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Official Magazine of



December 2009

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SIEMENS

Let engineers solve the engineering problems – that can't be hard!

Every now-ⁿ-again I wish that someone, somewhere, would tell me the truth, the whole truth and nothing but the truth so that I could actually understand what is going on in this often confusing country of ours.

Is Eskom really to blame for the electricity mess that we are dealing with now? Is electricity theft really so widespread and so rife that we could save an entire power station's capacity if we could just stop the theft?

Are the service delivery issues all related to the inability of our councillors, elected representatives and appointed managers to do a proper job? My list of questions just grows and grows and grows.

Our education system is in tatters, our public health facilities are degraded and deplorable, our life expectancy rates are dropping and our crime and rape statistics are climbing.

How can this be a country of dreams, a country of hope and a rainbow nation for all of us if these patterns continue to replicate themselves and if these patterns remain unchecked and unresolved?

It is such a simple matter to blame Eskom, to blame the local councils and to blame the political leaders for the mess that we find in our municipal government structures and within our parastatals.

But, we must also accept that it is the people of South Africa who are contributing to this process and who are individually and collectively allowing it to continue.

I do think that if Eskom were to invest enormously in managing its operations effectively and if it were to use new technologies to manage the demand for electricity properly then it would be possible to avoid the 35 percent rolling tariff increases that we are facing.

Just as I believe that if Soweto residents (or an estimated 80 percent of them) started paying for the electricity they used then we would not be faced with energy increases of 35 percent.

Just as I believe that if the councillors were doing an active and honest day's work then we could resolve the thousands of service delivery problems that seem to be endemic throughout the land.

What strikes me most forcibly about the South African scenario for 2009 is that every one of the major problems we confront could be resolved simply by applying proper engineering principles to the problem.

You see, whether it is capacity to generate electricity or the management of systems and protocols needed to distribute electricity efficiently is not really relevant. The true facts are that engineering solutions could readily be applied to any one of the problems.

And engineering solutions could resolve the problems.

I think that it's high time for all South Africans to put away the political agendas and stop hiding behind the supposed affirmative action and economic empowerment hurdles that are being blamed for so many ills.

We need to change the *status quo* and Eskom is just another organisation that is symptomatic of the service delivery debacle that faces us all.

Unless government, business and labour get together and apply proper engineering solutions to the problems then they will continue unabated and unchecked.

As this year draws to a close and the curtain falls on 100 years of the South African Institute of Electrical Engineers, it strikes me as ironic that the key to resolving South Africa's issues is held in the hands of these engineers.

So let's give them a chance to change things in 2010.

WATTnow and the entire publishing team at Crown Publications wish all its readers a prosperous and healthy 2010. And we can only hope that soon our engineers will be left alone to sort out the mess facing us in electricity supply, service delivery, housing shortages, poor public health systems and ever-deteriorating maintenance of infrastructure.

That really would make 2010 a better year for us all.



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Ponds may release arsenic in groundwater resources

Researchers have found that man-made ponds and paddy fields that are irrigated using underground water resources may have caused an outbreak of arsenic poisoning in Bangladesh. Organic carbon triggers the release of arsenic from sediments into the groundwater but the source of this carbon is not known.

Arsenic contamination of groundwater is not a new phenomenon and researchers have found traces of the poison in groundwater in countries that include Argentina, Chile, China, India, Taiwan, Thailand and even the United States.

Massachusetts Institute of Technology's scientist and lead researcher for the study, Charles Harvey, says that man-made ponds, installed from the 1970s on to help international aid agencies like the United Nations Children's Fund to provide clean

water to residents of a particular area are the probable cause of the contamination.

The arsenic contamination has, according to the World Health Organisation, affected about 35-million people living in Bangladesh, which has a total population of 130-million. Arsenic is widely distributed throughout the Earth's crust and international standards agencies have warned that potable water should not contain more than 0,01 milligrams of the chemical.

Arsenic is extremely toxic to humans and causes skin lesions and cancers of the bladder, kidney, lung and skin.

For the project, researchers used chemical tests and models of the flow of groundwater in a typical Bangladesh agricultural area and all evidence collected pointed to the man-made ponds on the surface, which were situated directly above wells.

The researchers have warned that medical authorities in Bangladesh can expect to treat more and more cases of cancer unless something is done to prevent the contaminated water from being consumed by the population.



Water on the Moon and a dying star studied

Traces of water have been found on the Moon. This follows an experiment undertaken by NASA's Lunar Crater Observation and Sensing Satellite or LCROSS mission last month that led to two spacecraft being crashed into a crater on the Moon. A tiny visible plume indicated that there was some water beneath the surface and scientists are working with the data to find out more about it.



According to Michael Wargo, chief lunar scientist at NASA, researchers are hoping to find significant deposits of water in craters that are in permanent shadow. The researchers also believe that if the water is billions of years old it may contain valuable additional information about the formation of the solar system.

The spacecraft used for the experiment were crashed into the Cabeus crater.

The researchers used a spectrograph to analyse the light from the plume of dust and were able to determine the different elements found in the material by their effects on the light wavelength. Wargo says that it is certainly safe to say that Cabeus contains water. The only question is how much water is stored there.

In a separate development, a team of UK astronomers have confirmed that the exploding star spotted by NASA's Swift satellite is the most distant cosmic object detected to date.

Astronomer Nial Tanvir, who used the United Kingdom Infrared Telescope in Hawaii to study the afterglow of the explosion, says the team was able to observe the 12 second gamma-ray for about ten days. He says the event, called GRB 090423, is one of the most violent explosions ever witnessed.

He says the Swift satellite detects about 100 gamma ray bursts a year and then scientists in various parts of the world follow up on the Swift findings. Tanvir says the star that caused the gamma ray explosions died about 13,1-billion light years away. They estimate that it lasted for just 630-million years after the Big Bang.

Another group of scientists led by Italian astronomer Ruben Salvaterra also studied the afterglow using the National Galileo Telescope in La Palma and his team confirmed the findings made by the UK group.



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ACTOM

Standard introduces mimoney wallets

Standard Bank has introduced its new electronic cash equivalent that is made to run on a mobile phone. Known as mimoney it is possible to buy almost anything you want to and pay for the goods directly from your cellular phone.

mimoney is an electronic voucher that works like cash, and is loaded onto your phone to be used where traditionally one could only use a credit card. For the youth and those who are nervous about using a credit card to make online payments, mimoney is a great solution. The latest innovation from mimoney involves being able to buy airtime right off your phone from the mimoney mobile application, mimoney Connect.

This modern function needs to be downloaded to your mobile phone (at no extra cost). The mobile application is simply a virtual wallet. It accumulates all existing mimoney vouchers and calculates your total balance.

The mimoney mobile application, mimoney Connect allows you to create a list of your favourite merchants so that transactions can easily be made. The application also allows you to create a folder of your favourite mimoney friends and family, called MiMates.

With this application you will be able to send mimoney to your MiMates and even request mimoney whenever you need extra cash.

This application is available for download from <http://www.mimoney.co.za/wallet.php> and is easy to create and download if you have a mobile handset that supports a java system (most mobiles are java compliant). Once you have downloaded the MiMONEY Mobile Application – you will need to set-up a Profile with your name, surname, date of birth and a pin.

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Sony claims Vaio is the lightest, thinnest, best on market

Sony has unveiled its new Vaio X series and claims that it is the lightest and thinnest computer in the world, delivering longer battery life than others and coming complete with wireless network connections. It weighs just 745g and is 13.9 mm thick, equivalent to the thickness of a mobile phone. It lasts up to 16 hours of consecutive use running on battery power.

The new Vaio features a high quality wide 11.1" LCD screen, a 17 mm key pitch isolation keyboard and a new touch pad with convenient multi-finger gestures for zoom and flick navigation. It has various interfaces such as VGA and LAN ports and a built-in webcam.

The Vaio uses Intel's Atom™ Processor, a solid state drive, and Windows® 7.

A groove running along the outer edge of the LCD and palm rest, is part of Sony's Rigid Arc structure, aimed at minimising distortion from external pressures. In addition, the housing is made out of carbon, and the palm rest is moulded from a one-piece aluminum plate to increase the strength. The PC is put through intensive durability and pressure-vibration tests, to ensure it will perform in tough, real-life situations.



Philips 'discovers' community members

Philips' CSI project 'Supply Opportunities Achieve Results' (SOAR) is providing people from surrounding communities opportunity to participate in the project and create a brighter future for themselves. Over the years, Philips has worked with local communities to upgrade and maintain facilities at schools, homes for the orphaned and healthcare amenities.

The lighting division at Philips recently invited a few local schools to the Sci-Bono Discovery centre in Newtown. In line with Philips' mission, the centre also aims to support education in science, engineering and technology.

The Sci-Bono Discovery centre is Gauteng's new Science facility and is the largest facility of its kind in Africa, providing learners and educators with an opportunity to discover the wonders of science.



Learners from Ditau Primary school; playing with one of the devices that is on display at the Sci-Bono centre.



This photograph depicts the evolution of the light bulb.



Ms Wandile Luthuli and Ms Jolene Eckersley, both from Philips, and learners from Everest Primary school.

WATTnow

— a magazine to keep you enlightened, informed and intrigued

WATTnow is published monthly by Crown Publications and the South African Institute of Electrical Engineers and it provides a fascinating insight into:

- Technology
- Energy and Electronics
- Science and Research & Development
- New products and interesting gadgets

In addition, WATTnow gives its readers in-depth, topical coverage of many different issues that have a direct bearing on the engineering industries on which so much of the country's future development depends.

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 for all engineers and is the only publication able to provide Category One credits who are part of the WATTnow CPD Programme.

WATTnow also offers its readers a monthly in-depth article on the many fascinating aspects of engineering ranging from the development of South Africa's nuclear energy capacity to the use of coloured lenses to correct dyslexia.

It is the official magazine of the South African Institute of Electrical Engineers and is distributed to all members of the Institute. It is also sold by retail outlets in all nine provinces.

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Pre-apprentice programme for training toolmakers

The National Tooling Initiative (NTI), in conjunction with the Toolmaking Association of South Africa (TASA) and the Department of Trade and Industry (DTI), will launch its first TDM-Powered pre-apprentice orientation programme at seven pilot sites around the country in January 2010.

The programme forms part of a turn-around strategy aimed at ensuring South Africa trains enough people to sustain its local manufacturing in years to come and at the same time keeps South Africa competitive within the global market.

Leading up to the launch of the programme, NTI conducted a three-step selection process to identify suitable candidates for the pilot. The first phase involved awareness sessions and these were held at sites in Gauteng, Mpumalanga, KwaZulu-Natal, Limpopo, Western Cape and Eastern Cape.

NTI chief executive, Dirk van Dyk, says the focus was on matriculants with an interest in the manufacturing industry, as well as people currently working in the tool, die and mould-making industry, who want to enhance their knowledge and skills in this field.

"The second phase of the process comprised follow-up sessions with school principals with a view to getting their assistance in mobilising the right type of young people for the programme. We went through the same

process with industry players to identify possible candidates already in the industry, who would benefit from the programme," says Van Dyk.

The third phase of the selection process involved a more detailed presentation for the applicants, which provided them with a deeper insight into the role of toolmakers, where tooling fits into the manufacturing process and career opportunities in the industry.

Assessment of applicants is now underway and 25 candidates will be selected to attend the TDM-powered pre-apprentice programme at Ekurhuleni East College and Missouri Secondary School in Gauteng, Nkangala FET College in Mpumalanga, Umgungundlovu FET College in Kwa-Zulu Natal, Lephalale FET College in Limpopo, Northlink FET College in Western Cape, and Coega Skills Centre in Eastern Cape.

Van Dyk says candidates are being thoroughly assessed to find the most suitable applicants. The programme comprises a formal curriculum of maths, science, technical English, computer and life skills, as well as a formal manufacturing element incorporating safety in manufacturing, how to read engineering drawings, measurement techniques and basic manufacturing processes.

The formal curriculum will be supplemented with a workshop training phase where participants will learn basic hand and machining skills, which will earn credits towards a competency-based apprenticeship. A further element of the programme is to ensure all participants gain exposure to various businesses in the TDM sector (large and small) and get practical knowledge of die-casting, injection moulding, blow moulding and metal pressing, amongst others.

"This intensive programme will help candidates determine whether they want to continue in the TDM sector and will provide them with an excellent foundation for the competency-based apprenticeship programme, which is due to be launched in 2011," says Van Dyk.



CSIR researcher is IEEE Female Scientist of the Year

Professor Marlien Herselman of the CSIR's Meraka Institute is the 2009 Female Scientist of the Year.

Herselman, an adjunct professor at the Nelson Mandela Metropolitan University and a principal researcher who leads the Living Labs research group at the CSIR, is no stranger to awards. In 2005, she was named Women Researcher of the Year at Tshwane University of Technology. In 2000, she was awarded a scholarship of the *Deutsche Akademischer Austauschdienst* of the International Women's University to attend a summer semester at the University of Hamburg.

With a double Master's degree (in education and business information systems) and a doctorate in the use of computer games for teaching, her research focuses on the use of information and communications technology for business enhancement, rural community infor-

matics and e-health projects.

Herselman's past projects include database administration, as well as data collection in Limpopo on malaria detection via satellite navigation systems for the ReGlan rural community hospital project. This project focused on assisting EU countries in the development of an early detection and prevention system for serious diseases.

Her expertise has also been applied to technology assessment of rural communities. This was aimed at identifying which technologies are available and which technology adoption models are implemented by rural communities in SA.

She is currently busy with a National Research Foundation-funded research project on technology assessment models in rural communities in South Africa.

Smartgrid technology may be key to electricity supplies

A combination of poor management, bad decisions, indecisive leadership and the pursuit of affirmative action, above all else, have contributed to the mess in which Eskom finds itself today. Countless indabas, reports, investigations and enquiries have been conducted over the years – and all to no avail.

There are two fundamental issues at stake: first the generation capacity of the organisation and, second, the management of electricity that has been generated. On both fronts, Eskom has failed.

It's all very well for Eskom to say that it warned the government in 1998 and in 2004 that electricity generation capacity was insufficient to meet the growing demands. Eskom, quite rightly, says that the government refused to allow it to impose realistic price increases years ago and, worse still, the government refused to invest in additional generation capacity.

That is perfectly true. However, management at Eskom did not address the issues either. So in 2008 South Africa faced its rolling blackouts and cities, towns, industries

and mines were brought to their knees by the constant power cuts.

Eskom blamed a lack of generation capacity for the problem. That is true. What Eskom only conceded, much later, was that it had run out of coal, stockpiles were inadequate and that electricity losses were considerably higher than originally estimated.

That is a direct reflection of management, not government.

