNEP and Basel Convention Secretariat among its 50+ members.

Hosted by UNU in Bonn, Germany, the think tank convenes experts from industry, government, international organizations, NGOs and science. A grant from the European Commission, Directorate-General for the Environment, funded the report.

The report cites a variety of sources to illustrate growth of the e-waste problem:

- Global e-waste generation is growing by about 40-million tons a year
- Manufacturing mobile phones and personal computers consumes three percent of the gold and silver mined worldwide each year; 13 percent of the palladium and 15 percent of cobalt
- Modern electronics contain up to 60 different elements -- many valuable, some hazardous, and some both
- Carbon dioxide emissions from the mining and production of copper and precious and rare metals used in electrical and electronic equipment are estimated at over 23 million tons – 0,1 percent of global emissions (not including emissions linked to steel, nickel or aluminum, nor those linked to manufacturing the devices)

- In the US, more than 150-million mobile phones and pagers were sold in 2008, up from 90-million five years before.
- Globally, more than one billion mobile phones were sold in 2007, up from 896-million in 2006.
- Countries like Senegal and Uganda can expect e-waste flows from personal computers alone to increase between four- to eight-fold by 2020.
- Given the infrastructure expense and technology skills required to create proper facilities for efficient and environmentally sound metal recovery, the report suggests facilitating exports of critical e-scrap fractions like circuit boards or batteries from smaller countries to OECD-level, certified end-processors.

Says Konrad Osterwalder, UN Under-Secretary General and Rector of UNU: "One person's waste can be another's raw material. The challenge of dealing with e-waste represents an important step in the transition to a green economy. This report outlines smart new technologies and mechanisms which, combined with national and international policies, can transform waste into assets, creating new businesses with decent green jobs. In the process, countries can help cut pollution linked with mining and manufacturing, and with the disposal of old devices."

Country Situations

The report assesses current policies, skills, waste collection networks and informal recycling in 11 representative developing economies, namely China, India, South Africa, Uganda, Senegal, Kenya, Morocco, Brazil, Columbia, Mexico and Peru. It also outlines options for sustainable e-waste management in those countries.

The data includes equipment generated nationally but does not include waste imports, both legal and illegal, which are substantial in India, China and other emerging economies.

Broken down by type, the report estimates e-waste generation today as follows:

- China: 500 000 tons from refrigerators, 1,3-million tons from TVs, 300 000 tons from personal computers.
- India: over 100 000 tons from refrigerators, 275 000 tons from TVs, 56 300 tons from personal computers, 4 700 tons from printers and 1 700 tons from mobile phones.
- Colombia: about 9 000 tons from refrigerators, over 18 000 tons from TVs, 6,500 tons from personal computers, 1 300 tons from printers, 1 200 tons from mobile phones
- Kenya: 11 400 tons from refrigerators, 2 800 tons from TVs, 2 500 tons from personal computers, 500 tons from printers, 150 tons from mobile phones

The report also includes data on per capita sales of electrical and electronic goods. For example, South Africa and Mexico lead the way in sales of personal computer sales with the equivalent of 24 sold per 1 000 people. Brazil, Mexico and Senegal generate more e-waste per capita from personal computers than any of the other countries surveyed.

The report emphasizes that developing vibrant national recycling schemes is a complex problem and not one that can be solved simply by providing funding and installing some high technology, sophisticated equipment.

It says for instance, China's lack of a comprehensive e-waste collection network, combined with competition from the lower-cost informal sector, has held back development of efficient e-waste recycling plants in that country.

It also points out that a successful pilot project in Bangalore, India, to transform the operations of informal e-waste collection and management has worked well and further pilot plants are being planned at different sites in that country.

Brazil, Colombia, Mexico, Morocco and South Africa are cited as places with great potential to introduce state of the art e-waste recycling technologies because the informal e-waste sector is relatively small.

Kenya, Peru, Senegal and Uganda have relatively low e-waste volumes but these are likely to grow rapidly. All four of these countries would benefit from capacity building in pre-processing technologies such as the manual dismantling of e-waste.

The report recommends that each one of the developing countries mentioned in the report should establish individual e-waste management centres of excellence, by extending existing waste management facilities so that these can handle and safely dispose of e-waste as it gets dumped.

The full report is available at http://www.unep.org/

Business, Skills Training Is a Never Ending Process

By Andy Marken, president of Marken Communications

No technology in history has grown as quickly as the Internet. Backbone bandwidth demand has been doubling, not every 18 months as with Moore's law but every 3,5 months. That's a 10X growth or a thousand percent a year. The increased bandwidth is also fostering social media as well as video technology and applications to expand almost as quickly.

With it has come a complete change in who we communicate with, the way we communicate with them. It has also changed how we work and how long we work. While life in Silicon Valley is akin to working at the edge of disaster, we like to believe that the rest of the country – in fact the globe – is in much the same state of chaos.

When most business leaders went to college years ago they would sit in a classroom, listen to the instructor, take copious notes and regurgitate the information as a test of what information had been absorbed. With a degree or two, sometimes more, we then set forth to conquer and change the world.

Unfortunately we didn't. Technology changed the world. And the rapid changes in technology are so prolific that these have forced every working person to become lifelong learners. Rather than rigidly structured process, learning is becoming a self-directed process.

There has been more information produced in the last five years than during the previous 5 000. A weekday edition of The New York Times contains more information than the average person is likely to have come in contact with in the last century in his or her lifetime. The change has been brought about by computers and the Internet.

To understand how quickly life has changed and continues to change, consider a study by Forrester Research and John Carroll University on electronic mail communication:

- Six-trillion email messages sent annually worldwide
- Eight-billion messages sent worldwide daily
- 900-million users sending messages daily
- 1 600-million corporate e-mail addresses
- 2 500-million personal email addresses
- Average cost of e-mail per user per year is $750
- Average value of email per user per year in terms of productivity is $4,500
- Average cost of company to send 20 messages is $1.05
- Average time spent daily reading e-mail is 50 minutes
- Average time spent responding to email is 60 minutes

According to an article in BusinessWeek, every day about ten thousand new Web sites are added to the Internet. New social media locations open up on the iNet daily, struggling for your personal and business attention.

Increasingly these sites are video-enabled. All of this has forced us to broaden our interest and knowledge areas. It has made it imperative for us to deal and respond 'comfortably' in a rapidly changing environment of uncertainty.

Peter Drucker in his book, Post Capitalism Society, noted that at least two-thirds of the industrial world's employees work in the service sector. Knowledge is one of our most important products. This calls for a different type of worker because a degree and technical experience are far less important than the currency of your business skills.

No one can say what technology platforms will dominate this century or what lies beyond the Web and enterprise resource planning. Individuals, corporations and educational institutions are adapting their training goals and programmes to prepare for unseen changes.

Experts who track technically-based career development and training see some trends emerging including:

- Business skills are becoming as important as technical skills in defining the success of professionals
- New technologies such as Web-based learning and video-on-demand coursework are rapidly supplanting classroom training
- Technical professionals must view education as a continuing and self-directed process

Many organisations have begun to identify core business competencies for technical professionals and make learning them mandatory. Increasingly they have to learn communications skills, budgeting and finance, strategic planning as well as project and performance management.

Firms are adding on-the-job training by matching people with appropriate learning tools. On-line video-on-demand courses, workshops and seminars are required for people at all levels and all disciplines. Some companies have gone so far as to establish required courses, electives and degree certificates.

While select technical skills continue to be in critically short supply, organisations also understand that they must help employees embrace and address larger business issues including finance and marketing.

Gartner Group reported early last year that corporate technical staff skills will shift from 65 percent technology to 65 percent business and management skills by the end of the year. While technical skills will continue to be important, much of that work will be outsourced and key internal personnel will be involved in business and technical management.

Because of the growing supply versus demand problem, traditional business schools are beginning to shift to competency-based education.

For example the governors of the 14 western states and CEOs of major corporations created the Western Governors University (WGU) in Salt Lake City several years ago. The University enables students to earn credits towards a diploma by taking skill assessment tests rather than courses.

The goal was to respond to business and industry needs by providing a means of certifying that an individual can do the job rather than simply prove that he or she has a diploma.

Gartner predicts that training delivery will shift from 25 percent technology and 75 percent instructor-based, to 50-50 by the end of the year. Video on demand and Web-based training will grow rapidly over the next two years. Organisations of all sizes are beginning to view training not as a business cost but rather as an investment in key members of the organisation.

For many, the accelerated pace of technology change over the past five years is straining their ability to keep up.

Fortunately for generation X and Y workers, skill development is viewed quite differently from boomers. For them, ongoing learning is a reality. It is part of the cost of participating in the world. They have become very adept at gathering, processing, analyzing and interpreting information – retaining and discarding data as needed.

It is all part of the 'normal' day.

Employees who are planning their future in an uncertain environment have to realise that just as they need money for food, rent/mortgage and utilities, they also need education.

When firms 're-engineered' themselves to become 'lean and mean' they reduced their training programmes. Those who plan on being productive are finding that they must invest in themselves.

While some may disagree, we feel that the shift is healthy.

Today employer and employee loyalty is dead.

Employees don't feel guilty or obligated to pay the organisation back for the training. They are investing in the training for their career advancement themselves.

As we move forward in the 21st century, traditional technical workers will have to expand their business skills while general business employees have to become more proficient in their understanding and use of technology. People across the board will need to not only know how the devices and applications work, but also where the information is located and what the data means.

The lines between technology and business practices are blurring.

Good management skills are more valuable, more respected and more richly rewarded as we move further into the century because they are a combination of courage and strong, genuine concern for individuals, the company, society and the customer. Good management skills are based on the individual and how efficiently and effectively he or she executes the plans despite the lack of firm guidelines.

These abilities are more difficult to acquire than course-taught capabilities.

In today's global business environment, business skills – knowledge of your company, its mission, the industry and your competitors – are vital survival skills. They are skills which change with every tick of the clock.

Everyone today is under tremendous pressure to leverage knowledge and information in everything that they do, even when the path and the destination are unclear.

People have to leverage knowledge and experience in innovative ways on an ongoing basis.

For the success of organisations where decisions must be made with incomplete data, people who can embrace and deal with uncertainty will be a critical resource for organisations that prosper by leveraging its available knowledge and information.

the challenge is on

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South Africans embrace smartphone technology

Smartphones have made a inroads into corporate South Africa, far surpassing general consumer use or small business use. This is the rather surprising finding from a new research study by World Wide Worx. The Mobile Corporation in SA 2010 report shows that three quarters of South African companies have deployed smartphones within their organisations, compared to almost none two years ago.

