

Will banks let cell phone banking remain affordable?

If there is one thing that really infuriates me – and probably angers millions of other people in South Africa too – it's the small amounts of money that banks charge for every single transaction conducted in this country.

Sure, there are ways to reduce the service charges that you pay and there are special incentives that have been implemented for pensioners, students, children, certain extremely rich folk and so forth. But South Africa's bank charges and service fees remain among the highest in the world and while millions of people complain about what they have to pay, nothing is done to reduce the charges.

The banks just keep on profiteering at the consumer's expense.

Years ago, when automatic teller machines were introduced (you might remember the Bob machines, for instance) the South African community was assured that, by using these machines, bank charges would be significantly reduced and the savings would be passed directly onto the account holders.

As we have seen over the years, those claims were a load of hogwash. So much so that earlier this year the Competition Commission set up a special task team to investigate bank charges and has even instructed the 'big four' banks to reduce their charges within a specified time.

All banks charge like wounded buffalo – and they charge for anything they do. For instance, if you go into a bank and give them your hard-earned cash to safeguard so that you can earn a paltry amount of interest for the period that the cash stays with them, they charge you a cash-handling fee.

If you want to draw cash from a teller, they charge you for doing so. If you have a Standard Bank account and you draw money from an ABSA machine, ABSA charges you and vice versa. Everywhere you turn there's another hidden little cost of say R5,00 that is added to your statement as a transaction fee.

If you want any kind of service from your bank, somewhere or somehow they will find a way to charge you. In fact, I'm surprised they don't charge you an entrance fee at the security doors of every branch.

Here's a simple example: Some years ago, I went into the ABSA Bank in Monument Park to get a document certified.

Certain officials inside the bank were deemed to be Commissioner's of Oaths (like the *Posmeester*) and could stamp a document and sign it as a certified copy. ABSA Monument Park (and every other branch in the country for that matter) hit on a new way to make more loot.

So when I wanted a certified copy of my wife's death certificate, the enquiries clerk took the photocopy I had made, stamped it, signed it and demanded R10 from me. I paid it, waited for the handwritten receipt, then closed all my ABSA accounts and vowed never to deal with the bank again.

I never have.

The acceptance of cell phone banking in South Africa – available to anyone and hailed as a great innovation for the country – holds the promise of bringing banking convenience to the fingertips of millions of South Africans.

Even the poorer folk in our community – what FNB calls the 'marginally banked' can now transact using the technology. The big question is, will the banks stick to the spirit of this technology and not start charging users for every transaction that's conducted via cell phone?

The banks assure us that they will not add on charges but forgive my cynicism because they said the same thing when ATMs were introduced and they said the same thing when Internet banking started. In fact, as one of the early adopters of Internet banking I was initially charged just R19 for the facility. Look at what you pay on Internet banking charges today.

I believe it's up to the banks to keep cell phone banking affordable and to stop ripping off consumers by levying abominably high service fees and charges for a technology solution.

Technology is there to make lives easier for all. It's not there as a licence for banks to profiteer at their expense.

So let's wait and see how readily cell phone banking spreads within the community and then let's see if banks start charging for the service. If they do then let's all petition the Competition Commission and get them to force the banks to reverse these charges..