This year Eskom proposed its rolling price increases of 35 percent a year for the next three years. It justified the price increases because of the extensive building programme that was already underway at Medupi and Kusile.

The National Electricity Regulator of South Africa (Nersa) has yet to approve these increases and a decision on high tariffs is only expected sometime in 2010. There is no doubt that, in time, electricity tariffs will rise – and rise dramatically, too.

The public spat between Eskom's former chairman, Bobby Godsell and the former chief executive, Jacob Maroga, characterised the deep rifts that exist within the organisation. Political interference from President Jacob Zuma and Public Enterprise Minister, Barbara Hogan, couldn't resolve the rift either.

So Eskom was left without a chairman, without a chief executive and, most importantly, without a leader.

Eskom has focused much of its effort on resolving its shortage of generation capacity and has attempted to resolve the shortage by building two new coal-

fired power stations, returning mothballed power stations to service, and introducing limited demand-side management incentives to homeowners and businesses.

At the moment, the key focus is to raise enough money to complete the new power stations at a cost R120-billion each and to raise the R360-billion needed to fund additional capacity for the utility.

That's all well and good, and from a power generation perspective, South Africa certainly needs this kind of investment. However, there is a lot more that Eskom could be doing to alleviate the power shortages by using technologies and systems that are readily available elsewhere in the world.

One such technology is loosely labelled as smartgrids where electricity consumption can be controlled and monitored on a real-time basis and adjusted accordingly.

Dr William A Gruver, a world authority on smartgrid technology and a widely respected electronics engineer, was invited by the South African Institute of Electrical Engineers to deliver this year's Bernard Price Memorial Lecture.

Discussing developments in smartgrid technology in the United States and other parts of the world, Gruver points out that being able to control consumption is as important as controlling power generation.

The United States government has spent years working with smartgrid technologies and President Barack Obama's administration has committed \$3,4-billion to upgrading the electricity grid and installing millions of 'smart meters' in households around the country.



In fact it has just embarked on a programme that will see 100 smartgrid projects being installed in 49 states across the country. The electricity utility companies are investing a further \$4,7-billion, bringing total expenditure to \$8,1-billion.

Unsurprisingly, a South African company, Zest Energy, has just licensed similar technologies for use in the local market. According to Zest energy's chief executive, Coenraad Vrey, if Eskom were to implement smartgrid technologies in all new developments around South Africa then the need to generate vast quantities of additional electricity would certainly abate.

Gruver points out that the motivation for smartgrid technology in the United States is driven, in part, by global climate change, which is influencing policies on energy usage and greenhouse gas emissions.

Gruver contends that distribution systems need to be active so that risk of major power outages can be avoided and appropriate levels of quality of supply can be consistently delivered to consumers.

Referring to a major blackout that affected Canada and the northern parts of the United States, Gruver says that more than 10-million Canadians and 40-million Americans were suddenly plunged into darkness and remained without electricity for 30 hours.

In addition, 22 nuclear and 80 fossil-fuel plants had to be shut down due to the power failure.

He uses this as an example of how reliable the whole world has become on stable electricity supplies and reiterates that with

smartgrids, such outage could possibly be avoided in future.

Referring to the report published by the VTS Enviro Group in May this year, Gruver says that the vision for the future is to have a network of integrated microgrids that constantly monitor electricity supply and can shut off supplies in response to frequency fluctuations.

Various software applications would be used to monitor electricity and when demand in one area becomes excessive then electricity can be re-routed from off-peak sites to make up for the possible shortfall. All of this can be done in real-time.

Moreover, these smartgrids can detect fluctuations in power supplies, provide a warning system for potential outages and can even signal which areas need to be isolated.

By installing a combination of small generators and solar panels, overall demand for electricity can be reduced and, in off peak times, the electricity generated by these micro-installations can be injected back into the grid.

As Gruver points out, the technology to achieve this is readily available in many parts of the world.

It is precisely this concept that Zest Energy wants Eskom and the local authorities to adopt for use in South Africa and Vrey points out that Eskom should insist that smartgrids are installed uniformly across all the new suburban developments in the country.

There are various test sites underway at housing estates such as Dainfern, north of Johannesburg.

Powercom Process and Meters

The Powercom process sets out to provide an end-to-end solution for distribution of electricity either via Eskom or via the individual municipal authorities in the country.

The process is simple and straight forward:

- Money (or credit) is purchased and downloaded automatically into the smart meter by the utility, the local authority or the customer.
- No vending machines are needed and credit can be purchased using a cell phone, an automated teller machine or an Internet banking facility.
- Customers are automatically alerted via SMS or e-mail when credit levels are running low.
- Electricity supplies can be connected remotely or disconnected from the control centre.
- End-to-end monitoring of the network providing particular protection from meter tampering, grid tampering or cable theft as the smart system pinpoints exactly where the interference has occurred.
- Real-time notification allows the utility company to respond immediately to a tampering alert and, within seconds, can disconnect the electricity supply to that meter.
- Load control, forecasting, energy saving and conservation are all possible through the Powercom smart grid system and these controls can be extended to individual appliances or systems in a house such as an air conditioning unit, a swimming pool pump or a Jacuzzi heater.
- Load profiling for each customer, street, suburb and city.
- The system is based on open protocols so that different third party meters can be added to the system and work efficiently with the Powercom solution.

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 per-

sonal 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 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.

Zest uses the Powercom system that offers advance meter management, automatic meter reading and advanced meter infrastructure systems based on the Power Line Communication (PLC) technology.

Essentially what this means is that Zest can provide real-time readings from any smart meters at a distance of up to two kilometres within four seconds. PLC technologies have been in existence for more than 40 years but the technology barriers have made it virtually impossible to implement on a large scale.

Using a combination of smart meters, GPRS concentrators and the TCP/IP protocols it is possible to control the electricity supply to individual homes in real time and to shut it off (or reduce power consumption) in a matter of seconds.

"This is where the smart system really shows its value. Instead of having a warning light flashed onto a television screen when power consumption is reaching a critical state, smart meters could simply reduce the amount of power being consumed at each individual household and, in that way, avoid the threat of rolling blackout," says Vrey.

The system structure comprises a smart meter, a repeater, a GPRS concentrator and the data server. In the case of cardless prepayment meters, money is paid to the utility company and a corresponding amount of electricity is loaded via the GPRS network. When consumption reaches a predetermined point, a short-message-service (SMS) message is sent to the consumer requesting that a further payment for electricity is made.

"Any attempt to tamper with the meter, or load money illegally into it results in the supply immediately being shut off. The customer who was responsible for tampering with the meter has to contact the supply company to have electricity restored to the property," says Vrey.

The meters offer multi-tariff and time of use data and the entire system automatically identifies meter or grid tampering because the software is constantly monitoring energy usage.

From a demand-side management perspective, Eskom readily concedes that it is not only losing vast quantities of electricity to theft but it does not know exactly what those losses amount to. It is also widely accepted that various organisations (such as the Soweto Electricity Crisis Committee) are illegally reconnecting users who have had their electricity supply cut off.

In fact, the latest estimate is that less than 20 percent of residents in Soweto are paying for electricity consumed and Eskom itself is owed about R1.8-billion in outstanding electricity accounts from that area alone.

The combination of prepaid electricity and constant network monitoring will, in Vrey's opinion, not only assist in reducing electricity consumption but will allow Eskom to provide electricity to those consumers who have paid for it.

As Gruver points out, constant monitoring of an electricity distribution network means that the system can be 'tweaked' or fine-tuned automatically to keep the electricity supply stable across the entire network.

Vrey says that while the residential environment is currently the main focus for Powercom, the use of this system in an industrial environment is even more essential as large consumers of electricity are often also large wasters of the energy.

Again, with constant and automatic monitoring of the network, electricity consumption can be stabilised and real savings for industrial consumers can be achieved.

Essentially, Eskom may well be focused on raising enough capital for it to build the much-needed power stations, but it should also be raising enough cash to install smart

grids, smart meters and smart monitoring systems across the entire network.

And it should be smart enough to realise that in a country that has limited resources, conservation of energy is a fundamental requirement. And if that conservation can be improved through the use of smart grids then surely Eskom must look to using that technology in the national interest.

Load control and energy conservation

Powercom's smart load balance system was developed in response to the need for centralised load control systems – often referred to as ripple control systems – and is based on a combination of power line communication and radio communication.

It is a demand-side management tool and remotely controls the various categories of load such as:

- Geysers
- Air conditioning systems
- Street lighting
- Underfloor heating
- Swimming pool pumps
- Municipal load control for pumping water or sewage
- Time of use load shifting
- Active load management
- Control of loads to customers that pay an uninterruptible tariff

The system can be installed by local authorities or energy service companies and is aimed at stabilising power supplies at all times through more efficient demand-side management. The application uses a bi-directional broadcast system that uses feedback from metered bulk supply points to control or adjust demand.



Let's call on our engineers

On the face of it, South Africa has made some tremendous strides in the past 15 years with almost three million homes being delivered to the homeless, huge electrification programmes for townships and rural areas, extensive investments in improved telecommunications structures, billions spent on road improvements and a complete change in public health services, where at least the poor now have access to rudimentary medical care.

That's on the face of it. If we scratch a little deeper, South Africa is sitting right on the edge of a precipice and it's a precipice that could plunge the whole country into disaster.

Renowned forensic scientist, David Klatzow, addressing a breakfast meeting arranged by Crown Publications, points out that the judicial system – which is meant to uphold the South African constitution – is showing signs of deliberately altering evidence to suit its own ends. This,

he says, means that the judiciary itself is in danger of losing

its independence and if this independence is undermined then there is nothing that South Africa can do to uphold a constitution that has been hailed as one of the most liberal in the world.

He refers to the debacle of Judge John Hlope, the investigation by the Judicial Services Commission, and the decision to drop any charges against this senior judge accused of attempting to influence other judges in their response to charges laid against President Jacob Zuma.

Klatzow says that much like the apartheid Nationalist government of the 1970s and 1980s, tampering with evidence and deliberately falsifying evidence is as much a reality today as it was in those apartheid years and as a result, the very constitution of this country is at risk.

Moving away from the judicial issues to the more functional day-to-day running of the country, here is what we know right now:

- Eskom is calling for rolling price increases of 35 percent a year for the next three years. This is a compounding increase because if the price of electricity for a normal household starts out at

R1 000 a month now, then in year one it increases to R1 350 a month. In year two it goes up by R472,50 to R1 822,50. In year three it goes up by R637,87 to R2 460,37. Effectively, the cost has risen from R1 000 to just over R2 400 a month.

- The Eskom price increases obviously do not include the municipal charges that will be added to the figures as well. Even at 15 percent a year – and earlier this year Johannesburg increased its charges by 31 percent – it means that the figures climb from R1 350 to R1 552,50 in the first year then to R2 095,87 in the second year and to R2 829,42. So electricity that was costing a household R1 000 a month right now will, by 2012 cost more than R2 800 a month.
- For people living in Gauteng and in Cape Town (other cities are bound to follow soon) the highways are to be converted into toll roads. In fact any observant driver using the Johannesburg highways can see the yellow T-symbol on some of the signboards on the N1 and the R21. And advanced electronic tolling system is to be implemented (on a supposed pay-as-you-go basis) where money is



paid, in advance, to toll road concession holders and is deducted from the advance payments made.

- Electronic tags are fitted to each vehicle using the road and contain essential information such as the legitimate owner and his or her residential address, the registration number of the vehicle (with full vehicle identification such as engine and chassis numbers) and so forth. For every kilometre travelled on the almost 200 kilometre freeway system around Johannesburg and the east west, south and north rand a levy of initially 50 cents per kilometre will be charged.
- The purpose of the charge is obviously to make the motorists pay for the improved roads network but, as the South African National Roads Agency has already pointed out, the 50 cents a kilometre levy was set several years ago and when tolling is introduced it's more likely to cost between 70 cents and a rand a kilometre.
- Again let's do a simple calculation: I live in Lynnwood, Pretoria and I work in Bedfordview. The distance to the office is 68 kilometres, of which eight kilometres are driven along non-toll roads. So the return trip to the office and back each day is 120 kilometres and, at 70 cents a ki-

lometre, that will add R84 a day to my expenses. Working an average of 21,74 days a month it means my costs rise by R1 826,16 a month. And I am what is considered a 'light' user of the roads network.

- So let's put the two figures together: in just three years, my direct expenses on electricity and transport (with no additional consumption) have risen from R1 000 a month to R4 656 a month. That's a five-fold increase and doesn't take into account the increased fuel and maintenance costs, the rates and services charges or anything else.

The direct household costs – for me and for everyone else in South Africa rise dramatically. But that's not where it stops because every wholesaler in the country will be recouping the higher electricity costs (to keep food cool or to keep the warehouses functioning) to the retailer and will also add the costs of tolls to transport goods around the country to the wholesale cost of food.

The retailer in turn will recoup the higher wholesale prices from the consumer after adding the increased transport costs between the regional distribution centre to the actual retail outlet and then add the higher electricity costs to the prices charged in supermarkets.

So the direct costs structures, for all South Africans are likely to rise dramatically each year and there is almost certainly little or nothing that anyone can do to avoid this. Yet again, that's not where the precipice ends.

Eskom and electricity – the case for engineers

Currently Eskom is losing about 3500 MW of power annually through theft and other losses of electricity and yet it is doing little or nothing to curb these losses. One of the major causes is illegal electricity connections – mainly in the townships and informal settlements – but in some cases in ordinary suburbs around the country.

With proper policing and management – management of the resource by trained and competent engineers, technicians or technologists – these losses could be significantly reduced. Illegal connections represent an enormous loss to Eskom.

Added to this is the problem of losses through inefficient infrastructure for the transmission and distribution of electricity. Many of the substations and much of the distribution infrastructure has been neglected over the years both by Eskom and by the respective municipal authorities.

Once again with trained and qualified engineers, technicians and technologists running the distribution network, significant further savings could be achieved countrywide – probably as much as another 1200 MW.

The combination of these two factors alone would save construction of another power station and would reduce the need for the increases being proposed for all South Africans right now.

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If we look at provincial and municipal structures it is evident that the current government is incapable of effectively delivering services on any level – not just to the poor or indigent – and the pattern of poor service delivery is steadily increasing.

For example:

- At least 64 municipalities are in severe financial distress and already eight Western Cape municipal managers have been suspended along with three in Mpumalanga and two in Limpopo. The mayor of Standerton, the mayoral committee and the chief whip have been fired by the ANC's national working committee
- Apparently, the major problem facing municipalities in South Africa is the shortage of skills and, according to a report compiled by Sicelo Shiceka, Minister of Co-operative governance and Traditional Affairs, there is an overall vacancy rate of 12 percent in senior management positions in all nine provinces. The assessments were done to identify the root cause of the distress in many of the country's 283 municipalities.
- The report found that a lack of skills, poor financial management and corruption contributed to the poor service delivery and was exacerbated by a lack of leadership within these structures.
- The report found that there was a high incidence of irregular or inappropriate appointments, low capacity, poor skills development and weak institutional management.