The study, backed by First National Bank (FNB), and Research In Motion (RIM), the developer of the BlackBerry, shows that saturation point has almost been reached by large South African companies in the use of fixed landlines (96 percent) and ordinary cellphones (92 percent).

And, as forecast in 2007, 3G data card penetration has also reached near saturation point, with 94% of large companies deploying it. Now the focus has turned to integration of smartphones with business processes.

"These results show that enterprise mobility solutions are no longer just nice to have. They're essential for businesses that want to be competitive, responsive and efficient in a world where a customer answers immediately and where project flow can't stop because a manager is in a meeting," says Deon Liebenberg, Regional Director for sub-Saharan Africa at RIM. "Not only does mobility allow companies to improve internal efficiencies and communications, it also enables them to interact more effectively with their increasingly mobile customers," he claims.

The study also showed that corporate South Africa expects to embrace the new world of online services to an extent that was not even anticipated as recently as one year ago. "Until last year, concepts like Software as a Service (SaaS) and Cloud Computing were regarded as little more than buzzwords," says Arthur Goldstuck, managing director of World Wide Worx.

Yet, in the coming 24 months, 84 percent of South African corporations expect to have a SaaS strategy in place, and 60 percent expect to have adopted a Cloud Computing strategy.

"These aren't technologies as such," says Goldstuck. "They are strategies that make the organisation's use of new technology more efficient. From storage systems and software deployment, hardware upgrades and network capacity to bandwidth, the focus is on cost-effectiveness, flexibility and mobility," he claims.

Guatemala's jatropha cultivar makes biofuel at 31 cents a litre

Jatropha cultivar provides almost 3 273 litres of biofuel per hectare of ground at a cost of 31 cents a litre. The cultivar has apparently been optimised for farmers in Guatemala and was developed by SG Biofuels of California.

Known as Jmax 100 and what SG claims is the world's first elite jatropha culitvar, its low production costs allow for profit margins and processing costs (either for transesterification into biodiesel, or hydrotreatment into renewable jet fuel). The wholesale cost of fuel made from JMAx 100-based jatropha oil should be at or below parity with diesel or jet fuel produced from $80 oil.

JMax 100 is the first elite cultivar developed through the company's JMax Jatropha Optimisation Platform, and CEO Kirk Haney says the yields and profitability of JMax 100 far exceed what is currently available through existing varieties of Jatropha. The profitability of Jatropha was projected at $990 per hectare – more than 300 percent higher than existing commercial varieties.

JMax 100 and the JMax Jatropha Optimisation Platform have been developed over the past three years by the SG Biofuels Genetic Resource Centre (GRC) and a science team that includes three members of the National Academy of Sciences.

SG Biofuels' GRC contains over 6 000 unique accessions and an unprecedented array of Jatropha genetic traits including enhanced fruit yield, pest resistance, soil adaptation, improved flowering capabilities, uniformity and improved harvesting.

"JMax is built on a base consisting of the SG technical team, the sequencing of the jatropha genome, the data we have from our cross breeding programme, and our regional studies," said Haney.

Up to 500 000 hectares of land in Guatemala are suitable for jatropha cultivation using the JMax 100 cultivar.

With the announcement, SG moves from development to its commercial phase, and said that it is seeking customer partnerships immediately to develop opportunities for JMax 100's deployment. The company is seeking to form partnerships with other departments of agriculture, oil companies, financial investors or owners of large tracts of land in other parts of the world.

SG is collaborating with the Hawaii Agriculture Research Centre (HARC) to develop a customized Jatropha cultivar that can be used to meet the high local demand for locally-grown renewable fuel.

Commenting on the cycle of promise and despair that has plagued jatropha development in recent years, Haney said that "the reason jatropha was hyped was that the promise was so high, but the proper work wasn't done," lamenting the "high-profile failure" of D1 Oil's original business models and first round of plantation.

But he added that "JMax 100 is the tip of the iceberg in the development of Jatropha as a renewable energy crop," said Haney. "While Guatemala now has a significant head-start, we anticipate continued advancements through the JMax platform that will further enhance the productivity and profitability of Jatropha for growers around the world."

In a separate announcement, chemists at UC Davis have developed a new process that can convert both plant oils and carbohydrates into biodiesel in one process. The system converts carbohydrates into levulinic acid esters that can increase yields by up to 24 percent and performs better in cold temperatures. The researchers said that production costs were higher, but would be offset by improved fuel yields.

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Pilot project to reduce energy use in 11 old city buildings

The first large scale Clinton Climate Initiative (CCI) project in South Africa encompasses the retrofit of 11 City of Johannesburg buildings. The aim: to reduce energy use and fight climate change. The contract, which was highly contested and carries significant status, was awarded to Johnson Controls Systems & Service, South Africa, in November last year.

Neil Cameron, general manager of Johnson Controls Systems & Service South Africa says that as one of the CCI's C40 cities, the City of Johannesburg has committed itself to the reduction of carbon emissions and the reversal of climate change.

This project marks the physical initiation of that campaign in South Africa and will provide the blueprint for the implementation of energy saving programmes to be implemented at other City of Johannesburg structures."

The project, worth an estimated R20 million, will begin with an investment grade audit of the buildings by Johnson Controls. These reports will identify potential savings of as much as 25 percent of current energy expenditures and retrofit requirements. Phase Two, the implementation of the recommendations, will begin in the second quarter of 2010.

The council-owned buildings identified for this pilot initiative are in Dobsonville, Ennerdale, Jabulani, Lenasia, Meadowlands, Newtown, the Metro Centre, Museum Africa, Putco, the Roodepoort City Hall and Roodepoort Civic Centre. The project will include: lighting retrofits; boiler and chiller plant optimisation; improvements to electrical systems; roof, window and building improvements; and more.

Says Cameron: "This contract reflects the credibility of Johnson Controls and the high regard in which it is held in the South African market. It also enhances our reputation in the country as a recognised expert in this field with the capability to contract on this scale."

"Johnson Controls is a leader in the energy management market in South Africa, achieving over $50-million per annum in energy savings for its customers. However, local companies have been slow to adopt performance contracting.

Cameron says that every small contribution to preventing global warming has value and Johnson's performance-contracting approach provides companies with a means to start immediately, without incurring massive capital expenditure, and initiate energy saving measures from the outset.

The decision by the South African government to make use of this approach – effectively financing the project through energy savings over the next 20 to 25 years – will provide tangible benefits, opening up the market for further deals of this kind."

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New enzyme to reduce costs of biofuels

American company, Novozymes, has launched the first commercially viable enzymes for production of biofuel from agricultural waste after a breakthrough in enzyme technology that allows cellulosic biofuel to be a competitive alternative to gasoline.

Novozymes' new Cellic CTec2 enzymes enable the biofuel industry to produce cellulosic ethanol at a price below $2.00 per gallon (R3,29 a litre) for the initial commercial-scale plants that are scheduled to be in operation in 2011. This cost is on par with gasoline and conventional ethanol at current US market prices.

"We have been working on this for the past 10 years and promised our customers and the market to be ready by 2010," says Novozymes' chief executive, Steen Riisgaard. "Biofuel producers now have a critical component to turn agricultural waste into a competitive alternative to gasoline."

Extraordinary advances in enzyme development have reduced the enzyme cost for cellulosic ethanol by 80 percent over the past two years and enzyme costs are now down to about 50 cents a gallon of cellulosic ethanol.

Novozymes has used its own financial resources for the research and development of the new enzyme but also received development grants totaling $29.3 million from the US Department of Energy.

Novozymes has partnered with leading companies in the biofuel industry, such as POET, Greenfield Ethanol, Inbicon, Lignol, ICM, M&G, CTC, COFCO, Sinopec, and PRAJ to help accelerate process technology development and implementation. Coupled with further improvements in enzyme efficiency, Novozymes expects the cost to produce cellulosic biofuel to be further reduced.

"Cellulosic ethanol will be cheaper," says Riisgaard. "Our partners expect production costs to fall below $2.00 a gallon once their first commercial scale plants are fully operational, and the cost will continue to drop in the future."

Cellulosic ethanol uses enzymes to break down cellulose in biomass into sugars that can be fermented into ethanol. Cellic CTec2 has proven to work on many different feedstock types, including corn cobs and stalks, wheat straw, sugarcane bagasse, and woodchips.

A number of pilot- and demonstration-scale facilities are in operation all over the world, while large-scale commercial facilities are under construction and scheduled to be running in 2011. Moving to higher blends such as E15 and promotion of E85 are still needed to meet the cellulosic ethanol targets defined by the Renewable Fuel Standard.

Commercialisation of cellulosic biofuel is expected to create 1,2-million new green jobs in America alone by 2022.

GMSA extends water saving initiatives

General Motors South Africa has initiated a number of water-saving initiatives in its two Port Elizabeth plants in order to reduce consumption per vehicle produced.

Since the drought in the region has intensified, the company has been looking at ways to meet Nelson Mandela Bay Municipality's call for industry to reduce its consumption by 25 percent.

According to Mike Pearton, GMSA vice president of manufacturing operations, the company held two full-day workshops with engineers and management to find reliable and sustainable ways to reduce the company's reliance on municipal water and to look into recycling the effluent streams so that we can reach the 25 percent water reduction target," he said.

As an ISO 14001 certified company, resource conservation has been integrated into all of GMSA's operating processes. Pearton said between 2007 and 2009 the company reduced its water consumption by more than 50 percent but concedes that even more needs to be done using new technologies to reduce consumption and eliminate waste generation in all operations."

GMSA and the Port Elizabeth Regional Chamber of Commerce and Industry (PERCCI) continue to engage with the municipality on water conservancy initiatives. The sharing of information on water saving best practices has been one of the group's key objectives. "The 25 percent saving is tough on all of us, but the successes attained in one company could be applied by other companies with exponential effects in a relatively short time," said Pearton.

Furthermore, Pearton says water saving initiatives should not be limited to companies.

"We need to start saving so much of the water wasted in our schools in our city because of vandalism. We need to stop copper pipe theft and we need to set up a partnership between the municipality, Department of Education and various industries to upgrade water infrastructure throughout the Eastern Cape," Pearton added.

As part of its broader commitment to saving water, GMSA recently fixed the ablution and drinking facilities at Vezubuhle Primary School in Motherwell where copper pipe theft caused severe water wastage. The conventional tap heads have been replaced with water-efficient taps that only release water on demand resulting in significant savings.