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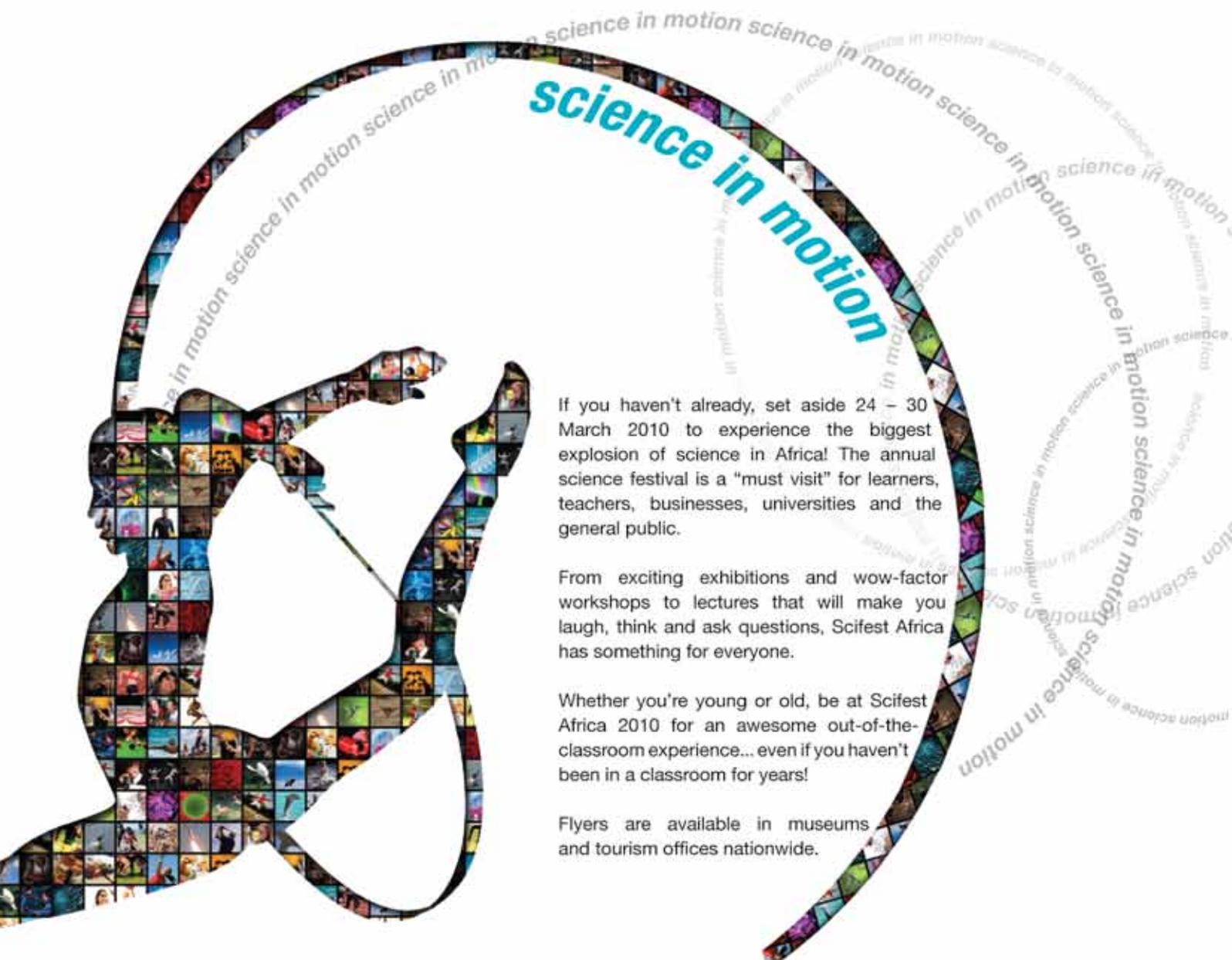
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Sony introduces its new Alpha range of cameras

Sony has introduced its latest range of Alpha cameras, the α 500, α 550 and α 850, which provides outstanding features such as quick auto-focus, live view with face detection and smile shutter. The α 500 has a resolution of 12,3-megapixels while the α 550 is a 14,2-megapixel unit and the α 850 gives users a staggering 24,6-megapixel full-frame Exmor™ CMOS sensor that delivers true-to-life reproduction with exquisite resolution.

"Sony's new range of α cameras is aimed at photo enthusiasts who want value for money, easy-to-use cameras with advanced features" says Yosuke Aoki, general manager of the digital imaging marketing division of Sony Electronics. "The cameras offer brilliant, high resolution detail and enhanced Live View features that make beautiful photos effortless to capture."

The α 500 and α 550 feature advanced Quick AF Live View technology along with Sony's proprietary face detection technology and fast, phase-detection auto-focus. This allows the models to automatically detect up to eight faces, instantly selecting and focusing on primary targets within the camera's nine focus zones. Face Detection also optimises settings such as exposure, white balance and the D-Range Optimiser for natural skin tone.

While most DSLR users have a hard time capturing smiling faces, the combination of Quick AF Live View with Face Detection and Smile Shutter on the new α 500 and α 550 simplifies the process of capturing smiling faces – even those that are constantly in motion. With Smile Shutter mode activated, the cameras analyse and detect faces to determine if they are smiling and automatically release the shutter once a desired smile level is achieved. In addition, Face Detection analysis ensures natural skin tones by optimising image settings.