As if this were not bad enough, a report released at a local government indaba held in Boksburg in October showed that 35 municipalities had overspent their total adjusted budgets by R2,6-billion while 182 municipalities had under-spent their budgets by R19,1-billion.

So while government makes money available to maintain and improve services countrywide, the local and provincial authorities are incapable of translating the money they have into maintenance of the current infrastructure or into the creation of fundamental new projects such as the provision of water, housing, improved electricity distribution, rural road maintenance or anything else.

In his Medium Term Budget policy statement to Parliament, newly appointed Finance Minister, Pravin Gordhan claimed that government was planning to implement a massive crackdown to rein in wasteful state spending and corruption.

The fiscus is facing a R70-billion shortfall in revenue from taxes, which Gordhan blamed directly on the current recession that has seen more than 200 000 jobs being lost so far this year. He also committed the government to massive borrowings of R640-billion over the next four years that will be used to sustain spending on job creation, education, health, rural development and fighting crime.

In a radio interview directly after his budget speech, Gordhan referred to South Africa as a deeply divided nation and claimed that this was impacting on gov-

Public health service – the case for engineers

Throughout South Africa, public health services have collapsed and the level of healthcare at public hospitals is verging on diabolical. The government, in its wisdom, is now trying to invade the territory of the private healthcare providers and is doing so in the guise of creating a National Health Service.

Effectively, what the government is hoping to achieve is to get its hands on the equipment and facilities maintained by private healthcare groups and use these to supplement the collapse of public health services.

In every one of the hospitals around the country there are reports of machines and essential medical instruments that don't work because they have either not been properly maintained or have broken down through excessive usage and a lack of maintenance.

Added to this is the problem of such rudimentary functions such as the inability of hospitals to provide clean sheets to patients, to provide proper food or even to effectively dispose of medical waste and other refuse.

If the public health service were to appoint a number of engineers and technicians to its staff the maintenance of these machines could be correctly carried out, the broken instruments could be repaired and the infrastructure to dispose of medical waste could rapidly be implemented.

There is no doubt that by applying an engineering solution to the public health infrastructure a lot of the rudimentary and fundamental problems could be rapidly resolved. And, considering the size of the health budget – and the excessive number of administrative staff employed at inflated wages – it seems obvious that this is one of the first steps that should be taken.

And let's not pretend that the only reason nurses are leaving the public sector is because of their poor salaries. When a nurse has to watch her patients die because the facilities are just not there to take care of them it's hardly surprising they quit and head for a local private healthcare clinic or vanish overseas.

Nurses are there to care for their patients but government has made it impossible to do so because it doesn't keep essential instruments (such as incubators) working. Technicians and engineers could solve these problems in the blink of an eye.





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.

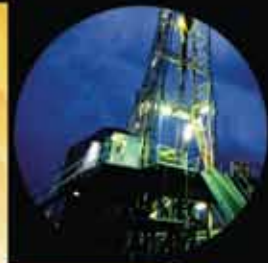
SANEA is a non-partisan, diverse energy association with international networks through the World Energy Council (WEC). WEC has member committees in over 90 countries. SANEA is playing a pivotal part in the future of energy in South Africa, bringing influential role-players together with a view of identifying 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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ernment's ability to deliver services to the people. He was reacting to a question about whether government policy had swung from the 'right' to 'left' since Zuma's election.

Gordhan says that savings of R14,5-billion over the next three years will be introduced in national departments and about R12,6-billion will be saved through redundant, ineffective or overpriced activities in provincial departments, providing a total saving to government of R27-billion.

Of course the question is why weren't these savings introduced years ago? But that's another matter.

The main changes to the budget are:

- R16,4-billion in what Gordhan calls "unforeseeable and unavoidable expenditure" that includes R12-billion in pay hikes for public servants.
- R1,5-billion in roll-overs of unspent funds for infrastructure and building projects.
- R509-million for municipalities to meet the increased costs of subsidising electricity for poor households.
- R900-million for the HIV/Aids treatment programmes.
- A billion rand to bail-out the Land Bank (allegedly riddled with corruption and misappropriation of funds).
- R200-million to keep the South African Broadcasting Corporation afloat after its board was fired and widespread allegations of corruption and misconduct were bandied about.

As expected, the economy is in a decline and will show negative growth of almost two percent compared with the projected growth of 1,5 percent.

Gordhan told Parliament that government would not compromise on service delivery or on its infrastructure spending and referred to what he called " ... public dissatisfaction with the poor quality of service delivery and the high levels of wasteful expenditure and inefficiency in government."

He called for "a much needed change in culture in the public service" and claimed that government itself would look at "re-shaping the ways in which public services are delivered and resources allocated ...".

Referring to revenue, it is expected that personal income tax levels will fall by 4,5 percent to R203-billion while corporate tax will be 21 percent lower at R139-billion and VAT collections, 30,8 percent lower at R138-billion.

He says that government is expecting to collect just R657-billion compared with the projected R740-billion, an indication of how hard the current recession is hitting the country and its citizens.

So what are some of the possible solutions? In terms of service delivery, electricity generation, infrastructure development and repairs and maintenance to the national, provincial and local roads infrastructure, much can be done.

Water and sanitation – the case for engineers

At the centre of the countrywide service delivery protests is the fact that residents in townships do not have access to running water and sanitation services. To further complicate matters there are more than 34 municipal authorities in the Western Cape alone who are not providing clean water to residents.

There are even more serious reports of bacteria-ridden water emanating from the Eastern Cape, Mpumalanga, Limpopo, Gauteng and KwaZulu-Natal.

And the local authorities consistently blame 'lack of skills' for the problems.

Once again, if each one of the troubled and distressed water supplies services had an adequate number of engineers, technologists or technicians on their payroll, the water supply difficulties would be significantly reduced and the service delivery protests would abate accordingly.

The local authorities are trying to appoint previously-disadvantaged individuals and as a result they are disadvantaging the entire community by not providing basic water supplies or sanitation services.

How dumb is that?

And to say that none of the skills are available is nonsense. Skills among the previously disadvantaged individuals might be difficult to find but if we drop that precursor, there are people available to do the work, particularly if municipalities are prepared to pay salaries to these people.

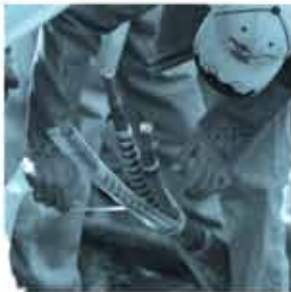
Industrial use of electricity – the case for engineers

Eskom has made much noise about what it calls demand-side management – a euphemism for reducing the use of electricity countrywide.

Yet it hasn't appointed a task team of engineers to visit industrial consumers of electricity – which use considerably more electricity than all residential consumers put together – and advise them on how best to cut their electricity consumption and what measures they can implement to increase efficiency.

Again, this is a skills and management issue and Eskom should have in place a task team of people who visit the major consumers, audit their electricity consumption and then advise on measures to save electricity so that price increases such as the 35 percent rise for the next three years can be avoided.

Eskom says it doesn't have the skills for this but there are literally thousands of unemployed, retired engineers and technicians who are well equipped to form part of this task team and who can guide Eskom's major industrial consumers on how to save electricity and, more importantly, how to reduce both consumption and costs.



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Infrastructure development – the case for engineers

If we remove electricity distribution and water and sanitation services from the infrastructural demands placed on municipal authorities then we are left with a whole range of other services from road maintenance and township development to refuse collection and disposal.

Engineers play a vital role in all these disciplines and with a proper staff of skilled and trained engineers, technicians and technologists working for each individual municipality, the underspending of R19,1-billion could be avoided and the infrastructural service delivery could be achieved.

Of course there are a number of other idiotic anomalies within the government structures. For instance, engineers are entitled to adjudicate the technical and engineering aspects of a tender but are not entitled to examine the financial proposals as these are examined by a board of auditors or other number-crunchers.

Yet it is the engineers who are responsible for handling the project, implementing it and bringing it in on, or under, the budget. The bureaucratic and cumbersome tendering process adds significantly to the under-spending by all local authorities around the country.

It is obvious that engineers should form an integral part of the team that adjudicates the tender and if the local authorities were to streamline the tendering process by appointing a single team comprising engineers and number-crunchers to do the evaluation then more projects would be completed and meaningful services might be delivered to hapless residents of townships throughout South Africa.

Fundamentally, each of these issues is little more than an engineering problem and if skilled and properly trained engineers were running many of these projects most of the service delivery and maintenance problems would probably evaporate.

However, the combination of retrenchments of engineers aged 50 and over and the insistence of retirement at the age of 65 (60 for women) by corporations and government departments provides much of the skills vacuum that exacerbates all the difficulties currently being faced by government today.

Put skilled engineers – whatever their age – back into the driving seats of provincial and municipal departments and many of the problems dissipate. Then, where money is available to spend, let these engineers allocate it and spend it appropriately. After all, that's what engineers do – they spend money on keeping things running smoothly and efficiently.

Government has already hinted that it is looking to re-employ many of the skills that were lost to different industries and sectors through the transformation programmes implemented in the 1990s and the first few years of the 2000s. However, government attitudes here appear to be changing.

There are literally thousands of retired engineers in South Africa who are fit, willing and able to work and yet there are limited or no direct job opportunities open to them. And this in a country that is desperately short of skills.

Coming back to Pravin Gordhan's comments about South Africa being a deeply divided nation it is quite evident that now, when things are tough, when the economy is in a recession, where service delivery is appalling and where corruption is rife, it is time to put away the divisions and, as a nation, set about resolving the problems.

Personally, I am sick to death of hearing the constant racist cries that emanate from all quarters of our society. South Africa is faced with an engineering crisis – on all levels – and it must use whatever engineers are available to it to resolve this crisis.

And pay them accordingly.



KeyScore keeps score in a way that works

Every company, everywhere in the world, has its 'policemen' who monitor other people who work there. They might be formally appointed individuals, such as the network administrator, or they may be informally appointed – the office gossip who sticks his or her nose into everyone else's business and then drops a word in the boss's ear.

The office gossips are the informers – and like all informers, their information is often misdirected, misconstrued and misinterpreted.

So, it was with a great deal of interest that I was told about KeyScore, an innocuous piece of software developed by Jan Laubscher of Rivonia in Johannesburg.

Laubscher, a member of the South African Institute of Electrical Engineers, has developed software applications for a host of different uses. He's got tons of experience in the electronics field – software, hardware, deployment, networks and forensics too.

He is an insurance assessor and has worked on many difficult and challenging claims that demand a thorough understanding of computer technology as well as its application in order to adjudicate fairly on a claim following a serious loss.

Laubscher developed KeyScore as a way to resolve a minor problem within one of many companies that use his services. Essentially, what the company wanted to know is which of the many assessors and secretarial staff on the payroll had the capacity to take on more work.

And, more importantly, they wanted to apportion work fairly across the groups of assessors they employed.

It's not an uncommon problem. I find that the more I talk to people, the more I am convinced that everyone is always busy and that nobody ever parks-off for the day or takes time off in company time. And they tell lies too.

Talk to your own colleagues and you'll find that everyone around you is extremely busy, all the time. Everybody is stressed, over-worked and underpaid ... and everyone is lying at some point too.

Laubscher wanted to develop a way to 'check' on people without having to rely on the 'policeman's approach' of timesheets, paper-chases and monitoring systems, which are, at best, unreliable.

He also wanted to get rid of the 'office gossip' syndrome with people who 'tell on' their colleagues. Why? Because the 'policeman's information is just as unreliable as the gossip's.

So Laubscher developed a piece of software to do the job instead.

KeyScore is a small application that can be deployed across a network – no matter how big – and it monitors who is working and who is cyberloafing.

All of us spend time cyberloafing – and frankly it's quite

recreational and, often, quite acceptable too. Maybe we're reading the newspapers, checking on share-price movements, exploring a new holiday destination or just chatting with our mates about golf, poker or Mrs Brown's loveliest new daughter.

But cyberloafing can quickly overtake work and very often does.

Laubscher wanted to be able to distinguish between the two – or at least be able to see exactly what the ratio between work and cyberloafing was. The KeyScore program was the result.

As with any application that runs in the background, monitoring computer activity, KeyScore can be used as a hard-nose policing device – but that's not its real strength. There are hundreds of applications that will do that and do so by recording every activity undertaken.

KeyScore's advantage is that it sets out to find out which workers might have extra capacity and which ones are loafing – or should I say, 'Pretending to be busy'.

Human nature is such that the willing person tends to do mountains of work while the rather more laid-back (or lazy) worker – who is perfectly capable of doing more work – will get away with doing the minimum amount of work for the maximum reward.

From a management perspective this distorts the staff productivity picture because what you, as the manager, want to do is keep all the people working productively for, say, six hours a day.

This is where KeyScore really helps because it puts a monitoring device in place. From a deployment point of view the program is installed on each computer and runs in the background without interfering with any running applications. It starts up by itself, runs all day and, when the computer is shut down, stops at that point, entering a no-activity mode or effectively 'sleeping'. When the computer starts up, or the operating system starts running, KeyScore wakes up and continues doing what it was doing when it went to sleep.

All the administrative functions are handled at network administrator level and this is where the value of the system can truly be assessed. Every user can be tracked in administrator mode and you can drill down into each profile to assess exactly how they spent the working day.

It is during the administrator set-up procedure that you decide which programs represent legitimate work and which ones are more likely to be loafing sites.

So, for example, in a working environment such as Crown Publications, journalists are expected to surf the new pages and keep tabs on developments in spheres as varied as general news or specific

essay expenditure within a mining group. These tasks would represent legitimate work.

However, if a journalist is surfing Heat Magazine, Rolling Stone or Penthouse Pets, the chances of that having some relevance to his or her working portfolio are remote.

You would configure the software accordingly, allowing sites such as Telegraph Online as legitimate sites, Heat as a questionable site (flagged as orange) and Penthouse Pets as being a no-go area flagged in red.

Having done this it's a simple task for the computer to keep track of how much time was spent on which site and provide you, as the administrator, with a full report in the form of a graph or a table.

In this way you can very quickly find out which people are working more than loafing and track those who are loafing more than working. That's why it's so useful – and you don't even need to confront the person about the time they spend on the Internet unless they want to argue the point.

Of course it does have the necessary functionality to provide a full log of all activity, all websites visited and all images downloaded, so it can be used as a full-on policeman within the organisation. But that's not actually what it was built for: it's more of a productivity assessment tool than a policing tool.

Having used it on a number of different computers, I am convinced that it's a much better solution than some of the other software that tends to be resource intensive and requires almost constant monitoring and maintenance.