Solar cells made with silicon ink receive US patent

Innovalight has been awarded a patent for manufacturing of crystalline wafer solar cells made with silicon ink by the United States Patent and Trademark Office.

The patent was issued in a record time of just one year compared with the normal three-year cycle required to have a patent granted. The issued patent covers a novel process for the commercial manufacture of high-efficiency selective emitter solar cells with silicon ink.

Innovalight's proprietary nano-technology-based silicon ink and processing technologies allow crystalline silicon solar cell manufacturers to significantly boost output capacity and solar cell performance as well as reduce costs.

Crystalline silicon solar cell technology accounts for about 77 percent of the commercial solar panel market today according to solar industry research firm Navigant Consulting.

"This is a great accomplishment for Innovalight, and it's a true success in the Department of Energy's PV Technology Incu-bator Programme," claims Martha Symko-Davies, senior programme manager at U.S. Department of Energy's National Renewable Energy Laboratory.

"Innovalight was awarded a sub-contract of $3-million through the laboratory that was funded by the DoE and this contributed to their achievements," she added.

Innovalight raised an additional $18-million in capital and this money will be used to expand the company's proprietary silicon ink production capability. The financing was led by EDB Investments of Singapore along with Vertex Venture Holdings.

"We are very happy with this patent, both with the breadth of claims and the ability to immediately provide our licensees with a substantial competitive advantage in the marketplace for selective emitter solar cell architectures," said Alex Sousa, intellectual property counsel for Innovalight.

"2010 is going to be a landmark year for the company and this is the first of what we expect to be a large portfolio of interlocking patents covering both enabling materials and manufacturing methods for low-cost high-performance solar cells," he added.

The company has a development roadmap to ultimately bring conversion efficiencies of solar cells to over 20 percent using its platform for silicon ink and processing technologies.

Innovalight already has over 60 patents filed for silicon ink and high-efficiency solar cells using silicon ink processes.

Innovalight is based in California.

The company specialises in developing low-cost, high-performance solar energy technology using proprietary silicon ink nanotechnology.

Innovalight is backed by venture capital For more information go to the company's website at www.innovalight.com

Scambusters out to halt Internet fraud

A crack squad of detectives has been formed in Britain to tackle online fraudsters operating throughout the country (and throughout the world) and already £4,3-million has been invested by the British government in an effort to stop Internet and e-mail scams.

An estimated £3,5-billion is lost in all types of Internet scams in Britain every year. In fact recent research by the Office of Fair Trading in that country found that 73 percent of adults had received at least one scam e-mail in the past year.

More surprisingly, almost ten percent of adults – or four million people – have responded to the scams. According to the report, almost half of those who responded to the scam lost more than £50 while about five percent lost more than £5 000 each.

The focus of the scams has apparently shifted from collecting money through one or other form of 419 fraud to taking fraudulent orders for goods that are paid for but never delivered.

Consumer Minister in the British Government, Kevin Brennan says the Internet is transforming the way many people shop for products. Because of this, fraudsters are setting up websites that offer hard-to-find goods or collector's items to attract customers.

The team of detectives – known as the Scambusters – says that it is particularly hard to stop Internet crimes or to track down and convict any of the conmen. John Peerless, who works with the Scambusters admits that so far there have been no convictions of conmen in Britain, although many websites have been closed down.

Golf cart with a difference – it's grenade proof

An armaments firm in India has designed and built a mini-armoured car that can be used in confined spaces such as airports, hotels and office blocks. Known as the Anti-Terrorist Assault Cart (Atac), it resembles a bullet-proof golf cart. It has two firing ports.

The unit costs two million rupees (about R325 000) and was designed after terrorists attacked and killed 165 people (including nine gunmen) in two hotels in Mumbai in 2008.

The Atac can be used to get people out of danger or to end a hostage drama and is capable of engaging with terrorists or criminals.

According to SW Thatte, vice president of MetalTech – the company that built the Atac – the unit can withstand a grenade blast, has bullet-proof windows, four firing ports and can manoeuvre along corridors and into lifts.

It has a top speed of 25 km/h and runs for up to six hours on a single charge. It can carry two fully armed and specially trained commandos and is virtually silent because it runs on batteries. It is designed to a level three protection level and has enough space to carry two additional people at a time.

It weighs about 450 kilograms (which is probably less than a golf-cart carrying two obese American golfers and their clubs).

Mentorship

The SAIEE is offering mentorship and advice to young engineers.

The offer comes at a time when our country is suffering a shortage of skills, and we believe that mentoring is an essential requirement in the training and development of the next generation of engineers.

If, as a member of SAIEE, you believe that you need a mentor you can request a mentorship service from the Institute.

The service will be of particular benefit to those young engineers working under the leadership of busy and pressurized engineers, who may not have the time to spend with the young engineers discussing and planning their career paths.

This service is particularly relevant to young engineers who are working in an environment devoid of engineers or with non technical managers. The young engineer may feel frustrated because he or she cannot benefit from the wisdom of an experienced engineer.

It will give a young engineer, the mentee, a chance to talk to a mentor, who will be his or her advisor, teacher and role model, away from the work environment. His or her mentor, matched to a similar profile, will understand the mentee's work and personal situation, having been there him- or herself.

The mentee will be able to discuss problems and frustrations with his independent mentor, who would have no stake in the outcome, and who would be able to provide an unbiased opinion and advice. The mentee might not be able to do so with his superiors, particularly if he is unhappy, and is considering an alternative career.

The mentor and mentee could arrange to meet regularly, but not too often, say a few times a year, when both should have enough time to listen properly to what the other has to say.

The mentor could recommend to the mentee what course of action to take without being too prescriptive while the final decision and the consequences remain with the mentee.

Among its more than 5000 members the SAIEE has many experienced engineers who are willing to act as mentors. They are are spread across the country and include engineers who are experienced in steelworks, furnaces, rolling mills, mining, manufacturing, electrical generation, transmission and distribution, through to light industrial, process control, instrumentation, telecommunication, robotics, automation, software development and engineering management of these sectors.

So if you feel that you would benefit by talking to a mentor, please contact Ansie Smith on the number below. She has a database to match the profiles of mentors and mentees.

Prospective SAIEE Mentors

If you feel you that you have the time and interest to help mentees, please contact Ansie Smith on smitha@saiee.org.za or 011 487 9050,

In addition you gain CPD credits, for when you are required to re-register.

Encrypting TETRA networks - technology is not the only answer

By Viv Crone, CTO of Spescom Limited

There is increasing demand for speech and data services, especially during times of crisis, when overloading of traditional GSM and analogue networks can make communication impossible. TETRA, or Terrestrial Trunked Radio, is a telecommunications standard designed specifically for Professional Mobile Radio (PMR) systems to enable emergency and other critical services to cope with data and communication congestion challenges when a disaster strikes.

TETRA networks support the use of applications for secure speech and data transfer, automatic vehicle location, railway applications, road transport information, file transfer and access to databases, fax, fixed image, slow video and fleet management. The network is a robust system that works under any and all conditions. This has made it the de facto standard for networks that need to be fail-safe and always available. It is so effective that it is even being adopted by sectors outside of emergency services, such as at airports and elsewhere in the transport sector.

In addition, TETRA has very effective security mechanisms to prevent eavesdropping, traffic analysis, user behaviour observation, masquerading, replay, data manipulation, denial of service and, in particular, prevention of unauthorised use of resources.

Security mechanisms include user authentication; air interface encryption, which protects content between the handset and the base station by encrypting the air-link, ensuring impossibility of eavesdropping; and end-to-end encryption, which protects content over the whole link between handsets by encrypting the data at one handset and decrypting it at the other.

However, to be secure, any encryption system still needs expert management to ensure effectiveness. For example, while end-to-end encryption encrypts data between handsets, ensuring that communications are secured throughout the system and removing the possibility of interception and monitoring, this does not necessarily mean that all information stored in the communications network is secure. There is still the possibility of a security breach within the network infrastructure where files are stored.

Stored data, such as recorded interactions, are an often overlooked aspect of security. To create a 'watertight' environment, some may argue that it is necessary to ensure that recordings are stored in an encrypted format as recordings stored in an open data server environment generally rely upon standardised physical and network security – and are vulnerable to weaknesses in these systems.

Encrypting stored recordings makes it impossible for eavesdroppers to get hold of this data as, in order to access it, operators must identify specific keys and algorithms, retrieve the file from storage and present it with the relevant decryption keys to a playback decryption device. However this is where a catch 22 situation can arise.

Since encryption of recordings makes rapid replay, combination and analysis more difficult, users may tend to 'simplify' the process. This may then lead to a general laxity with regard to making unauthorised copies, for example that will effectively reduce the security of the system to the level of open storage and place the security of critical information at risk.

From a technical point of view, TETRA security mechanisms are sophisticated enough to do the job adequately and protect the network from end to end.

However, from a management perspective, all things have their price, and as stated above, too many security processes can actually compromise the security of the network rather than strengthen it.

The best way to ensure real security of TETRA networks is not to rely solely on technology. The continuous adding of new security tools in an effort to become more secure can in fact place the security of the network at risk.

The solution requires the use of appropriate technology used in conjunction with a system of strict and sensible management, to ensure that processes are adhered to and that the security of the network is not breached through carelessness or conflicting technology.

Spescom is listed on the Johannesburg stock exchange and operates in the information, communications and technology sector. It was founded in 1977 and has developed and delivered a number of world – first technologies' innovative products and services for local and global markets.

Spescom's core focus is the delivery of integrated business communication solutions that leverage voice, video and data technologies to enhance the way businesses communicate with their customers.

The depth of technical expertise extends throughout its four divisions, Spescom DataFusion; Spescom DataVoice; Spescom Telecommunications; and Spescom Media IT. These operations combine to deliver world-class solutions, integrated contact centre platforms and applications, a range of voice application technologies, telecommunications and broadcast solutions.

The company has a staff complement of 258 with offices located in Johannesburg, Cape Town, Durban and London. For more information about Spescom visit www.spescom.com.

Hackers pose a real threat to GPS devices

Devices that use satellite navigation signals to work out their exact position are increasingly vulnerable to hackers according to Professor David Last, former president of the Royal Institute of Navigation.

Jamming of sat-nav signals with noise signals is increasing by even more sophisticated methods that are being developed to allow hackers to send information that is incorrect and actually changes what the display shows.

He says this poses a threat to parts of Britain's national infrastructure.

Last was addressing experts attending a special meeting organised by the Digital Systems Transfer Network and warned that the global positioning system is widely used for transportation, distribution, 'just-in-time' manufacturing, emergency service and a wide range of mining and farming applications too.