For greater focusing and framing control, the α 500 and α 550 feature a new Manual Focus Check Live View function that enables still life and macro shooters to view the Live View image directly on the LCD monitor with 100% frame coverage. Both α cameras have a variable-angle 3-inch LCD monitor treated

with a multi-layer, anti-reflective coating for better visibility under bright outdoor light.

The α 850, with its 24,6-megapixel, full-frame Exmor CMOS image sensor, allows users to capture high-resolution images with no crop factor in the wide-angle and specialty lenses (such as fisheye lenses). Similarly, the α 500 and α 550 feature a newly developed 12,3-megapixel APS-C Exmor CMOS sensor and 14,2-megapixel APS-C Exmor CMOS sensor respectively. Coupled with a new BIONZ image processor and high ISO sensitivity of up to 12,800, users now have more control during handheld, low light shooting.

All α cameras feature SteadyShot INSIDE, an in-body optical Image Stabilisation system, which automatically counters unwanted camera shakes. Adding convenience, the new α range is made to work with any α , Minolta or Konica Minolta AF lenses, including the new DT 30mm F2.8 Macro SAM lens and full-frame-capable 28-75mm F2.8 SAM zoom lens.

When using the optical viewfinder, the α DSLRs are capable of shooting at speeds of up to five frames per second (fps). During live view shooting on the α 500 and α 550, it is able to capture up to four fps while the α 550 has a Speed Priority mode that allows for up to seven fps (with focus and exposure locked at the first frame) and can be used in both optical viewfinder and Quick AF Live View modes.

Also available on the α 500 and α 550 is the Auto High Dynamic Range mode where two exposures are combined to create an optimised image. By ensuring that both highlights and shadow detail are fully captured and reproduced, pictures taken using Auto HDR will look as realistic and beautiful as the original scene.

As part of Sony's efforts to recycle valuable resources, a significant portion of the external body of these cameras is made from high-quality recycled polycarbonate recovered from damaged CDs used by Sony Music. The α 850 costs R24 000 (body only) while the α 550 is priced at R12 000 and the α 500 at R10 000 (both including an 18-55 mm lens).



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A USB fridge will keep those drinks cool

With the Christmas season fast approaching there is a wide choice of unusual, novelty gifts (not necessarily at novelty prices) that you can consider for people on your gift list. Here are a few of the more unusual ones:

Dream Cheeky – a range of fun USB gadgets that includes a small USB fridge, which can plug into your computer and keep your can of cool drink crisply cool until you want to drink it. There is also a USB light and a USB roll-up chessboard for playing chess or draughts with your mates from the office, with a stranger at News Café or purely to improve your techniques by learning the individual opening gambits that must be mastered by every reasonable chess player.

Divoom portable speaker – This little speaker system is known as the UPO-1 (the PO stands for Passive Oscillation), and includes PO-Bass technology. It can be used to replace headphones—apparently it provides sensational sound quality—and can be used on a PC or Mac with a USB port. It is part of the iTour 70 range of small speakers that allows anyone to steal company bandwidth by listening to the radio or watching downloaded movies, live TV podcasts or YouTube recordings while supposed to be doing a honest day's work at the office.

Kworld media player – The M101 media player allows you to plug any memory card or USB flash drive into the media player and enjoy the digital offering on a conveniently bigger screen. The stand-alone device supports multiple format video material. Of course, why someone would do that instead of plugging the USB into a DVD player equipped with a USB port and then watching the moving on the 42-inch Sony Plasma is beyond me, but there must be a reason I suppose.

When I read about some of the new gadgets that come onto the market every year, it intrigues me that some clever engineer, working in some research department in some distant part of the world, walked into his or her office and thought: "I'm going to make a USB fridge today".