With KeyScore, you set it up, configure it and then just let it do its job – and it does so with alacrity.

What would I like to see added to future versions of KeyScore?

Very few elements actually, because it is already doing its job really well. But here are a few:

- An easier method of deployment. It's a pain having to go to every computer on the network and manually install the program. It doesn't take long, it's just a hassle.
- A feature during the setup that trolls for common file type extensions used on that machine and then adds them to the administrator bin for inclusion or exclusion status. Ideally, it should immediately allocate the file types according to the pre-selected administrator criteria and then flag the unknown (or unallocated) file types for the administrator's attention.

In terms of reporting, KeyScore has a built-in range of reports, with graphs and tables that are informative and include an overview of loafing in the company, the amount of company time that has been

unproductively spent and the amount of time that people have been working.

Having monitored myself as part of the test, the software appears to be extremely fair in its allocation between work and loafing.

I'm positive that as time passes, Laubscher will dream up new and better ways of doing things within the KeyScore application although it is already doing a valuable job.

I would like to see major engineering concerns and other large companies using it and then measuring the results against the productivity scales that seem to be so much a part of the human resources function these days. I'm pretty sure the results would widen the eyes of managers within all organisations.

I can assure you that within a relatively small organisation such as Crown it works wonderfully well and, for me, that's the determining factor when it comes to buying and using software. If it works, I'll have it – if it doesn't I'll bin it as quickly as I can.



The case of photovoltaics

By Peter Middleton

Photovoltaics are among the more difficult of the renewable electrical generation options to justify as a cost-effective replacement for an Eskom supply, yet there continues to be huge international interest and growth in the technology. Peter Middleton talks to one of its passionate enthusiasts, Andreas Bohnsack, the MD of Electron Technologies (Pty) Ltd.

I confess to having been a sceptic about the viability of photovoltaic technology. I love the idea of generating all the electrical power I need from a few photovoltaic cells on my roof, but the low ($\approx 100\text{W}$) output power per panel always puts me off. My mind is still stuck seeing 100W as one bright light bulb rather than a domestic electricity supply. Bohnsack, however, has demonstrated a willingness to explore the domestic viability at his own home, and has personally invested in the equipment – photovoltaic cells, batteries and an inverter – and that was two years ago.

Electron Technologies is an electrical projects company, specialising in switchboards, PLC and SCADA control systems and electrical installations, mostly in the water treatment industry. The solar side of its business is new, and seems to have emerged out of a genuine view on the part of its MD towards the use of solar power as an environmentally friendlier technology. Bohnsack, a canoeing enthusiast, readily expresses his concerns for the environment, based mostly on personal experience of the state of our river systems – gleaned through his hobby and his profession.

He talks and acts like an engineer though, but one who believes that we should be prioritising environmental issues. “We all have a responsibility in terms of sustainability,” he claims, “and greed is our downfall. We seem to be trapped in endlessly permeating the madness around oil and other resources.”

Electron Technologies engages mostly with the design of the electrical and control systems in water and sewage treatment plants and, in partnership with civil and mechanical engineers, with the installation and automation of these plants. “Water is one of our limited resources and as a company we have a

responsibility to do whatever we can to ensure the sustainable use of water in the future,” says Bohnsack. Water treatment plants are all trying to achieve full automation. “This is a huge problem, in my view,” he adds, “because the plants end up being far too complex for the people who are charged with running them. These fantastic plants operate for a year and then they just collapse. We want to see water treatment and sewage treatment plants that are working, and that stay working. That is how we see our company’s main role in South Africa’s future – providing robust, good quality systems that are sustainable, financially viable and have a long lifespan.”

Electron Solar is an extension of this philosophy towards the use of solar electricity. “There are currently some terrible systems being put into place, systems that may be affordable but not sustainable, reliable or viable in the long term. We are not trying to be pioneers or to exploit the new green products market,” adds Bohnsack. The solar side of Electron’s business is in partnership with a company called Energy Efficient Options in Cape Town, a company with 21 years of experience in proven photovoltaic technology.

But are photovoltaic systems viable?

Bohnsack, the engineer, responds with a scenario: the need to pump water on a piece of land 15km away from the nearest Eskom supply. “If this is your site, and you need to pump 10 m³ or 10 000 litres of water per day, you will need about 1,0kW of electrical power,” he begins to explain.

He highlights three possible options:

- Option 1: Get an Eskom supply connection.
- Option 2: Get a generator.
- Option 3: Install a photovoltaic or other renewable power source.

Option 1 will require that Eskom extends an overhead line to the site, generally 11kV, and it then needs to drop it down to 400V. “After that you will still need to cable the power to the site itself. The cost of an 11kVA overhead line alone is about R200 000 per km, which means that unless the transmission lines are previously installed, the cabling prohibits this solution.” Even after cabling is installed, you will still have significant low-voltage cabling costs to get the power to the pump: 100m of cable installed underground can cost you anywhere between R3 500 and R10 000. Once this is installed, you can enjoy relatively cheap electricity, but it still mounts up over the life of the pump – say at about 5kWh per day at 50c or R2,50 per day, R75 per month or R900 per year. That amounts to another R9 000 over the 10-year life of the pump though.

Option 2 involves buying a generator, superficially an easy option. They can be very affordable, as little as R2 000 for a small petrol generator, but regardless of cost or quality, generators need fuel – if very efficient, no less than 0,5 litres of fuel per kWh, ie, around 2,5 litres of fuel every day to give 5,0kWh of pumping power. At R8,00 per litre this is a substantial cost, R20 per day, R600 per month, or R72 000 over 10 years. In addition, the generator is a mechanical device with servicing needs and reliability issues and relatively short life – at least three or four generators will be needed to cover a 10 year period.

The third option is a solar solution. “You don’t need the power lines and you eliminate all running costs, noise and pollution,” says Bohnsack. “The systems that we put together have a proven maintenance-free life of 10 to 20 years,” he claims. These systems are used

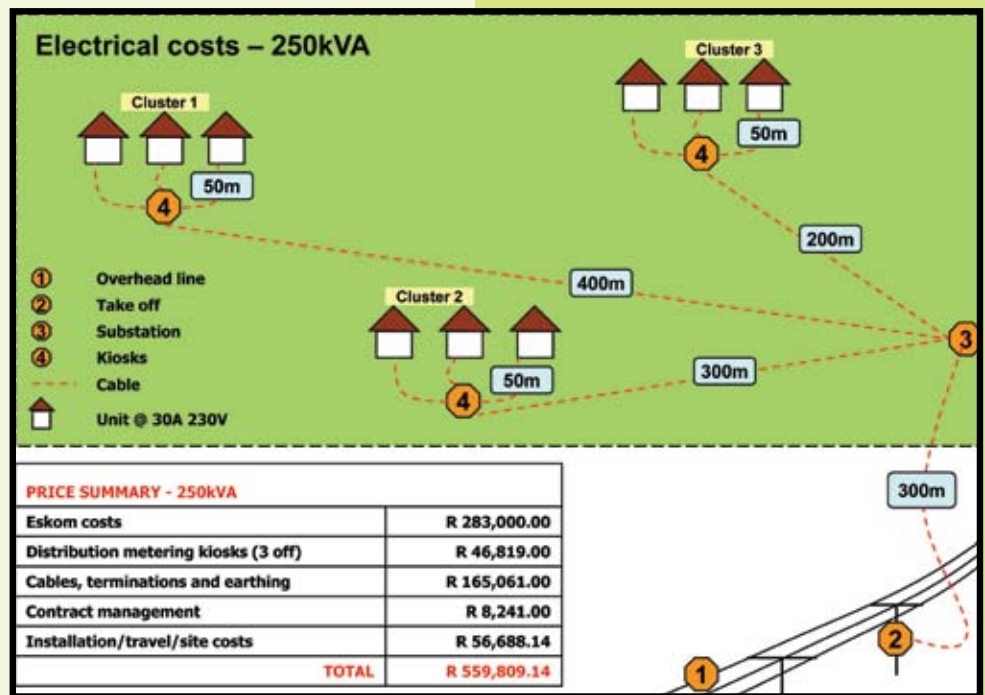
for rural pumping applications like cattle watering from farm boreholes, ie, this is not a fictitious scenario. The systems use no batteries and require no inverter – the pump is run directly off the photovoltaic cells via a basic control panel. “This substantially improves the reliability,” claims Bohnsack.

The costs? “We are currently installing a system for a farmer in the North West Province at R40 000, including the pump,” he tells me. This system will use six photovoltaic panels to generate power at 48V to pump 10 000 litres of water per day out of the farm’s boreholes – and it will also work on a cloudy day. “When it comes to borehole pumps on farms, which are difficult to supply from the grid, then photovoltaics are a perfect solution – absolutely viable.

Wind? “In some cases it may be cheaper but you have a mechanical device again, with all of the associated mechanical reliability problems,” he responds.

But what about domestic solutions? Electron has recently installed a system at the show house of a golf estate in the Magaliesberg. The reason? Because of the costs and the time delays of getting the Eskom supply to site. The system collects about 900W for about two hours a day – 90% of its peak rated output. It will charge the batteries for at least five hours a day and, via the inverter, supplies at least 3,5kWh per day, which can be used over the 24 hour period. Enough to run 20 eleven watt CFL bulbs for six hours continuously and still have 2,0kWh left over to run low power equipment like TVs, computers, an efficient fridge, etc.

The total cost around of R100 000 for a system like this breaks down as follows: 12 off batteries at roughly R1 200 each, R14 4000 of the total; R17 000 for the bi-directional inverter, which enables optimised charging, current feed both in and out of the batteries and easy connectivity to an external source – either a generator or an Eskom supply; and the remainder, 68,6% of the total cost, for the photovoltaic panels, a steel cabinet, regulator and installation costs.



While this system power is still a little short of being able to supply all of the electricity needs of a home, Bohnsack points out that it is more than enough for essential needs: lights; security; intercom; computers; access gates; garage doors; TV/DVD/sound system; and the fridge. Non-essentials, like the oven; pool pump; washing machine; tumble drier; dish washer and the microwave, still need to be catered for some other way, either using Eskom power or alternatives to electricity.

It is very easy to evaluate such a system as unviable by comparing the total cost of photovoltaic power to the current price of electricity – at 50 cents per kWh, R100 000 buys you 200 000kWh of electrical energy. It will take this photovoltaic system more than 150 years to generate that much power. This is a trivial way of looking at the equation, though. Eskom power pricing is not only cheap but it fails to factor in the historical costs of both the installation of generating capacity (currently estimated for Medupi at around R25 000 per kW installed) or that of the transmission infrastructure.

With both of these factors now ailing dangerously close to collapse, perhaps the time has come to determine financial viability of photovoltaics, and other renewable options, from a position 15 km away from an Eskom line. From there, the picture is very different.

An electrical cost estimate for the new supply of 60A @ 230V to small clusters of houses. Unit costs come down as the number of units increases: 9 units – R62 000/unit, 15 units – 37 000/unit. By comparison, a solar installation would provide each unit with its own power plant, with a 10 year maintenance free life span, no Eskom establishment costs, no monthly or Eskom charges and require no distribution switchgear nor supply cables.



The off-grid show house of a golf estate in the Magaliesberg that can supply at least 3,5kWh of electrical power every day, enough for essential needs: lights; security; intercom; computers; access gates; garage doors; TV/DVD/sound system and a fridge.



Andreas Bohnsack, the MD of Electron Technologies (Pty) Ltd and a passionate enthusiast of photovoltaics as a viable renewable energy option.

Standards are a ‘must have’ for every economic sector

By Ruanne van der Walt
Third year student at a Johannesburg tertiary education institution

There once were two ambitious young men and each had a dream of starting his own business. A large steel factory had recently opened near their town and they had heard that the factory insisted that its workers wear boots to protect their feet.

Both men were experienced cobblers so they each decided to open a boot shop. One of the men had learnt about protective clothing safety standards at the community college and because of this, he chose to add a steel toecap to his shoes and to reinforce them by using a thicker grade of leather.

The other man made his boots out of thicker leather but that’s all. It turned out that steel bars frequently fell on the toes of workers so the first man sold thousands of pairs of boots, became the biggest supplier in the country, married a famous actress and now drives a Ferrari.

The other man works for him as a quality supervisor.

The point about this story is that standards are crucial for every industry, no matter how seemingly insignificant it might be. In South Africa, the South African Bureau of Standards (SABS) defines a standard as being a published document that lists established specifications and procedures to ensure that a material, product, method or service is fit for its purpose and performs in the manner for which it was designed and developed.

The Concise Oxford English Dictionary defines safety as the state of being protected from danger, risk or injury. How do standards promote and improve safety?

The first idea that comes to mind is that standards can, for example, prevent a consumer from being electrocuted in his pyjamas while making toast and touching the electrical plug by accident.

The SABS standard 164-1:1992; applies to plugs and socket outlets for households and similar purposes, and ensures that the plugs of appliances do not give us a nasty early morning shock or a shock at all at any time provided the appliance is used correctly of course.

However, appliance standards are not the only standards that exist for the protection of users. Standards exist for everything; from traffic cones, concrete floors, motorcycle helmets, lamp holders, personal flotation aids, air quality, child restraints in motor vehicles to smoked snoek and prawns.

In an article published in July this year by the International Standard Organisation entitled: ISO standards to save sailing enthusiasts from danger and drowning, a new standard was written. It is the ISO 10862:2009, Small craft quick release system for trapeze harness and is aimed at making sailing even safer.

A trapeze is a contraption that is worn around a sailor’s waist and allows him to hang suspended above the water outside the boat. It is used to improve the speed and the control of the yacht. The sailor must

be able to release himself from the harness rapidly and easily to avoid endangering his life (for instance by being hit by an adjacent craft, an overhanging branch or a bad-tempered jet-skier).

In terms of the new ISO 10862:2009 standard, the release time of a trapeze or harness must be less than five seconds and should be operated by one hand (encased in neoprene gloves) or in any state where the yacht may be in danger of capsizing.

Many people might think that such legislation is idiotic but in fact standards exist as a fundamental tool aimed primarily at improving a service, a product, a technology or a methodology.

The consequences of using products that do not comply to a standard can be catastrophic: people all over the world have been maimed and killed because Toyota’s carpets in one of its models did not comply to a standard and resulted in the largest recall of new vehicles in history.

There are many different examples of dangerous products that do not comply with standards killing, injuring or maiming innocent users – and there are bound to be many more. So one must accept that standards are there for a reason and the reason is plain: to protect the end users.

First World countries like the United States have developed what are known as Private standards or standards that go beyond the minimum laid down by organisations such as the South African National Standards or by the International Standards Organisation.

Private standards are standards of a higher calibre and are used mainly by buyers of food and agricultural products in various countries. These standards are not compulsory but they do provide those who comply with the standards access to the richest markets.