He warned delegates that few people realise that the high-precision timing provided by GPS keeps the telephone networks operating, the Internet up and running and even controls Britain electricity grid.

According to Last, the signals from each satellite in a sat-nav constellation are putting out less power than a car's headlight, illuminating more than a third of the Earth's surface from a distance of about 20 000 kilometres.

These signals can easily be swamped by noise from equipment back on Earth and warns that it can be done intentionally. Military systems have been using noise to jam the GPS frequency with near, but now small jamming devices readily available on the Internet.

Such a device costs less than £100, can run for hours on a small battery and can confuse sat-nav receivers tens of kilometres away. Higher powered, more expensive devices can jam both the sat-nav and mobile phone frequencies.

He says it's now possible to buy a low-simulator, link it to Google Earth, put on a route and it will simulate that route to the timing you specify. A GPS receiver that is interfered with in this way will display the route that has been specified by the simulator.

By confusing the sat-nav signals, criminals could use these simulators for jamming high-value cargo, armoured cars, rental cars or any other tracking signals. And, he warns, that's where the real danger lies.

Last says that even the new Galileo system that's being built right now is vulnerable to such jamming methods.

Kriek quits as PBMR funding begins to dry up

American company, Westinghouse may need to provide additional funding for South Africa's pebble-bed modular reactor (PBMR) after the South African government announced that it would significantly reduce its contribution to the company.

In a separate development – that may possibly be linked to the funding shortages facing the company – Jaco Kriek, chief executive of PBMR quit with immediate effect. It is likely that, without government funding, at least 75 percent of PBMR's 800 employees could face retrenchment.

PBMR spokesman, Tom Ferreira, says that Kriek's decision to resign was not linked to changes in funding from government because the government is only due to take a decision on the future of nuclear power in August this year.

Kriek, who is a chartered accountant, says he is planning to look for new challenges in the energy sector.

In a rather terse notice the Department of Public Enterprises "noted" Kriek's resignation and thanked him for his service over the past six years as chief executive of the company.

Last month the Minister of Public Enterprises, Barbara Hogan said that an inter-ministerial task team would be formed to decide the future of nuclear energy and the PBMR project.

She is adamant that South Africa wants to maintain the PBMR project and the technology, expertise and skills that have developed as a result of the small nuclear power plant's development.

Westinghouse's director of business development, Rob Pearce, says that the company will certainly consider investing in the PBMR project in the future and may even bring additional partners into the project.

The government, in 2006/07 allocated about R7,2-billion to build a new modular reactor and to make the fuel to provide enriched uranium needed to generate electricity using this technology. Last year a further R1,7-billion was allocated to the project.

Energy Minister, Dipuo Peters has repeatedly said that South Africa can expect to have a new nuclear power plant capable of generating 20 000 MW running by 2020 and the Department of Energy is due to release its second integrated resource plan in June this year to clarify how a nuclear build programme will be implemented.

King Tutankhamen died of malaria say scientists

King Tutankhamen, a teenage pharaoh whose tomb in Egypt has yielded an array of dazzling treasures, died of malaria according to scientists from Egypt and Germany.

There has been much speculation about how the boy-king died in about 1324 BC at an estimated age of just 19. His tomb was discovered in 1922 in Egypt's Valley of Kings.

Tests performed on 16 royal mummies found that four of them, including King Tut, had contracted a severe form of malaria. However, they have not ruled out that he may have been murdered or may have had some other sickness.

Scientist Zahi Hawass, of Egypt's Supreme Council of Antiquities, says the results of genetic and radiological tests performed on the mummies between 2007 and 2009 indicated that four of them had contracted malaria.

King Tut was not a well boy by all accounts as he appeared to have broken his leg, possibly from a fall and had been born with a cleft palate, a mild clubfoot and other bone ailments.

The combination of complications from the broken leg and malaria are thought to have killed him.

He, and other members of the royal family had a form of Kohler disease, which can cause foot bones to collapse from a lack of blood. However, Kohler disease is not regarded as life-threatening.

According to Hawass tests showed that Tutankhamen had multiple disorders and these might have reached the cumulative character of an inflammatory immune-suppressive syndrome.

The scientists are also fairly certain that they have identified mummies belonging to Tutankhamen's father Akhenaten and his grandmother, Tiye, based on shared blood groups.

The paper, published in the Journal of the American Medical Association contradicts speculation that King Tut and his forebears had severe abnormalities.

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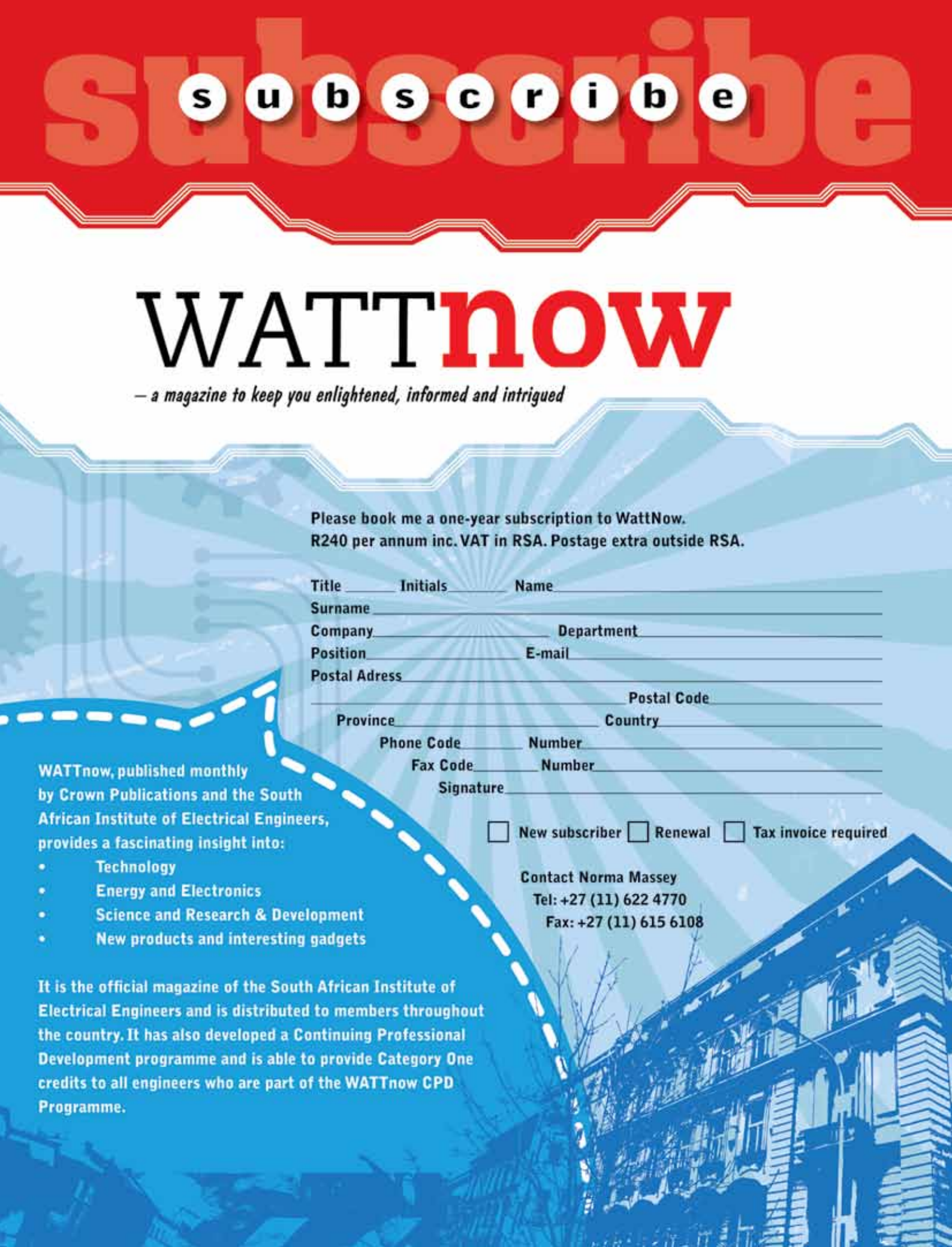
It is the official magazine of the South African Institute of Electrical Engineers and is distributed to members throughout the country. It has also developed a Continuing Professional Development programme and is able to provide Category One credits to all engineers who are part of the WATTnow CPD Programme.



Indian Ocean may contribute to El Nino

New methods of tracking climate patterns over the Indian Ocean could improve the early-warning systems for the El Nino phenomenon and could help to save lives and billions of dollars lost each year because of severe weather.

Researchers in Japan and France have created a new forecast model that can predict an El Nino phenomenon up to 14 months ahead of time according to a paper published in Nature Geoscience.

The El Nino phenomenon is a climate pattern that occurs periodically over the Pacific Ocean and is recognised for causing weather disruptions that range from floods in one part of the world to droughts in another part of the world.

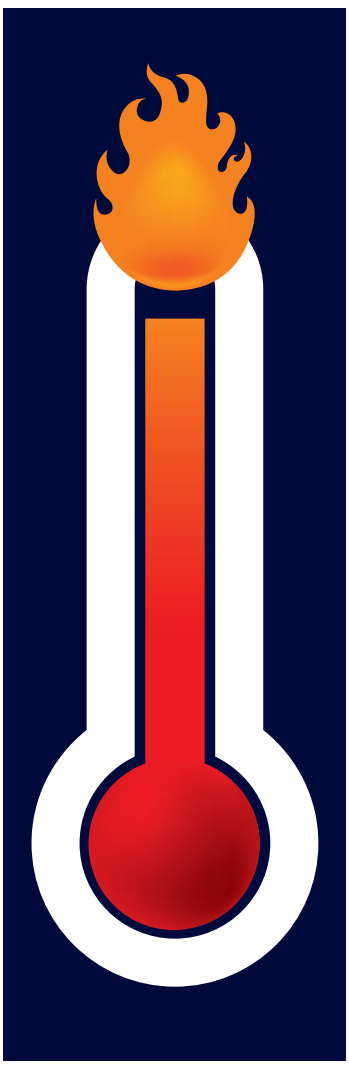
Developing countries that rely on agriculture and fishing are often most badly affected by the severe weather changes. The 1997-98 El Nino cost the United States an estimated $25-billion according to the US National Oceanic and Atmospheric Administration.

Lead researcher, Takeshi Izumo and his colleagues found that the Indian Ocean Dipole (IOD), the equivalent of an El Nino in the Indian Ocean, played a role in the formation of the phenomenon.