These are the standards of the elite. The Private Standards Innovation Fund believes that although these standards may place constraints on food exports, they also present an opportunity for South African businesses and firms to distinguish themselves as high quality reliable suppliers that are able to meet and exceed the exceptional food safety, environmental and social standards set by their buyers.

With relation to food safety in South Africa, the SABS has implemented HACCP (SANS 10330). This standard ensures that companies identify, investigate and manage all hazards and potential safety threats at each stage of their production and distribution cycle.

Standards are largely a kind of ‘unsung hero’ within any economic endeavour and the SABS website lists many of the benefits, which include:

- Easier access to, and a greater choice of, goods and services.
- Improve quality and reliability of all commodities used in this country.
- Provide consumers with the assurance that the products are safe to use or consume.
- Provide compliant manufacturers with a competitive edge as the

quality of their goods and services are underwritten because they comply with a standard.

Why then, if we have these great crusaders of public safety and business development, do we so seldom hear from them?

I am a third year student at a tertiary institution and until I started doing some research into the value of standards, I had only a very basic understanding of what standards are or what purpose they fulfill.

How can standards be used to improve safety if their purpose and benefits are not clearly understood and are not communicated to the public at large? How ridiculous is it that I, as a third year student, only investigate standards now. I should have been exposed to them at school and should have at least understood their value as a youngster.

The current National Curriculum Statement for the Further Education and Training phase in schools includes a subject called Business Studies. In this subject students learn about various topics related to understanding and running a business.

One of these topics involves the steps needed to write a business plan and how to establish a business. Students will benefit from learning about standards as part of this topic because standards may have a substantial influence on product development and the use of standards can set one business apart from many others.

The NCS includes other subjects such as Design and Engineering Graphics and Design, where standards may be introduced to students. I am in a technology and design field and have only now realised just how important standards are and just how they can be applied and used to improve safety and promote technological advancement.

To complicate matters, I recently searched the SABS's website for a page or pages devoted to public comment on standards. To my astonishment I could find no such resource.

I then searched the Internet in the hope that I would find an official forum to report incidents of non-compliance with standards and I was unable to find such a resource either.

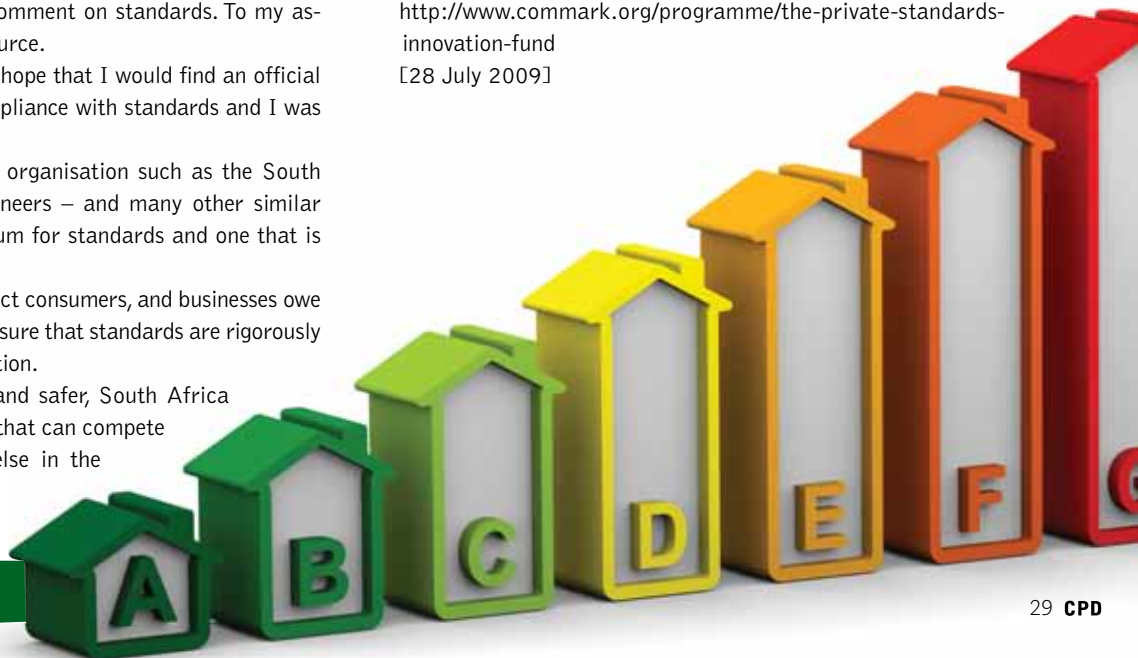
In view of this, I suggest that an organisation such as the South African Institute of Electrical Engineers – and many other similar organisations – develop a public forum for standards and one that is readily accessible to all.

Standards must be applied to protect consumers, and businesses owe it to themselves and their clients to ensure that standards are rigorously implemented at every level of production.

That way we will build a better, and safer, South Africa that produces products and services that can compete with anything available anywhere else in the world.

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Tesla is quick but its handling is brutish

The impressive looking and deceptively quick Tesla Roadster electric car has notched up a record 501km on a single charge after being tested in a remote part of Australia.

Owner Simon Hackett and his friend Emilis Prelgauskas drove the car from Alice Springs in the Northern Territory to Coober Pedy in South Australia. They were taking part in an alternative fuel rally known as the Global Green Challenge.

For the test, the Tesla's electric-charge port door was sealed once the batteries were fully charged. The lithium-ion battery – which the manufacturers claim will give owners a range of at least 320km – still had enough of a charge to travel a further 6km or 7km by the time the team reached their destination.

As part of the plan to conserve energy, Hackett and Prelgauskas drove at a constant speed of 55 km/h for most of the 12-hour journey.

In a separate series of tests, Jeremy Clarkson of *Top Gear* fame drove the Tesla around a test track in Britain and in his programme he was certainly impressed by the acceleration of this pocket rocket.

However, with the ferocious driving that the Tesla was subjected to in Clarkson's hands, the vehicle only managed to do about 75km before the battery was exhausted. Also, the heavy batteries mounted in the mid-section of the car meant that its handling at top speeds around a twisty track was cumbersome and weary rather than lithe and sharp.

Certainly the Tesla is the first true sports car made to run on electricity and there is little doubt that as battery technology improves and more and more manufacturers venture into this field, the range of vehicles will increase dramatically.

I wonder how many years it will take before Bernie Ecclestone decides to run an all-electric Formula One Grand Prix. My guess is that if manufacturers were told to phase out all combustion engines within ten years, electric derivatives would be commonplace long before that.

After all, Formula One has been the breeding ground for just about every significant development in the motoring world today – so why should this not apply to developing alternative fuels using different engines?

Cell phones should be banned in prison

Technology that effectively jams cellular phone signals will be introduced at British jails to stop criminal activity from inside the prison. David Jamieson, chairman of Wandsworth Prison's Independent Monitoring Board says that illegal cellular phones fuel drug trading, bullying and gang-related problems in jails throughout Britain.

Illegal phones sell for about £400 behind bars and the trade in illegal phones was estimated to be worth at least £9-million last year. Authorities confiscated more than 7 000 phones during the same period.

He estimates that there are more than 20 000 cell phones in use in prisons. Phones are often smuggled into the jails by visitors or corrupt prison officials. He has called on the government to provide cellular phone jamming technology – at a cost of £250 000 per jail – in an effort to reduce widespread crime, corruption, drug dealing and bullying in British jails.

Jamieson says that while it is impossible to prevent cellular phones from being smuggled into prison, it is quite easy to jam signals in a defined area around a jail.

Just last month a prisoner at Belmarsh Prison, Delphon Nicholas, was found guilty of ordering his accomplices outside the prison to murder Andrew Wanogho who died after being shot in the back by Trevor Dennie, Nicholas' accomplice.

Nicholas was jailed for a minimum of 30 years for the murder.



WATTnow



CPD Overview

WATTnow, in conjunction with the South African Institute of Electrical Engineers (SAIEE), has launched this programme for engineers who need to meet their professional development commitment by securing Continuing Professional Development (CPD) credits. In terms of the renewal of registration requirements, all professional electrical engineers must earn five CPD credits a year. Failure to certify CPD credits could jeopardise renewal of their registration.

WATTnow publishes articles in each issue that qualify readers for Category One CPD credits, which require engineers to respond to in-depth questions posed on articles that are specially designed and validated to provide CPD. Engineers using the system will accumulate between 0.1 and 0.3 CPD credits if all the questions are answered correctly. Ten such articles are published annually so at least one CPD credit can be obtained by this method. The articles in **WATTnow** are independently validated by the SAIEE, which determines the exact value of each credit applicable to each issue of the magazine.

In future, **WATTnow** will produce a series of video broadcasts of up to six lectures annually on topics that have been validated for CPD by the SAIEE. These lectures will be filmed and edited by a **WATTnow** production team and converted to either CD or DVD disks before being distributed free-of-charge to members of the **WATTnow** CPD Programme.

A series of appropriate questions will be included on the CD or DVD and members of the programme can submit their answers directly to **WATTnow** by e-mail, on-line or by fax. The filmed presentation will qualify the user to claim credits in the Category One section, which makes attendance of a conference at least once a year mandatory.

The SAIEE will issue each member with an official certificate recording the exact number of credits gained by each individual in any given year.

The **WATTnow** CPD Programme is based on a subscription service that will cost non-members of the SAIEE R2 400 a year while members of the institute will pay an annual subscription fee of R1 000.

This programme offers all members of the **WATTnow** CPD Programme a one-stop-shop to participate in and comply with the professional development criteria laid down by ECSA and ensure that all professional engineers can maintain their status without having to search around for sufficient credits to meet the ECSA requirements.

For further information visit www.wattnow.co.za



'Jet' to break the land speed record?

A British team of enthusiastic researchers will use a rocket car – powered by two engines taken from a Eurofighter Typhoon jet – to blast across the Hakskeen Pan in the Northern Cape at speeds of more than 1 000 miles an hour (1 600 km/h).

Wing Commander Andy Green says the dried-out lakebed at Hakskeen Pan provides the perfect surface for the Bloodhound rocket car to set a new land speed record of more than 1 600 km/h.

The six ton Bloodhound runs on metal wheels and the surface of the lakebed is hard enough to support the vehicle but soft enough to let the wheels sink in to a depth of about 10 mm. This provides damping and lateral grip at slow-to-medium speeds.

Green says that at high speeds the wheels protruding underneath the car act as a rudder, giving him the ability to control the car at high speed.

The current land speed record of 1 228 km/h (763 mph) was set by Green in the jet powered Thrust SSC in 1997.

The new Bloodhound vehicle will be built at a special facility in the Bristol docklands and will use two EJ200 jet motors, borrowed from Britain's Royal Air Force.

Green's team still has to raise about £10-million for the record attempt. Major sponsors so far include Lockheed Martin, which helped to design the Bloodhound's aluminium wheels and Intel, which has assisted with modelling work.

Already 2 400 primary and secondary schools, 98 further education colleges and 33 universities have joined the Bloodhound team and are using content from its website as an educational resource for students around the world.

Anyone interested in participating in the Bloodhound project or using its educational resources can register on the website at <http://www.bloodhoundssc.com>

Crystal creations – a black art in the world of science?

A group of scientists at the University of Edinburgh are using low-energy lasers to make salt crystals in gel and they say that these crystals could be used as storage data on laptop computers or any other electronic devices.

The crystals allow for a terabyte of data – equivalent to 250 000 high resolution photographs or a million books – to be stored in a space no bigger than a sugar cube.

Lead researcher Dr Andy Alexander says that many scientists regard crystal manufacture as a black art because the process used to produce solid crystals from salt in a solution is difficult to control.

However, by focusing two overlapping low-energy laser beams on a salt solution, the researchers were able to provide exactly the right amount of energy to form a temporary crystal. The technique was developed by the University's School of Chemistry.

Alexander says that the new crystals allow for three-dimensional optical data storage that uses many more layers. Each crystal acts as a storage point. To use the crystals, information is recorded by making marks in a pattern, which can be read using light.

Alexander reckons that the crystals could be used in a wide array of electronic devices within ten years. He says that after years of experimentation, the group has refined the technique to such a degree that it is now possible to produce crystals on demand.



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Brazil's affirmative action policies

Brazil has introduced affirmative action policies – aimed at increasing the number of black or mixed-race students – at its universities and may introduce a quota system for the tertiary education institutions.

Surprisingly, there are more people of African descent living in Brazil than in any other country outside the African continent itself.

Authorities in Brazil have been growing increasingly concerned by the fact that universities unfairly discriminate against black and mixed-race students. Critics of the plan say that affirmative action policies will heighten racial tension in Brazil.

The State University of Rio de Janeiro was one of the first organisations to introduce a quota system and, according to student Gisele Alves, without the quota system she would not have been accepted by the State University. The policy reserves



20 percent of its places for poor black and indigenous students.

Critics of the system have mounted a legal challenge to ban the quota system and, according to state congressman Flavio Bolsonaro, the introduction of affirmative action policies is “reverse discrimination”.

He argues that this system means that a student with high marks may be refused entry to a university but a student with lower marks will get into the organisation purely on the basis of skin colour and race group.

Of course Brazil does not have specific legislation to determine race, and officials in Brazil allow people to choose how they wish to be classified. Hundreds of years of racial mixing means that Brazilians regard themselves as neither black nor white but a mixture of the two.

Senior researcher at the Institute of Studies of Work and Society, Simon Schwartzman (what’s in a name) says poverty is the real reason black and mixed-race students seldom get into a university. He contends that people who are poor do not have access to good basic education and because of this they cannot meet the admission criteria for many universities.

LHC experiment may happen on Christmas Day

After 13 years of construction work that has cost more than £2.5-billion and having endured a catastrophic failure last year, the Large Hadron Collider (LHC) is finally gearing up for its most significant experiment – recreating in miniature the ‘Big Bang’ that created the universe billions of years ago.

Scientists at LHC have spent months cooling the collider to temperatures of -271 °C in preparation for the experiment, which is due to take place towards the end of December and, scientists hope, will unlock a tiny entity known as the Higgs Boson or God Particle, which is believed to give all objects, including people, their mass.

There is also some hope that a strange, so far unexplained, phenomenon of ‘dark matter’ will be uncovered.

Cern scientists have started firing protons around one small section of the collider as they prepare for its re-opening. Slowly more and more protons will be fired over larger distances and, if all systems are operating correctly then, by Christmas Day, the first serious experiments will be conducted.

Once fully operational, the LHC will use about ten times more power than any other particle accelerator on Earth and will consume 120MW of electricity – enough to power an entire Swiss canton – to accelerate the protons from two beams each less than a hair’s breadth in diameter.

The protons will reach speeds that are just a fraction lower than the speed of light. One set of protons will be fired in a clockwise direction, the other set in an anticlockwise direction and at four points along the 28km tunnel the beams will cross.

Bunches of protons – each containing about 100-billion particles – will slam into oncoming bunches triggering collisions that fling barrages of sub-atomic debris in every possible direction.

Scientists are effectively trying to recreate conditions that existed

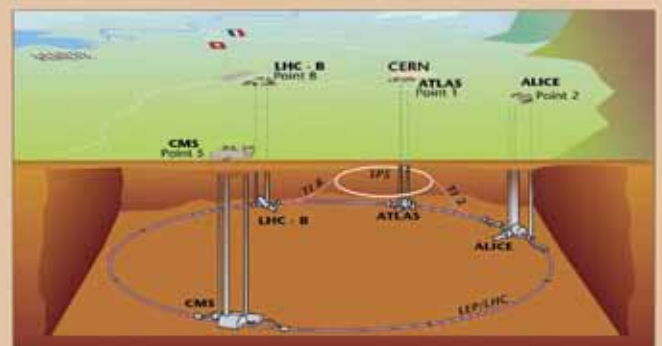
about a trillionth of a second after the universe’s birth. They hope that the explosive interaction will recreate the ‘Big Bang’ and identify a range of new types of particle including the Higgs Boson. There are some fears that the collisions will create miniaturised ‘black holes’.

Sceptics from around the world feel that it is these miniaturised ‘black holes’ that will multiply rapidly, eventually swallowing Earth and destroying the world as we know it. Protesters are so concerned that numerous legal actions have been instituted in courts in Switzerland, France, Germany and even the European Court of Human Rights, but none of these actions has succeeded.

The LHC itself is a truly remarkable machine. Its components and its structure have been engineered to tolerances of a billionth of a metre, pushing engineering capabilities to the absolute limits.

As one physicist commented, “If the LHC works it will probably be the most complex machine in history. If it fails, it will be the world’s most expensive piece of modern art.”

The LHC is situated deep under the Jura Mountains outside Geneva on the border between France and Switzerland.



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A grumpy boss? Good for you

An Australian psychology expert, Professor Joe Forgas of the University of New South Wales, claims that grumpy people think more clearly and are better at decision-making than their cheerful counterparts who bounce around the office like a character from Super Mario Brothers.

Forgas claims that while cheerfulness fosters creativity, gloominess increases the attention span and results in more careful thinking. Perhaps he's justifying his own feelings.

For his research, Forgas asked a group of volunteers to watch different films and then to dwell on the positive or negative events in their lives. This was designed to put each volunteer into a good or bad mood.

He then asked them to take part in a series of tasks, including judging the truth from an urban legend or providing an eyewitness account of a particular event. Volunteers who were grumpy and in a

bad mood significantly out-performed those who were the opposite.

The study also found that sad people were better at stating their case through written arguments rather than by verbalising them.

Forgas claims that the weather has a similar influence on people with wet, dreary days sharpening memory and bright sunny days making people more forgetful than usual.

If his research is right then the ideal person is a grumpy old sod who lives in miserable circumstances in a rain-soaked region of Europe, America or China and spends all his time dwelling on how many things have gone wrong for him.

I wonder if Thabo Mbeki was one of his volunteers?



Curiosity really is a curiosity

A new Mars Science Lab, curiously named Curiosity, is heading for the planet and in 2011, from the moment it arrives its advanced scientific instruments will start collecting as much information as possible about Mars and its distant past.

Dust samples from the planet will be analysed on the spot and even rocks on the surface will be vaporised using laser beams so that scientists can study the structure of these rocks using high-resolution photographs captured during the process.

Joy Crisp, part of the team at working on Curiosity at NASA's Jet Propulsion Laboratory, says the craft will be used to prospect for organic molecules, which are chemical building blocks of life.

She says that scientists want to establish if Mars was capable of harbouring life or might be capable of doing so sometime in the future.

Crisp says the rock record is of particular interest because it can answer questions dating back billions of years and by analysing the rocks it is possible to

establish whether it was a warm or cold planet in the past, whether water existed there and, if so, whether it was acidic or alkaline.

The new craft will have a much greater range than the two Rover craft currently on the planet. Curiosity will use nuclear rather than solar power. It will also have a descent stage called a Sky Crane that will gently lower the craft onto the planet's surface using cables and, once the craft is safely on the surface, the cables will be cut.

Crisp says that the Curiosity is a sophisticated analytical laboratory whereas the two Rover vehicles were really used to observe the surface of Mars and its environment. Curiosity's laser beam will allow scientists to vaporise rocks and, according to Crisp, when that happens, a tiny plasma cloud is produced providing scientists with detailed information on the chemistry of the particular rock.

The robotic arms used on the craft are fitted with a range of different instruments. For instance, the APXS or Alpha Particle

X-Ray Spectrometer will measure chemical elements in the dust, soils, rocks and processed samples from the planet.

The Mars Hand Lens Imager will provide colour images similar to those produced by an ordinary digital camera but can also act as a magnifying lens for geologists who intend to examine the structure and texture of rocks, dust and frost at the micro-metre to centimetre scale.

It also has, inside the body of the craft, an instrument known as SAM (for the Sample Analysis of Mars) that can open a vent to sample the atmosphere to see if it contains traces of methane in a particular area.

Methane can be released by microbes or liquid water reacting at depths beneath the surface of the planet where subterranean life may exist. The SAM can also be used to 'sniff' for gases released when a rock or soil sample has been baked in its oven.

Curiosity will carry instruments to observe Martian weather and measure the levels of cosmic radiation that bombard the planet.



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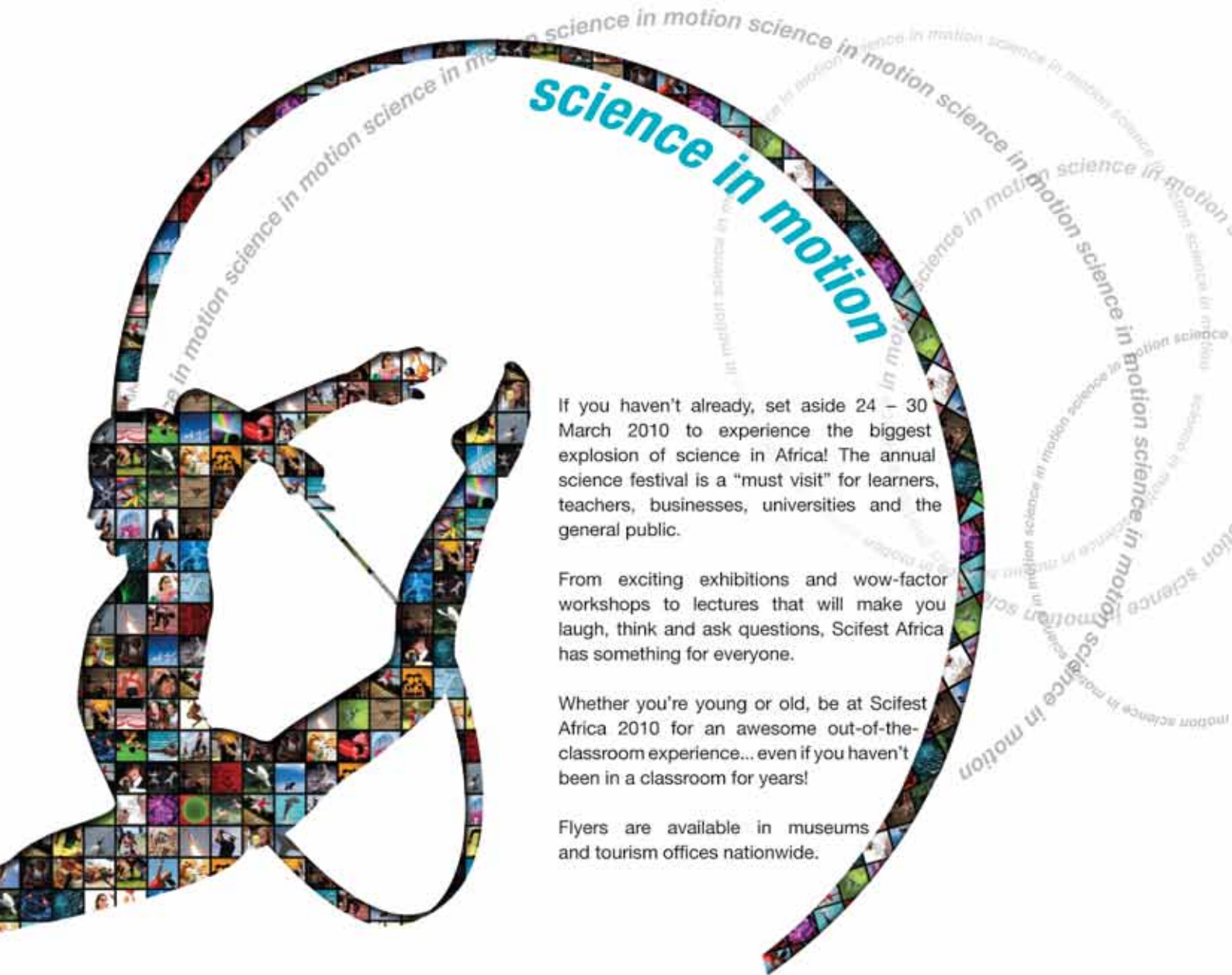
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Asteroids, comets need to be monitored

In 2004, NASA was instructed by the US government to identify any asteroids that might pose a threat to Earth. However, the body has been unable to do so because it does not have the money to build new telescopes.

NASA estimates that there are about 20 000 asteroids and comets in Earth's solar system that may pose a direct threat to the planet. These bodies are larger than 140m in diameter and so far, NASA has only been able to identify 6 000 of them.

According to Lindley Johnson, NASA's manager of the near-Earth objects programme, if an asteroid or comet larger than 140m in diameter struck the Earth, the damage in the area it hit would be catastrophic.

A report released by the National Academy of Sciences showed that NASA would have to spend about \$800-million between now and 2020 to build new telescopes that could accurately identify the threat posed by these flying rocks.

Johnson says that so far only five near-Earth objects have a better than one-in-a-million chance of striking Earth. Astronomers are keeping an eye on an unnamed object that is 130m in diameter and may collide with Earth in 2048.

Another asteroid, the Apophis is more than 260m in diameter and it has a one-in-43 000 chance of striking Earth either in 2036, 2037 or 2069.

Meet the Aardonyx – a new dinosaur species

A team of researchers from the University of the Witwatersrand's Origins Centre has discovered a new genus and species of the large-bellied, vegetarian dinosaur, named Celeste's Earth Claw or *Aardonyx celestae*, a name chosen to honour the pregnant wife of lead researcher, Adam Yates.

Describing his findings, Yates says the new creature is a transitional fossil caught between two body types – the prosauropod and the sauropod – and was apparently gradually developing into a quadruped.

The Aardonyx fossil is believed to be that of a juvenile creature less than ten years old that had grown to between 6m and 7m in length. The hip height was 1,7m and it would probably have weighed about 500kg. A fully-grown Aardonyx is believed to have been considerably larger than this.

Fully-grown sauropods were radically different from Aardonyx though. For instance, sauropods walked on all fours, grew to about 40m in length and weighed about 100 tons.

Yates says the Aardonyx probably foraged for vegetable matter in what palaeontologists believe was a riparian forest region that existed in what is now known as the Senekal area. The creatures lived there between 183- and 200-million years ago.

Yates and his team found numerous bones from the Aardonyx's skeleton lying among weathered and exposed onyx rocks in the lava formations that make up much of the Drakensberg range.

The Aardonyx is believed to be part of a transitional period where creatures transformed from bi-pedal dinosaurs to the huge vegetarian sauropods that browsed along the arid plains of the Karoo. Based on evidence from the fossils, Yates speculates that it had died because of a drought in the region and had been fed on by another species of carnivore dinosaur after its death.

He concedes that it is possible a predator could have killed the Aardonyx as the researchers did find evidence of a carnivore's teeth nearby.



Dr Adam Yates
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Embryos learning to detect their predators

Wood frog embryos are capable of smelling predators such as the salamander and are able to learn the level of threat these predators pose to tadpoles while they are still developing, according to researchers in the United States.

As part of the experiment, embryos were put into water containing the odour of a salamander and the odour of an injured tadpole and the embryos soon learned that the predator's smell posed a threat to their own survival.

Lead researcher Maud Ferrari, based at the University of California Davis, says that this type of early learning has been seen in fish, several species of larval amphibians and larval mosquitoes. However, this is the first time that her team has been able to document the learning behaviour in frogs.

To make the chemical cues for the embryos, Ferrari and her team crushed tadpoles and mixed them with water in which a tiger salamander had been swimming. The scientists also used crushed tadpoles to mimic the odour of an injured creature.

Once the embryos had hatched into tadpoles, the scientists were able to test their response to a cue from the tiger salamander. Immediately they sampled the salamander water the tadpoles froze, a very common anti-predator behaviour.

The tadpoles were put into a container of plain water and their movements were carefully measured. Then they were placed into water containing the odour of the tiger salamander and the tadpoles remained frozen and motionless.

Ferrari says that the ability of embryos to learn at such an early stage of development makes evolutionary sense as it is the only way these tadpoles will recognise their predators.



HTV delivers its payload then goes into destructive dive

Japan's new space freighter craft, the H-II Transfer Vehicle (HTV), has successfully delivered its 4,5 ton payload of scientific equipment to the International Space Station for Japan's Kibo laboratory.

The HTV arrived at the space station in September and it was only in November that the craft was released from the ISS and, through a controlled series of engine firings, re-entered the Earth's atmosphere and began its planned destructive dive over the Pacific ocean.

The Japanese Space Agency expected that most of the vehicle components would probably have been destroyed on re-entry but it warned that some debris might be found in the ocean.

The HTV is one major contribution that the Japanese Space Agency has made to the international Space Station project and is part of a barter agreement that allows the agency to

pay its own way for participating in the project.

A number of HTV craft will be used to replace the Space Shuttle when NASA retires its fleet from service in 2011. The HTV is also the first spacecraft to visit the ISS without driving itself all the way to the berthing point.

Instead, it stops under the bow of the ISS and the platform's Canadarm2 attaches itself to the HTV and guides it to the final berthing stage. The HTV is 9,8m long, has a diameter of 4,4m and a mass of 10,5 tons.

It has a maximum payload of six tons and carries food, clothing, water, laptop computers, scientific equipment and so forth inside its pressurised hold. It also has an unpressurised, external cargo bay that can be used to deploy equipment into space.

Japan is planning a further six flights of the HTV between now and 2015.