He says the IOD is the missing piece in the puzzle that triggers an El Nino. In the study, researchers produced a simple forecast model and included the impact of the IOD and while the usual causal factor for El Nino is warm water volume recharge, the model showed the IOD was also an important causal factor.

The 1997 El Nino was one of the strongest on record and apart from the devastation it caused in the United States, it caused raging forest fires in Indonesia and contributed to droughts that halted crop production in various African countries.

Scientists say that earlier warnings of the development of an El Nino can mitigate against the consequences of the changes in climate patterns in various parts of the world.



Explosion creates four-trillion degree temperatures

Scientists at Brookhaven National Laboratory have created the hottest temperature ever made in a laboratory, reaching four-trillion degrees Celsius and hot enough to make the kind of soup that must have existed microseconds after the birth of the universe.

The scientists used a giant atom smasher at Brookhaven to knock gold ions together to make the ultra-hot explosions that lasted for milliseconds. They say the explosion is enough to give physicists enough data to study for years as they try to understand how and why the universe was formed.

The temperature was hot enough to melt protons and neutrons. These particles make up atoms but they are themselves made up of smaller components called quarks and gluons.

The scientists used the Relativisitic Heavy Ion Collider, a particle accelerator and collider that is 3,2 kilometres long and is buried 3,6-metres below ground. The accelerator was built to simulate the creation of matter at temperatures first encountered in the early universe, says lead researcher Steven Vigdor.

He says the predicted melting temperature of protons and neutrons is two-trillion degrees. The temperature at the core of a typical Type-Two supernova is two-billion degrees. The centre of the Sun is 50-million degrees while iron melts at 1 800 degrees.

The average temperature of the universe is 0,7 of a degree above absolute zero.

Vigdor's team believe that they were observing a recreation of the moment just before the quark-gluon soup condensed into hadrons – the particles of matter that make up most of our universe.

Later this year physicists using the Large Hadron Collider in Switzerland hope to smash lead ions into each other to create even hotter temperatures that should replicate moments that occurred even earlier in the birth of the universe.

Vigdor says that many physicists agree that something happened in the milliseconds after the Big Bang that created an imbalance in favour of matter over anti-matter. If there had not been this disparity, Vigdor says, matter and anti-matter would have simply reacted to create a universe of pure energy.

Brookhaven has already patented some potential commercial applications from the research done by Vigdor's team. For instance, quarks spin in different directions and understanding how and why they do so will help scientists to harness that power.

In fact, scientists at Brookhaven believe it may be possible to replicate a symmetrical spin in graphene, for example, and use graphene as a nano-material to replace silicon in super-fast, super-small devices used in computers.

SANEA

The South African National Energy Association

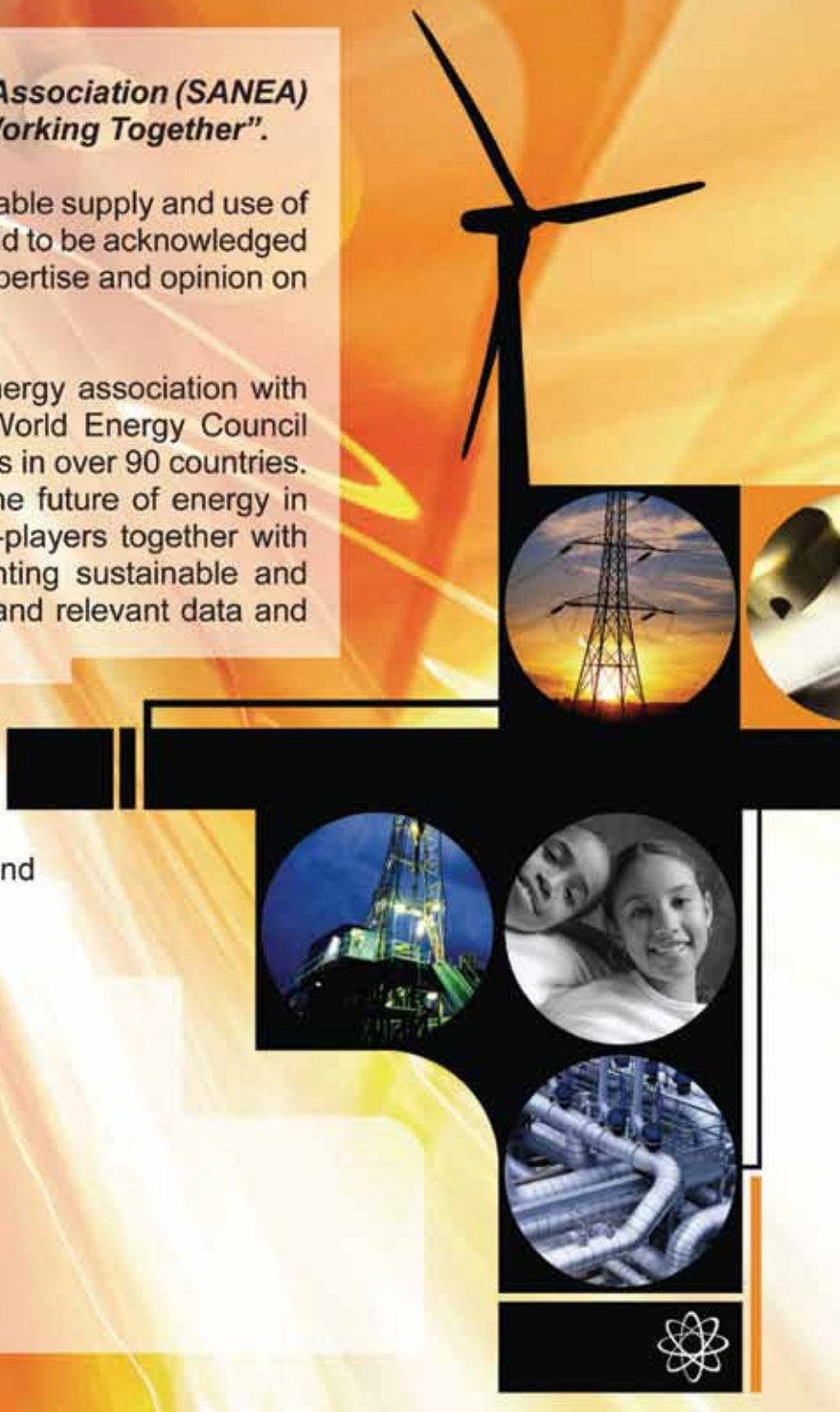
Energy People Working Together

The South African National Energy Association (SANEA) has as its vision "Energy People Working Together".

SANEA strives to promote the sustainable supply and use of energy for the greatest benefit of all and to be acknowledged as a credible centre of knowledge, expertise and opinion on energy matters.

SANEA is a non-partisan, diverse energy association with international networks through the World Energy Council (WEC). WEC has member committees in over 90 countries. SANEA is playing a pivotal part in the future of energy in South Africa, bringing influential role-players together with a view of identifying and implementing sustainable and effective solutions, providing factual and relevant data and knowledge,strengthening the energy network in South Africa and globally, and enhancing awareness of energy issues in South Africa.

We want you to partner with us – Join SANEA as a member and let your voice be heard!



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British Library to create oral history of science

The British Library has started working on a project to create an online oral history and archive of British science and the three-year task will see more than 200 British scientists being interviewed, their recollections recorded and made available online in an audio library.

An advisory board has been set up to choose the most important technological innovators and scientists who will be interviewed. Dr Rob Perks, curator of oral history at the British Library, says that there are two recordings of Ernest Rutherford – regarded by many as the father of nuclear physics – and a recording of Christopher Cockerell who invented the hovercraft.

A study carried out before the project showed that in the last 10 years, 30 leading British scientists, including nine Nobel prize winners – had died leaving little or no archive of their work or their achievements.

Perks says the oral history project will try to stem this loss of information and encourage working scientists to preserve their work. He says the project will look into what was behind any of the important breakthroughs in science rather than focus purely on those eureka moments.

Each scientist chosen for the project will be asked about his childhood, education, influences, relationships and frustrations giving a picture of how science has been – and still is being – practised.

Artificial pancreas tested and works

Researchers at Cambridge University have made an artificial pancreas that will help to control or improve blood sugar levels in patients with diabetes. The device has been tested on 17 children with Type One diabetes during a series of nights in hospital.

The apparatus kept blood sugar levels within the normal range for 60 percent of the time. The system means that diabetes sufferers would have to wear a monitor about the size of a matchbox and a similar-sized pump that delivers insulin into the body via a very thin tube.

Medical researchers have been working for years to try and develop an artificial pancreas and, so far, this is the first apparatus that has been tested on humans. Lead researcher for the project at Cambridge University, Roman Hovorka, believes these devices will transform the management of Type One diabetes but concedes that it will take several years for the device to be commercially available.

The Juvenile Diabetes Research Foundation has teamed up with Johnson & Johnson's Animas unit – which makes insulin pumps – and DexCom – manufacturers of monitoring devices – to develop and test a different artificial pancreas.

Current pump technology delivers insulin into the bloodstream at pre-set rates whereas the Cambridge unit only provides insulin when it is needed. There are millions of people who suffer from the auto-immune disease that stops the body from making insulin to break down sugar.

28 foundries to get government assistance

The new Technology Localisation Programme will assist 28 foundries with technology assistance packages that would enhance their capabilities in terms of accessing contracts and creating jobs. The Department of Science and Technology Minister, Naledi Pandor, launched the programme.

This programme forms part of the government's competitive supplier development programme (CSDP), an initiative by the Department of Public Enterprises, the Department of Trade and Industry and the Department of Science and Technology.

The United Nations Industrial Development Organisation supports the programme, which aims to increase South Africa's participation in major international procurement opportunities.

She says that there are a total of 117 foundries around the country and 28 of these were selected for the assistance packages because they would be the companies most ready to produce components for original equipment manufacturers and would qualify for contracts awarded by two state-owned enterprises, namely Transnet and Eskom.

Pandor emphasised that the government did not intend interfering in normal business practices and said that the foundries benefitting from the assistance packages would still have to tender for and compete with other foundries before being awarded a contract by any state-owned enterprises including Eskom and Transnet.

She says the Department will provide the 28 companies with support that allows them to use "lean and clean" manufacturing casting technologies and will also have access to the department's activities in advanced manufacturing and the use of light metals.