Japan Aerospace Exploration Agency (JAXA) technicians observe the assembly of an H-2 Transfer Vehicle (HTV) in this undated handout photo. NASA has begun unofficial negotiations with Japan's space agency on purchasing units of an unmanned cargo transfer spacecraft as the successor to its space shuttles, the Yomiuri newspaper said.



A Japan Aerospace Exploration Agency (JAXA) H-2 Transfer Vehicle (HTV) is pictured in this undated handout illustration.



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Human and animal waste could resolve some energy problems

The high cost of converting animal and human waste into energy is hampering the development of this sector, even though it could contribute at least 200MW of power for small communities around the country according to Rob Cloete, direct of Biogas Power.

He claims that a number of pig and cattle farmers are interested in converting animal waste into electricity for use on their own farms and the farming community in the immediate vicinity, but they would need to spend at least R20 000 on a small bio-digester to convert biogas into electricity.

Cloete believes that unless the cost of the equipment reduces significantly – or unless Eskom provides some kind of incentive to install such equipment – the widespread use of biogas among the farming community will be limited.

In South Africa a number of trial projects have been implemented, some successfully. For instance, in Limpopo a piggery is generating about 10MW of electricity from animal waste and in KwaZulu-Natal, a chicken farm is producing 3 000 kW/h of electricity a month from chicken manure.

Cloete estimates that the average rural family could generate enough electricity to cook a meal and provide light for a few hours a day from just 45kg of animal and human waste. However, the high equipment cost is believed to be the main reason that these options are not being seriously considered or implemented by any of the rural communities in South Africa.



Peugeot makes a car-come-bike for commuters

Peugeot has made an electric car with a difference – it's a combination of car and motorbike, can seat four people and is just 2,5m long. This was achieved by moving the driver's seat to the side of the vehicle and allowing him or her to sit in a more vertical position because there are no pedals on the floor.

The vehicle uses 'handle-bars' much like a motorbike. A passenger is seated next to the driver and then two other passengers are seated in tandem behind the front seats. Access to the vehicle is through an inverted door opening mechanism. The vehicle even has a small boot that can be accessed through a tailboard at the back of the hybrid car-come-motorbike.

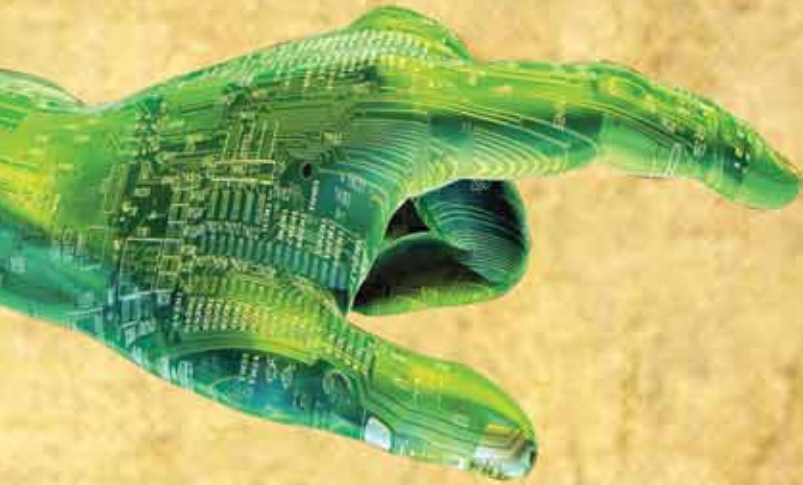
Known as the BB1, the vehicle is fitted with electric motors on the rear wheels and these increase the amount of interior space in the vehicle. Apparently it is partly based on a quad-bike.

The engine has an output of 15kW or 7,5kW per wheel. It can reach a speed of 30km/h in just 2,8 seconds and reach 60km/h (from standstill) in just over six seconds. Its maximum speed is 90km/h.

The lithium-ion batteries apparently provide a range of 120km from two battery packs situated behind each of the rear seats. The frame is a tubular steel structure designed by Peugeot Motorcycles and the vehicle includes various dynamic systems such as electric power steering and double-wishbone front and rear suspension assemblies.

The body is made from carbon fibre and the entire vehicle weighs just 600kg.





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Is energy savings awareness on the increase?

A record number of entries were received for the Eskom-sponsored ETA Awards this year and, according to Steve Lennon, managing director of Eskom corporate services, this is a "clear indication" that

South Africans are taking energy efficiency and environmental issues more seriously now than in the past.

There were a total of 207 entries for the awards from a cross-section of society. For instance, a group of school children submitted projects that illustrated the direct impact of energy savings on their environment.

On the other hand, FirstRand – a major public company – has incorporated various major energy saving measures and environmental features into its new building.

"In essence, we received entries from private citizens with ideas for energy savings, from major corporations eager to reduce energy consumption and from a cross-section of professional engineers who displayed a level of inventiveness and imagination in producing projects that compare with some of the best in the world," said Lennon.

This year's ETA Award winners were:

- Innovation Category: Kobus Engelbrecht, African Technical Innovations for the Green Ceiling Heater.
- Power Fitness Category: Carole Mason from Investec, Bank for its' Think 15 percent More internal campaign that

has already saved 10 percent of the company's electricity consumption.

- Residential Category: Light Kinetics for its LED street light installation in the Winterveld.
- Industrial Category: Mondi Group for putting to use previously wasted heat from a production process that saved a staggering R22 million a year at its Richard's Bay Kraft mill.
- Commercial Category: FirstRand Limited for its massive R7,5 million in energy savings countrywide.
- Women in Industry Category: Lydia Willems, University of Stellenbosch, for running an energy savings competition for university residences.
- Women in Community Category: Colleen Lamprecht, St Joseph's Home for the Frail in Middelburg, for energy efficiency measures instituted at the old age home.
- Young Designers Category: Three Crowns Senior Primary School, Eastern Cape for building a centre that educates the community about sustainable energy use and gives it access to alternative energies.



SECC vows to keep illegal connections running

Eskom security staff have started arresting members of the Soweto Electricity Crisis Committee (SECC), responsible for illegally reconnecting electricity supplies for residents who have not paid their accounts.

Although members of the SECC are being apprehended, the organisation claims that it will keep working with the community to illegally reconnect their supplies or modify prepaid machines to allow electricity supplies to continue illegally.

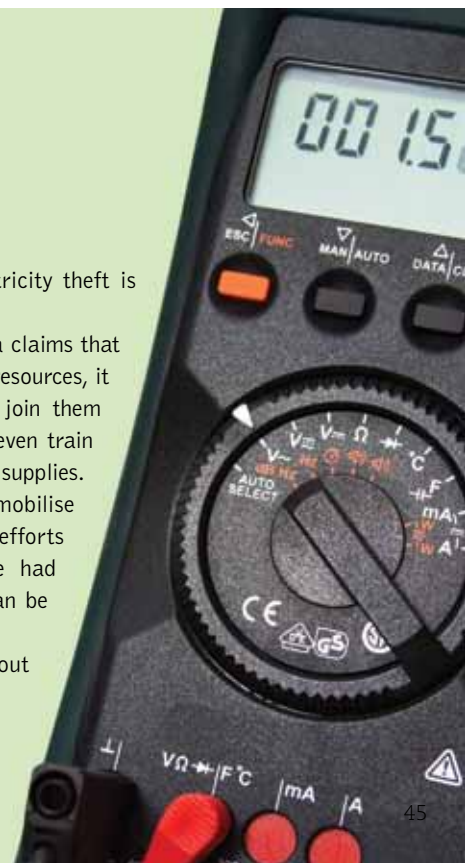
Eskom says that just 20 percent of the households in Soweto pay for the power they use. The company estimates that about 35 percent of the power supplied to residential consumers is stolen from the utility and that with organisations such as the SECC actively reconnecting

individuals' households, the scale of electricity theft is likely to continue to rise.

The group's youth leader, Bobo Majhoba claims that while the SECC does not have money or resources, it will continue to persuade electricians to join them in their fight for free electricity and will even train unemployed individuals to reconnect power supplies.

He says that the organisation plans to mobilise people in other townships to join their efforts so that millions of residents who have had electricity cut because of non-payment can be reconnected to the electricity grid.

Soweto residents alone owe Eskom about R1,8-billion.



Toshiba methanol fuel cells recharge other cells

Toshiba has developed an alternative power source to recharge a variety of electronic gadgets. The Dynario fuel cell costs about R2 500 and can apparently triple the battery life of portable gadgets, including mobile phones and music players.

It uses a combination of methanol and water to produce the electricity and anyone buying the cell would have to pay a further R260 for a set of five refills. Toshiba says that each cell produces enough power to recharge two mobile phones. Recharging is done via a USB cable.

The Dynario has its own lithium-ion battery onboard to store the power generated by the methanol fuel cell. The recharging unit went on sale via Toshiba's online store, Shop, 1048 in October.

Various other companies around the world, including Medis Technologies in the United States and SFC in Germany have been making similar fuel cells for some years.

Toshiba says it will start mass-producing the Dynario fuel cells if demand from customers is sufficiently high. At the moment it has produced just 3 000 units for its online store.



Peters pledges government support for energy plans

The South African government is hoping to install at least a million solar water heaters in households and commercial buildings over the next five years according to Energy Minister Dipuo Peters.

Apparently, various interested parties will soon be meeting to develop an action plan for rolling out the solar water heaters and, according to Peters, at least 100 000 new jobs could be created across the 'value' chain, which includes the manufacturers, installers and maintenance technicians.

Peters says that a typical residential solar water heating system reduces the need for conventional water heating by about 40 percent. However, she conceded that the initial costs of installing a solar water heating system were high and that it was this factor that discouraged most people in South Africa from fitting the systems into their homes.

Referring to electricity price increases,

Peters said that it was inevitable that electricity costs would rise in 'quantum leaps' over the multiples of the official inflation targets and, primarily for this reason, South Africa had to start searching for and implementing affordable, renewable and sustainable, alternative energy options to "enhance our energy security, diversity and climate change needs".

Peters believes that South Africa, with its abundant sunshine and comparatively mild climate, makes it an ideal country for the development of many different solar energy technologies. She warned that South Africa would have to start taking renewable energy technologies seriously as the country cannot rely on burning fossil fuels to provide affordable electricity.

Peters claims that the Renewables 2007 global status report showed that \$100-billion was invested throughout the world in renewable energy capacity, new manufacturing plants and research and development programmes that year. The investment came mainly from Germany, China, the United States, Spain, Japan and India.

Where was Africa or South Africa in that process?

"Africa has a general dependence on imported capital goods, consumables and services but it cannot be left behind when the rest of the world forges ahead with the design and implementation of alternative energy resources. South Africa, and Africa, need to be far more proactive in their approach to renewable energy resources," she said.

Peters believes that significant strides have been made in developing the Renewable Energy Feed-In Tariffs (REFIT) to induce independent energy producers to invest in the renewable energy industry. However, she warned that generous government subsidies (in purchasing electricity or providing solar water heaters) would not be sufficient to create a strong, durable market for any new technology particularly a technology such as solar energy.

Instead, incentives should be paired with other enablers such as standards, product certification institutional arrangements, market stimulants and most of all, public awareness among consumers when it comes to purchasing any new device that uses electricity.

"Products must be designed and manufactured to be energy efficient and the public must demand that manufacturers provide such products," she said.



AFD helps CEF with CCS

Agence Française de Développement (AFD), the French arm for international cooperation, is a public establishment that has been combating poverty, promoting development and protecting the environment for over sixty years. Its mandate for economic growth and the preservation of the environment falls directly within the framework of the UN's Millennium Development Goals, which seek to reduce global poverty by half by 2015.

Recently, AFD granted the Central Energy Fund (CEF) R1 568 million for its Carbon Capture Storage (CCS) Centre. CEO, Jean-

Michel Severino, signed the accession letter to the CCS Charter in the presence of CEF's CEO, Mputumi Damane.

"We view this partnership with the CEF as being of significant importance, particularly during the current energy crisis in the country," said Severino. The CCS will be undertaken by the South African Energy Research Institute, a subsidiary of CEF. It will be one of the country's most promising measures for Climate Change mitigation. "The CCS is currently the only technology available that is able to make an impact in reducing greenhouse gas emissions while still using fossil fuels and the existing energy infrastructure," he added.

The partnership between AFD and CEF began in 2007 with the launch of a R7.2 million project to increase energy efficiency and renewable energies in the South African economy. The objective was to reduce dependence on fossil fuels and carbon dioxide emissions.

"AFD has been able to make a contribution to SA's national energy efficiency strategy by providing technical assistance to CEF, more precisely to its division - Energy Development Corporation (EDC) – and subsidiaries, National Energy Efficiency Agency (NEEA) and South African National Energy Research Institute (SANERI). All of these players have played a key role in implement-

ing policies regarding energy efficiency and renewable energy," said Severino. "At the same time, they have also been involved in the identification and preparation of investment programmes while creating the necessary financial and institutional structure."

This cooperation has also led to the AFD's, in partnership in CEF, involvement in:

- Solar water heater projects in the Nelson Mandela Metropolitan and Ekurhuleni municipalities.
- CEF's landfill gas portfolio across four municipalities to offset carbon emissions.
- Energy efficiency projects at South African universities.

CEF is responsible for searching for appropriate energy solutions to meet the future energy demands in SA, SADC and the sub-Saharan African region. These include oil, gas, electrical power, solar energy, low-smoke fuels, biomass, wind and renewable energy sources.

The announcement between AFD and CEF was made during Severino's four-day visit to SA where he committed R3.5 billion in funds. These were towards the Desmond Tutu HIV Foundation, Global Rating, the National Housing Finance Corporation, the Development Bank of Southern Africa, and Transnet. He has also visited Capitec Bank and the Airports Company of South Africa.



Energy efficient gadgets may be irritating

As more and more manufacturers around the world attempt to reduce energy consumption, so more and more appliances are being fitted with novel technology to ensure that electricity consumption levels are lowered.

A number of the new technologies were on show at the recent Ceatec fair in Japan where energy consumption was a major focus in many new products launched there.

For instance, there is a television set that is fitted with a tiny camera with built-in face-recognition software. If a viewer looks away from the screen (or leaves the room to fetch a beer during an ad-break) the TV picture fades out, although the audio transmission remains on, to standby mode.

As soon as he or she returns to look at the screen, the image is immediately restored. Of course, TV sets use much more energy to display the pictures than to play the audio channel, so by switching off the picture, tiny amounts of energy may be saved.

New liquid crystal display (LCD) screens are now using much more efficient backlighting technologies to reduce energy consumption and even the energy-efficient light bulbs are being rebuilt by engineers interested in reducing energy consumption.

The latest of these are the light emitting diodes, which while more expensive, have the capacity to last for years. Currently the bulbs – which Japanese engineers estimate will last for up to 19 years – cost around \$40 each, but economies of scale and more efficient production methods are expected to see prices drop dramatically in the next few years.

Researchers point out that new generation LEDs have diodes clustered inside the bulb and produce a bright light, which can be dimmed.



South African Institute of Electrical Engineers Centenary Memorabilia Order Form



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3. Black Satin Pouches	R10	<input type="checkbox"/>	_____
4. SAIEE Ties	R100	<input type="checkbox"/>	_____
5. SAIEE ladies scarf	R100	<input type="checkbox"/>	_____
6. Champagne Flutes	R100 for 4 Or R25 each	<input type="checkbox"/>	_____
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FROM THE CENTENARY PRESIDENT ... du Toit Grobler

Victor Wilson, Immediate Past President of the SAIEE, lost the battle against leukaemia at 06:50 on 17 November 2009. A memorial was held in his honour at the Botanical Gardens in Pretoria on Monday 23 November 2009.

Victor led and served the SAIEE from the highest office with dedication and distinction during 2008. On 6 March this year he advised his fellow Office Bearers that he was not well and that the Council Meeting later that day would be the last he would preside over during his term of office. In fact, it became one of the last formal duties he carried out as President. Victor attended the Bernard Price Memorial Lecture at the University of the Witwatersrand on 30 September 2009. We were delighted to see him; he looked well and mentioned that he was planning to attend the Centenary Banquet on 19 November and the Centenary Conference and Inauguration of the Centenary Legacy at Sci-Bono on 20 November 2009.

I missed Victor’s presence during my term of office this year and the SAIEE will continue to miss him in years to come. We understand, though, that our loss is not nearly as great as that of his wife, Christa, and their family. On behalf of the Office Bearers, Council and Staff Members of the SAIEE, I offer our sincere condolences to Christa and his family.

CHRISTMAS 2009/NEW YEAR 2010

On 31 December 2009, the first decade of the 21st century will have gone by. By that time we will have celebrated Christmas and my wife Elize and I would like to wish you and your loved ones a blessed Christmas and a prosperous 2010.

TELLUROMETER DAY 15 OCTOBER 2009

On 15 October 2009, a successful celebration of the invention of the tellurometer—50 years ago—was held in conjunction with the International Federation of Surveyors and Tellumat, the suppliers of Tellurometer equipment. The event was organised by the SAIEE Historical Section and was held at the Auditorium with field demonstrations all over the SAASTA grounds.

SAIEE ANNUAL CHARITY GOLF DAY – DONATIONS 15 OCTOBER 2009

On 15 October 2009, the President handed a cheque for R13 889.00 to the Campus Manager of Maria Kloppers Child Care in Observatory, being the nett proceeds of the golf day. The handing over took place at the Campus where the SAIEE treated 50 children, ranging from day-old babies to 18 year olds, to fruit juice and cupcakes. An earlier, anonymous donation of R10 000 by a SAIEE member, brought the total donation resulting from the Annual Charity Golf Day to R23 889.00.

GAUTRAIN SITE VISIT 22 OCTOBER 2009

Thirteen members and visitors attended a rather disappointing site visit to the Gautrain Project Offices and Marlboro station. This followed an interesting presentation by Gautrain CEO Jack van der

Merwe at the President’s Invitation Lecture on 28 May 2009. His excellent presentation was repeated at KZ-N Centre on 29 July 2009.

LAUNCH OF THE SAIEE CENTENARY HISTORY BOOK 29 OCTOBER 2009

The SAIEE Centenary history book, *The First Ten Decades: The history of the SAIEE 1909 -2009*, was launched on 29 October 2009 at a function held at the War Museum in Saxonwold, Johannesburg. Proceedings included handing over the first two copies of the book to President, du Toit Grobler and Deputy President, Dr Angus Hay. Copies were also handed to persons who contributed to the book and to representatives of the 55 platinum, gold, silver and bronze sponsors of the book. Compiling editor, Mike Crouch, gave an overview of the book and the President expressed a vote of thanks. The President presented his first copy of the book to his wife, Elize, whose birthday it was that day, as a token of appreciation for her support of his involvement with the engineering profession ever since they met.

KZ-N CENTRE ANNUAL DINNER DANCE 30 OCTOBER 2009

A successful dinner-dance was held at the Durban Country Club on 30 October 2009. At the function Vaughn Stone, Past Chairman of the KZ-N Centre and Immediate Past Honorary Vice President of the SAIEE, was awarded the Lifetime Contribution Award 2009. He became the first person to be receive *The first ten decades: The history of the SAIEE*, as part of this award.

SAIEE COUNCIL MEETING 6 NOVEMBER 2009

The following Office Bearers for 2010/2011 were elected by Council:

President:	Dr Angus Hay
Deputy President:	Andries Tshabalala
Senior Vice President:	Mike Cary
Junior Vice President:	Paul van Niekerk
Hon Vice President:	Neël Smuts
Immediate Past President:	du Toit Grobler

The induction of the Office Bearers will take place at the SAIEE AGM on 25 March 2010.

Council also approved the re-establishment of the Finance Committee under the chairmanship of the Deputy-President. The first meeting of the Finance Committee took place towards the end of November 2009 to prepare the 2010 budget for approval by the December 2009 expanded Council meeting and to identify and propose a successor to Mr Les James as Honorary Treasurer for the 2010/2011 term of office. Council approved the election of Professor JP Reynders as Honorary Fellow.

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



Farewell to Institute stalwarts

Victor Murray Wilson: *1956 † 17 November 2009

Victor Wilson was born on 10 December 1956. He grew up in Cape Town, matriculating at Bishops Diocesan College in 1973 and then attending the University of Cape Town, from where he qualified with a BSc (Elec Eng). He always showed a strong fascination with things electrical and at an early age was able to construct a computer for teaching Boolean Algebra. He was clearly one of the bright boys and in his Matric year was selected to attend the Commonwealth Young Scientists' Congress in London.

In 1979 Victor joined Telkom and within ten years was a Deputy Director. By 2003 he had been appointed Specialist: Technical Product Development. Victor was considered to be 'Mr Internet' and was deeply involved in setting up Telkom's Internet facilities. He was also a founder member of the Internet Society and served on the Board of the .ZA Domain Name Authority.

In 1978, Victor joined the South African Institute of Electrical Engineers (SAIEE) as a Student Member and was well known to be a regular attendee at all monthly meetings. He was soon drawn into the activities of the Institute and chaired the Electronics and Software Section committee for a number of years. In 2002, he received the SAIEE Engineer of the Year Award for his outstanding contributions to the Institute and in 2005 he was nominated as Junior Vice President of the Institute, which led to his induction as President in March 2008.

On 26 February 2009 we received the first email from Victor explaining the onset of 'pre-leukemia' and telling us that he would be undergoing intensive treatment in the near future, including a possible bone marrow transplant. Victor became critically ill and was unable to complete his term of office as President at the AGM on 26th March

2009, as he was hospitalised the day before.

The bone marrow transplant from his sister Wendy took place on 27 May 2009 and was considered to be successful. By mid-July things were going so well that Victor was looking forward to returning to work in September. During mid-September his cancer cell count was zero but early in November his good progress reversed and his cancer cell count increased rapidly. The Leukemia was back in force and, having bravely endured seven months of treatment, Victor passed away on 17 November 2009.

Our hearts go out to Christa who endured with fortitude the stress of supporting Victor and keeping his spirits up during this desperate illness. The condolences of the President, Council and Secretariat of the Institute go out to Christa and the family at this sad time.

We will remember Victor Wilson as a gentle man: an active member of the Mountain Club of South Africa who rejoiced in climbing. He and Christa climbed to the Mt Everest base camp, Mt Kenya, Mt Kilimanjaro and Mt Fuji. Victor was a happy soul who, as a member of the Pretoria Promenaders, loved square dancing with Christa. He was always excited by new technology and gadgets and found much satisfaction in helping others – and he always found the time and patience to do so.

Victor Wilson will indeed be sorely missed by all who were associated with him.

MAC

Ian McKechnie, Past President of the SAIEE



Bruce Norman: *1925 † 28 March 2009

Bruce Norman was born in 1925 and went to school in Johannesburg. He matriculated at King Edward High School in 1940, and began work as a learner draughtsman at Eskom.

In 1942 and 1943 he studied Electrical Engineering at the University of the Witwatersrand, interrupting his course for war duties with the SAAF in 1944 and 1945. He returned to Wits and graduated with a BSc (Eng) degree in 1947.

Mr Norman rejoined Eskom in 1948 and was sent to the US for postgraduate training with Westinghouse for three years. During this time he obtained his MSc degree at the University of Pittsburgh. In 1952 he returned to Eskom and was involved in network planning for two years, before becoming Regional Engineer for Natal, where he was responsible for all system extensions for the Natal Undertaking.

In 1966, Mr Norman became Senior Systems Engineer, responsible for planning extensions to all Eskom's transmission systems, and was eventually appointed as Chief Engineer (Systems Planning).

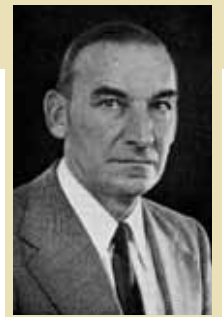
He was elected as President of the SAIEE in 1977, presenting his Presidential Address in an important paper entitled Electricity Supply for the next half century. In this paper he pointed out the importance of expanding generating capacity and transmission lines, diversifying

out of coal, building more hydro and nuclear stations. Had his recommendations been followed, the country would not be experiencing the power supply problems it is experiencing now, and its GDP growth would not have been limited by electrical power supply availability.

He was intimately involved with the high voltage dc line project from Cabora Bassa to Apollo near Olifantsfontein, as well as the 400kV and 765kV transmission lines from Mpumalanga to the Western Cape.

Mr Norman was a Fellow of the SAIEE and a member of the American IEEE. He wrote several papers for these institutes as well as for Cigré, the Paris-based international conference for large electrical networks. He was Chairman on the SA National Committee of Cigré, the South African representative of the Cigré Study Committee no. 31- System Planning, and a past member of Study Committee no. 14, ac/dc Conversion Plant.

Mr Norman passed away on 28 March 2009. He is survived by his wife and four children.



Three members of the SAIEE, Myles Fowlds, Dennis Hunt and Douglas Oakes each received their 50-year membership certificates from du Toit Grobler at the annual banquet held in Johannesburg in November.



Myles Fowlds.



Dennis Hunt.



Douglas Oakes.



The Young Achiever Award was presented to Luthando Precious Peter by Leon Viljoen, Powertech Transformers.



Prof Ian Jandrell and SAIEE's former President, Ian McKechnie, congratulate Luthando Precious Peter on his achievement as the SAIEE's Young Achiever of the Year.



Guest of honour, Trevor Manuel, addressing delegates at the Centenary Banquet held to celebrate 100 years of the SAIEE.



Jan Reynders was made an Honorary Fellow of the SAIEE and was presented with his award by du Toit Grobler at the annual banquet in November.



This year's President's Award was presented to Hu Hanrahan, Professor Emeritus by SAIEE President, du Toit Grobler and Mike Cary, Rotek Eng.



Stan Bridgens, business director of the SAIEE, accepted the award for the Engineer of the Year on behalf of Viv Cohen from Jack Rowan, Actom.

Trevor Lloyd Wadley Symposium

The Tellurometer was invented by Trevor Wadley 50 years ago. To celebrate this event in conjunction with the Centenary of the SAIEE, two symposia were held. The first, in association with the Western Cape Branch of the SAIEE, took place on the 14th of May at the Tellumat factory. The second event was hosted by the Historical Section of the SAIEE

at the Observatory Auditorium, on 15 October.

Wadley will be remembered for the three main instruments which he developed during his lifetime: his Ionospheric Recorder, his Short Wave Radio Receiver and his Tellurometer.

The Ionospheric Recorder was able to scan the ionospheric layers sweeping continuously through the frequency range 100 kHz to 20 MHz without the need for the mechanical band switches commonly used in competing instruments.

The Wadley receiver could be correctly set to within 1 kHz of the desired frequency over its full coverage from Audio frequencies to 30

MHz. Equally important, the short and long term frequency stability was exceptionally good even during the warm-up period. After 1957 it became standard equipment for the Royal Navy and many other professional bodies.

Wadley revolutionised land surveying with his Tellurometer. Before 1957, distances between 10 and 50 kilometres were laboriously measured using special tapes. Wadley's electronic instrument could perform this task in less than 30 minutes and measuring distance became no more difficult than measuring angles. Previously, surveyors had to relate their measurements to a minimum number of measured bases but subsequently they could triangulate using distances as well as angles.

The Cape Town company, Tellumat, which still manufactures Tellurometers, illustrated the evolution of the instrument with examples from its collection. With considerable effort they were able to restore an MRA2 manufactured in the early

1960s to working condition. This was demonstrated over a distance of about 800 m so that attendees could see how such early instruments were used in the field. This may have been the last opportunity for anyone to observe such early instruments in action as time has taken its toll on many of their perishable components.

Although the Global Positioning System (GPS) has largely displaced the Tellurometer in surveying, the instrument is still useful in certain specialised applications and has been developed for other purposes such as a real-time mine hoist cage position indicator.

The SAIEE wishes to thank Tellumat for its enthusiastic participation in this event.

The day was shared between SAIEE members and surveyors and provided a wonderful opportunity for us to learn more about each other's techniques. One of the results of this conjunction was the donation to our museum of a rare Siemens & Halske electrodynamic spoon telephone (ca 1880) by Haymo van Wyk, a retired surveyor with an early interest in building radios.

This was one of the first instruments produced following Alexander Bell's invention of the telephone. The instrument was moved alternately from mouth to ear to converse with a correspondent. No battery was required as the energy derived from the acoustic input was simply converted to an electrical signal. Such instruments were connected to each other with a direct line – telephone exchanges came later.



Wadley inspecting Ionospheric Recorder with a continuous coverage from 0,1 – 2 MHz.



Wadley testing his prototype Tellurometer at Northcliff in Johannesburg.



Trevor Wadley's radio receiver design was used in the Racal RA117, seen above.



Dirk Vermeulen of the Historical section of the SAIEE, in discussion with one of the presenters at the symposium.



Arthur Atkins member of the SAIEE inspecting the Tellurometer alongside the President of the Institute.



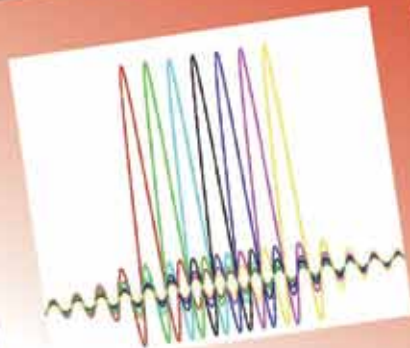
A Siemens & Halske electrodynamic telephone (ca 1880).



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