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Satellite – calibrated to help weather forecasters

Fully calibrated images from the European Space Agency's Smos satellite show large swathes of Scandinavia, Australia and the Amazon and the maps record the amount of moisture held in soils and the quantity of salts dissolved in sea water.

The data is expected to improve the accuracy of weather forecasts and provide warnings about impending disasters such as floods. Smos was launched in November last year and uses a single instrument, an interferometric radiometer called Miras.

The instrument is eight metres across and looks similar to a helicopter's rotor blades. It measures changes in the wetness of the land and the salinity of the ocean water by observing variations of the natural microwave emission coming upwards of the surface of the planet.

To do this the instrument has 69 antennas that work in unison to produce a single image. The instrument produces a single temperature snapshot every 1,2 seconds.

One of the problems for scientists has been interference with the signal, which operates in the supposedly protected L-band (21 centimetre) spectrum. Many spurious signals over China, western Russia and large parts of Europe have been detected.

As a result of these signals, the scientists had to tune the reconstruction algorithm to clean up the images and this was one of a number of calibration exercises undertaken to ensure that the scientific community received reliable and usable data.

The instrument will also be used to provide scientists with a better understanding of the hydrological cycle or how water is constantly exchanged between the Earth's land and ocean surfaces and the atmosphere.

The satellite is part of ESA's Earth Explorer programme that will eventually have eight spacecrafts collecting data about the environment. The first satellite, Goce was launched early in 2009 and the third satellite, Cryosat-2 has just been launched. It will assess the extent of the world's ice cover.

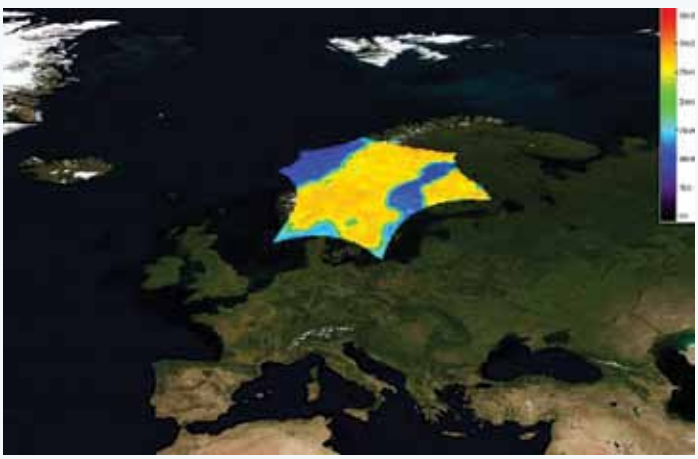

Image of brightness temperature over Scandinavia captured by SMOS. Credit: ESA.

Flightless female mosquitoes may cut malaria deaths

Scientists have genetically modified mosquitoes in a laboratory at the University of California to produce flightless females in a bid to help slow down the spread of dengue fever and malaria in African and Asian countries.

There is no vaccine or treatment for dengue fever, which is endemic in the tropics and is particularly prevalent in Asia and the western Pacific. The disease, which causes severe flu-like symptoms and can kill, is spread through the bite of infected female Aedes aegypti mosquitoes.

There are an estimated 50-million cases of dengue fever each year and about 2,5-billion people are at risk of contracting it in Asia or Africa. Malaria is caused by a bite from the female anopheles mosquitoes infected with the plasmodium parasite.

Malaria infects between 350- and 500-million people each year killing between one and three million people – about 90 percent of them living in Africa.

Oxitec, a British biotechnology company worked with lead researcher Anthony James of the University of California to create the modified gene. Oxitec has applied for a patent on its work.

Scientists claim that by genetically modifying the mosquitoes to produce flightless females they could suppress dengue fever and malaria within six to nine months.

The genetic modification affects only female mosquitoes and does not prevent male mosquitoes from developing or flying normally.

The plan is to distribute tens of thousands of eggs that would hatch into genetically modified males. These males would fertilise the females' eggs, which when they hatched, would produce flightless females.

The genetic modification is completely species specific and released males will only mate with females from the same species.

James says that the genetic modification of the mosquitoes is more environmentally friendly than the widespread use of insecticides.

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- Consultants
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- Representatives
- State and/or Local Government Representatives
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Siemens develops new power supply units

New 12V and 24V power supplies for the lower performance ranges up to 30W have been developed by the Siemens Industry Automation Division.

The new Sitop PSU100C units of the Sitop compact product line feature a slim-line, space-saving design with a wide-range input for single-phase AC and DC networks. One of their main characteristics is low energy consumption – for example due to no-load losses and high efficiency even in partial-load operation.

In the first delivery stage, Siemens supplies two units for the output voltage 24 VDC, 0.6A/15W and 1.3A/30W, as well as a unit for 12 VDC with 2.0A/24W. Further units with output voltages of up to 100W will follow.

The Sitop PSU100C switched-mode power supplies have a wide-range input for single-phase AC networks between 85 – 264V and for DC networks between 100 – 300V. One of the main characteristics of the Sitop PSU100C power supplies is the high energy efficiency. For example, energy losses during no-load operation – such as in standby mode – are extremely low at around 0.5W.

The constantly high efficiency across the entire load range, including partial-load operation, also saves energy. The new units are ideal for operating temperatures between -20°C and +70°C and feature an adjustable output voltage and a user-friendly connection system using plug-in terminals.

The space-saving, slim-line design of the unit requires only a minimum of mounting space on the DIN rail. Backed up by comprehensive international certification packages such as ATEX and Germanischer Lloyd, the units are suitable for decentralised applications in industry, infrastructure and building technology all over the world – ranging from mechanical engineering (series and special machines) through heating and air-conditioning systems, conveyor and safety technology and transportation systems to regenerative energies and agriculture.

The Siemens Industry Sector has its headquarters in Erlangen, Germany and is one of the world's leading suppliers of environmentally friendly production, transportation, building and lighting technologies.

With integrated automation technologies and comprehensive industry-specific solutions, Siemens claims to increase the productivity, efficiency and flexibility of its customers in the fields of industry and infrastructure. The Sector consists of six divisions: building technologies; drive technologies; industry automation; industry solutions; mobility and Osram. The company employs 207 000 people worldwide and sales totalled €35 billion.

The Siemens industry automation division is based in Nuremberg, and is one of the world's top suppliers of automation systems, industrial controls and industrial software. Its portfolio ranges from standard products for the manufacturing and process industries to solutions for whole industrial sectors that include automation of entire automobile production facilities and chemical plants.

As a software supplier, this division provides a turnkey service from product design and development to production, sales and maintenance services. The division employs 39 000 people worldwide and achieved sales of €7-billion last year.

Westcor project dumped in the Congo River

The dream of hydro-electric power being generated on the Congo River and electricity being distributed to Angola, Namibia, the Democratic Republic of Congo DRC), Botswana and South Africa have gone up in smoke.

And Westcor is being wound up immediately, with its last board meeting scheduled for the end of March and its offices closed and staff laid off by June.

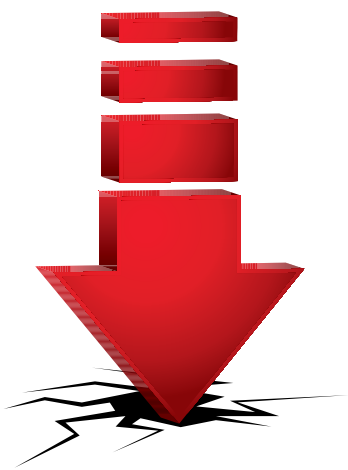
This was announced after the Westcor SADC Energy Ministers' meeting held at the SADC Secretariat in Kinshasa in February. The DRC energy minister has agreed to develop a new project, with a new mandate, based on the possible exploitation of alternative schemes.

This undertaking, according to a statement released by Westcor, will see a new inter-governmental memorandum of understanding and a new inter-utility memorandum of understanding being drafted for ratification by the five energy ministers of the states formerly involved in Westcor.

A meeting will be held in Angola in April to establish exactly what the financial obligations of each state are in order to close Westcor.

Staff members seconded by member states to the Westcor project will be repatriated and will return to their previous positions with the utility companies where they were employed.

I guess all you can say is "that's the end of that then.



Hino light-duty hybrid trucks coming soon?

Hino Motors, Ltd officially launched the Hino 300 Series Hybrid truck, in Hong Kong, having already sold more than 100 units in Australia. Hong Kong is the second overseas market where these trucks are available.

The HINO 300 Series Hybrid features superior fuel efficiency while meeting customer's eco-drive needs. The Hino Hybrid is an environmentally friendly vehicle, offering lower carbon dioxide emissions and reducing strain on the environment.

Hino began commercial production of parallel hybrid buses with diesel and electric power in 1991 as the global forerunner, followed by its launch of the world's first light-duty hybrid truck in 2003. Hino had sold more than 6 800 hybrid trucks and buses as of the end of December 2009.

By applying its diesel-electric hybrid technology cultivated through years of development, manufacturing and sales experience, Hino aims to expand its hybrid vehicle offerings in the global market, to further help reduce environmental impact.

http://www.quickpic.co.za or please call Craigh Smith on 082 468 8032 for login details.

Underground coal fires cause major carbon emissions

Literally thousands of coal fires are burning underground in the United States, India, China and Africa and yet little is actually known about their impact on climate change or on human health according to Dr Glen Stracher, a researcher at the East Georgia College in Swainsboro.

He has identified at least 200 huge underground fires in 20 states in America. The causes of these underground fires range from spontaneous combustion to lightning or bush fires that ignite the coal seams underground. He says that some of the fires reach temperatures of about 260 degrees C.

Stracher says that analysis of heat-fused rock clinkers show that underground coal fires are an ancient phenomenon and have been occurring for at least a million years or more.

In 2002 the United States Environmental Protection Agency estimated that underground fires emitted about 48 tons of mercury into the atmosphere each year.

There are an estimated 1 300 underground coal fires in Indonesia alone and Stracher warns that researchers have a very limited understanding of the environmental damage these fires are causing or what they might contribute in terms of damaging the health of different nations.

In 2007, French researchers warned that carbon dioxide emissions from underground coal fires could amount to about three percent of all global emissions.

In China, underground fires are thought to consume between 10-million and 200-million tons of coal each year or between five and ten percent of the country is total production of coal.

A number of technologies are being used to try to put out these fires including digging the burning coal out of the ground, filling the burning seams with a type if grout or even using nitrogen foam to smother the fire completely. However, the costs of putting out underground fires are generally prohibitive.

A fire in Centralia, Pennsylvania has been burning since 1962 after illegally dumped garbage caught fire in a nearby strip mine and ignited the Buck Mountain coal bed. Residents and government authorities have been unable to extinguish this blaze.

In South Africa, there are a number of underground fires burning around Witbank (Emalahleni) in Mpumalanga and authorities there have been unable to extinguish them either.

IBM claims it has a solar cell that is cheaper and more efficient

IBM has built a solar cell using copper, tin, zinc, sulfur, and/or selenium, and, in the process allowing power conversion to demonstrate an efficiency of 9,6 percent or 40 percent higher than the value previously attained for this set of materials.

In order to achieve progress in solar cell research, IBM is using its world-class expertise in microprocessor technology, materials and manufacturing.

"In a given hour, more energy from sunlight strikes the earth than the entire planet consumes in a year, but solar cells currently contribute less than 0,1 percent of electricity supply -- primarily as a result of cost," claims Dr. David Mitzi, who leads the team at IBM Research responsible for developing the solar cell.

The IBM researchers describe their achievement of the thin-film photovoltaic technology in a paper published in Advanced Materials, highlighting the solar cell's potential to accomplish the goal of producing low-cost energy that can be used widely and commercially.

The solar cell development also sets itself apart from its predecessors as it was created using a combination of solution and nanoparticle-based approaches, rather than the popular, but expensive vacuum-based technique. The production change is expected to enable much lower fabrication costs, as it is consistent with high-throughput and high materials-utilisation-based deposition techniques including printing, dip and spray coating and slit casting.

IBM claims that currently available thin film solar cell modules based upon compound semiconductors operate at 9 to 11 percent efficiency levels, and are primarily made from two costly compounds -- copper indium gallium selenide or cadmium telluride. Attempts to create affordable solar cells from related compounds that are free of indium, gallium or cadmium have not exceeded 6,7 percent, compared with IBM's new 9,6 efficiency rating.

Over the past several years, IBM researchers have pioneered several breakthroughs related to creating inexpensive, efficient solar cells. IBM does not plan to manufacture solar technologies, but is looking for partnership agreements with existing solar cell manufacturers.

Mud volcano caused by drilling, claims report

Indonesian energy company PT Lapindo Brantas has been blamed for the devastating mud volcano in Indonesia. A team of scientists say in a report published in Jakarta that there was strong evidence that drilling at a gas exploration well had caused the volcano.

Lapindo Brantas has denied that it was responsible for the mud volcano claiming that it was caused by an earthquake. The mud volcano occurred near Indonesia's second-biggest city, Surabaya and has now displaced more than 60 000 people as hot mud continues to flow from the East Java drilling site.

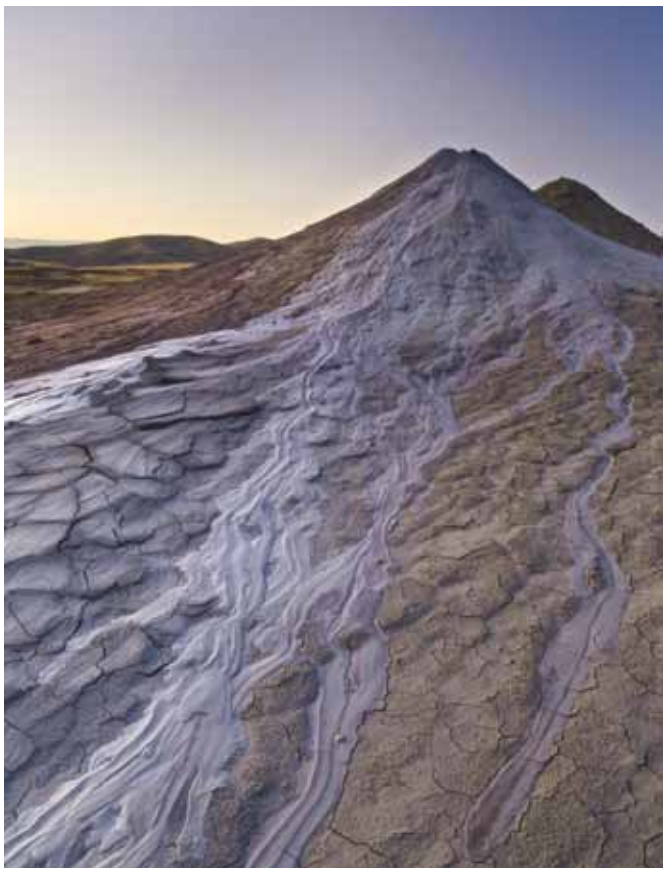
According to the investigators, the daily drilling reports from Lapindo Brantas indicate that the company pumped heavy drilling mud into the well to try to stop the mud volcano. This was partially successful and slowed down the eruptions of mud according to lead scientist, Richard Davies, of Britain's Durham University.

He and a team of international experts have been investigating the cause of the mud volcano.

The report says that the earthquake that Lapindo Brantas is referring to had a trivial impact on the mud volcano as it had occurred at Yogyakarta, more than 250 kilometres south west of the mud volcano.

Lapindo Brantas has apparently spent about $673-million compensating people who have been affected or displaced by the disaster.

Lapinodo Brantas is linked to the Bakrie Group, controlled by the family of Indonesia's former Chief Welfare Minister, Aburizal Bakrie.



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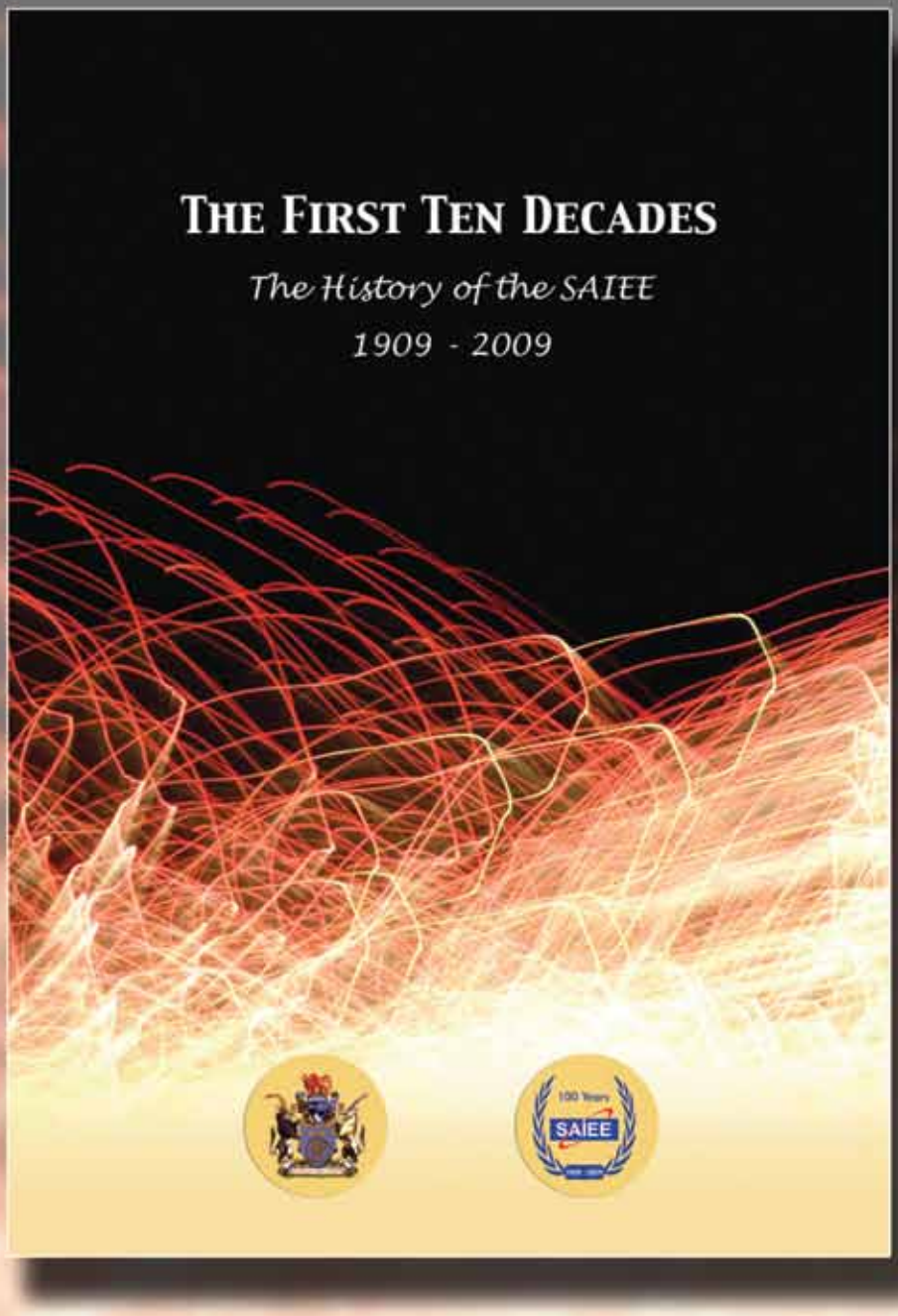

FROM THE CENTENARY PRESIDENT ... du Toit Grobler

THE CENTENARY YEAR OF THE SAIEE

In 2 Peter 3:8, the Bible says: "... With the Lord a day is like a thousand years, and a thousand years are like a day. ..." The Centenary year of the SAIEE has gone by in the blink of an eye. The only thing remaining to be said is thank you to each and every one who in any way contributed to the success of the Centenary Celebrations and who supported the President in his efforts to serve the interests of the Institute and its members at all times.

ESKOM'S APPLICATION FOR A PRICE INCREASE

On 24 February 2010 NERSA announced its decision to grant Eskom nominal year-on-year tariff increases of 24,8% in 2010, 25,8 % in 2011 and 25,9% in 2012. This reduction in Eskom's initial application of 45%, and its subsequent application for 35%, can be regarded as the consequence of a collective process in which the SAIEE played an active role on behalf of its members.

Although the increase requested by Eskom has been reduced, the amount granted will nevertheless have a significant impact on the South African economy. The tariff increase announcement has also left a large number of issues unanswered and the SAIEE makes a repeated appeal for those to be addressed in a transparent, participative and inclusive manner, without delay. The SAIEE has repeatedly expressed its willingness, to the Honourable Minister of Energy and other Ministers, to contribute to processes such as the drafting of the NIRP2 – to date without any response.

COMPOSITION OF COUNCIL 2010/11

The composition of the 2010/11 Council was finalised at the last meeting of the current term of office, on the 5th of March 2010, and is as follows:

OFFICE BEARERS	DESIGNATION	
A HAY (Dr)	PRESIDENT	
A TSHABALALA	DEPUTY PRESIDENT	
M CARY	SENIOR VICE PRESIDENT	
P VAN NIEKERK	JUNIOR VICE PRESIDENT	
du T GROBLER	IMMEDIATE PAST PRESIDENT	
L H JAMES	HONOURARY TREASURER	
N SMUTS	HONOURARY PAST PRESIDENT	
PAST PRESIDENTS	**FELLOWS**	**SNR MEMBERS**
P C BALLOT	WJ BERGMAN	MADIKANE T C
S C BRIDGENS	T BRITTEN (Dr)	K NIXON
R G CONEY	H O BROSCHK	N MBULI
V J CRONE	M J CASE (Prof)	P TOLSMA
M A CROUCH	V COHEN	T MAPHUMULO
J W GOSLING	H GELDENHUYS (Dr)	JH PRETORIUS (Prof)
R A HARKER	R HARDIE	M STRYDOM
L JAMES	R HILL	I KRUGER
A S MEYER	P NAIDOO (Dr)	J BUISSON-STREET
I S McKECHNIE	D WOODBURN	D CAMPETTI
B N B NGULUBE		
MEMBERS	**CENTRE CHAIRMEN**	**CENTRE**
T SITHOLE	C RAMBLE	KWAZULU-NATAL
N MASHELE	J MABOTA	CAPE WESTERN
I GEBBIE	L HAUPTFLEISCH	SOUTHERN CAPE
W FISHER	G HOPEWELL	EASTERN CAPE
N MAPHALALA	B RADEMEYER	MPUMALANGA
T BHULOSE (LETLAPE)	K SEMPLE	VAAL TRIANGLE

SECTION CHAIRMAN & REPRESENTATIVES	SECTION
MPP CLARKE	HISTORICAL
S MOLOKO	POWER
P TOLSMA	ELECTRONICS AND SOFTWARE
G MADONSELLA	IET SA NETWORK
W CRONJE (Prof)	IEE SA BRANCH
M KUISIS	ROTATING MACHINES WORKING GROUP

Thank you to those who made themselves available to serve on Council and congratulations to those who have been appointed. I would like to offer a special word of appreciation to those people who served on Council and its committees during 2009/2010. To the incoming President, Dr Angus Hay, you have my full support.

ENGINEERING COUNCIL OF SOUTH AFRICA

On 10 March 2010, the SAIEE President made a Centenary Year Presentation at the bi-annual President's Forum. He handed separately bound copies of Annexure 15 of the Centenary Book, 'The Role of the SAIEE in the Engineering Profession up to 2009', to the ECSA President, Mr Chris Campbell, and to the ECSA CEO, Mr Ossie Franks. He also presented a Certificate of Appreciation, for the contributions of ECSA to the successful celebration of the SAIEE Centenary in 2009, to the ECSA President.

NATIONAL PLANNING COMMISSION

The Office of the Presidency has issued a statement that more than a thousand applications for appointment as Commissioners have been received and that the appointments will be announced at the end of March 2010.

PLANTING OF A MEMORIAL TREE: VICTOR WILSON

The planting of a Memorial Tree in honour of the late Victor Wilson, Immediate Past President of SAIEE, by his wife Christa van Schalkwyk, took place on 5 March 2010. The 2010 Tree of the Year, a Fever Tree, was planted northwest of Innes House after the final Council Meeting of the 2009/2010 term of office. After the Ceremony, the President presented Christa with a framed photo of Victor, which included their Past President's and Wife's badges as well as Victor's certificate of Service as 2008 President of the SAIEE.

After the Ceremony Christa addressed an email to the President and the Council in which she said,

"I just want to thank you all for the opportunity to plant a tree for Victor and for the beautiful photo you gave me. It was a thoughtful gesture from you all highly appreciated. It was good to be in the company of people that Victor was very much part of. Together with him all these connections are now also missing from my life."

COLLOQUIUM ON ELECTRICAL SUPPLY IN SA

A colloquium with the title "The Electricity Supply and Demand balance in South Africa with a specific focus on the 2010 FIFA World Cup event" was presented at the Observatory Dome auditorium by Kannan Lakmeeharan on 11 March 2010. Kannan is the Managing Director of the System Operations and Planning Division of Eskom. The presentation was followed by a very active question and answer session, and light refreshments.

ANNUAL PAST PRESIDENTS' LUNCH

The Annual Past Presidents' Lunch took place at La Scala Restaurant in Monte Casino, Fourways on 12 March 2010. Homage was paid to the late Victor Wilson, who would have attended the lunch as a past president for the first time.

ANNUAL PARTNERS' EVENING

The President invited members of Council and Staff to join him and his wife, Elize, for a dinner at Founders Restaurant followed by the musical, 'Route 66' at the Barnyard in Cresta Mall on 13 March 2010. The evening was well attended and enjoyed.

FORTHCOMING EVENTS OF THE SAIEE

The SAIEE Annual Charity Golf day on 2010-04-23 in Pretoria.

Kind regards,
du Toit Grobler IntPI(EE), Pr Ing, Pr Dipl Ing, FSAIEE
SAIEE Centenary President 2009

Mike Crouch flies out

Mike Crouch retired as the marketing director of the SAIEE in March this year and before leaving the Institute he was asked what he would like as a farewell gift in appreciation for his dedication and hard work over the years. Mike chose a flip in a Harvard aeroplane.

The reason for his attachment to these rowdy aircraft that were widely used during the Second World War is that in about 1943 when Mike was just 10 years old he lived in Queenstown in the Eastern Cape, where the Royal Air Force's 47 Air School was based.

The RAF used the American Harvard trainers to train pilots for its forces.

The Harvards went on to be used by the South African Air Force as training planes until the planes were retired from service in 1995.

Mike recalls that as a young boy, he and his friends would hear the distinctive whine of the Harvard propeller changing pitch and would be on their bikes in seconds riding out to the aerodrome to watch the Harvards as they came in to land.

He has many happy memories of those exciting times during the war.

The Harvard was first flown in 1938, is a two-seater trainer, has a 550 horsepower, nine cylinder, rotary engine. Many thousands of these planes were made during the Second World War. The first Harvards arrived in South Africa in October 1942 for use by the Joint Air Training Scheme schools. By July 1944, 633 Harvard Mk IIA and III aircraft had been shipped to South Africa, with 555 surviving in October 1945 (379 MkIIAs and 176 Mk IIIs).

After the war, 300 Harvards were shipped back to Britain and 255 went back to the United States in terms of the lend-lease agreement. The South African Air Force bought 65 AT-6Ds (7634 to 7698) and 30 T-6Gs (7699 to 7728) from the USA between 1952 and 1956.

Mike set up his flip in a Harvard through the Harvard Club of South Africa which is based at Zwartkops Air Force Base in Valhalla, Centurion and on Saturday 6 March he happily climbed into the rear seat of Nellie before her pilot Ivan took off for a 25 minute flight over Pretoria, westwards to Hartbeespoort dam before flying back to the Harvard Club.

Mike Crouch happily seated at the back of a Harvard as it taxis down the runway before taking off for his flip in a vintage Harvard.

The photo of Mike and Nellie's pilot Ivan after the flip out to Hartbeespoort Dam.

South Africa to host largest Telecommunications Conference

The IEEE International Conference on Communications (ICC) will be hosted for the first time on African soil. South Africa has been successful in winning the bid to host this flagship conference which is the largest telecommunications conference in the world.

The General Conference Chair, Minister Naledi Pandor has extended an invitation to the International, African and South African ICT community to attend and also participate in the various 'cutting-edge' and informative Keynote sessions, 10 Workshops, 7 Business Forums and 20 Tutorial Sessions arranged from 23 – 27 May 2010.

The conference will be hosted at the CTICC in Cape Town and the conference organizing committee has secured many outstanding local and international speakers engaging in various business topics and future technologies that would address accelerating growth and development, especially in developing economies like South Africa.

Some of the invited keynote speakers are:

- Dr Steven Gray, Head and Vice President Corporate Research, Huawei Technologies, USA
- Dr Reinaldo Valenzuela, Director, Wireless Research, Bell-Labs, Alcatel-Lucent, USA
- Prof Raymond Yeung, Chinese University of Hong Kong and inventor of Network Coding

There will also be a high calibre business leaders' forum with three of South Africa's prominent business leaders, viz, Mr Reuben September, Group CEO, Telkom; Mr Ajay Pandey, Managing Director and CEO, NEOTEL and Mr Andile Ngcaba, Executive Chairman, Dimension Date, Africa and Middle East.

Additionally there will be 15 parallel technical sessions where more than 1400 peer-reviewed papers will be presented by researchers from across the world.

This is an excellent opportunity for all those involved in the ICT industry to form part of this great event. Miss-it-and-you-miss-out!!

For more details and to register for the conference visit:

www.ieee-icc.org/2010

For further details contact the Conference Operations Chair, Prof Sunil Maharaj, University of Pretoria, e-mail: sunil.maharaj@up.ac.za

Heat pumps may help reduce SA's energy consumption

By improving the efficiency of heat pumps, South Africa could achieve as much as an eight percent reduction of carbon dioxide emissions, equivalent to eliminating the carbon emissions of a 244 GW coal-fired power plant says Colin Openshaw, senior consultant, product development at Eskom DSM.

He was addressing delegates attending the Greenbuilding Africa conference held in Johannesburg in March.

Using the forthcoming FIFA World Cup 2010 as an example, Openshaw says that a hotel with 250 guests will consume at least 30 000 litres of hot water a day (heated to a temperature of 55 degrees C) and this would require at least 203 kW of energy.

He estimates that through the efficient use of heat pump technology the energy savings that could be achieved by the same hotel would amount to about 77,4 percent.

Openshaw says that the heat pump cycle typically consumes a unit of electrical energy for every three units of heating produced and this is 33 $kWh_{electrical}$ used to produce 100 $kWh_{thermal}$.

On average, he says, 67 percent of electrical energy consumption can be saved using this technology compared with conventional electrical resistance heating.

He says that the benefits of using heat pumps are that there is a totally integrated control system for hot water production and a decrease in greenhouse gas emissions while energy consumption is reduced and maintenance costs are lower

He says that while solar heating is suited to South Africa the option for using heat pump technology in a residential arena means that considerable electricity savings could be achieved with a corresponding reduction in carbon emissions.

Openshaw points out that if heat pumps were widely deployed within the residential market the total energy savings would be the same as taking 52-million cars off the road per year.

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