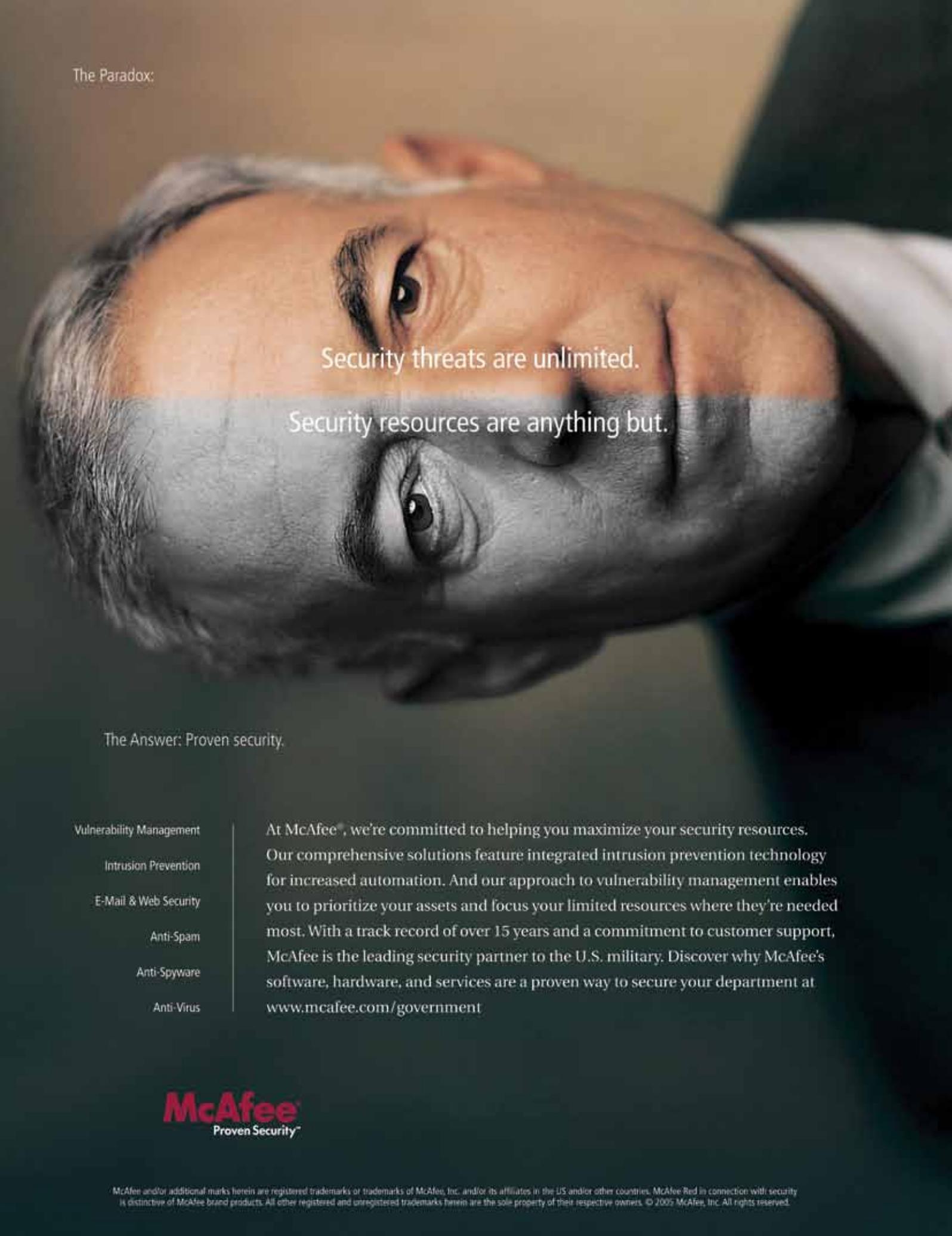
Admittedly it is just an extension of the USB coffee warmer that made its debut several years ago and while some suckers bought it (like me) it never actually worked properly at all.

The point, though, is that the scope for engineering is enormous and if you're not one of those people who is interested in building mega-factories, running automated robots or extensive computer control systems then you can always turn your mind to making something else: like a USB sandwich toaster or jaffle iron.

After all, it's all engineering.



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New initiatives to prevent transport thefts



Thefts from long-haul trucks total about €8,2-billion a year in Europe and, according to the commercial drivers' International Road Transport Union, 17% of long-haul truck drivers are robbed during working hours. Robberies often take place at lay bys where thieves make off with everything from expensive electronic goods and tobacco to chocolate and shaving cream.

"These attacks represent a serious threat to the safety and security of commercial vehicle drivers, and are a threat to the haulage companies, the manufacturers and retailers transporting the goods," says Per-Anders Grösfjeld, marketing manager for transport information systems at Volvo Trucks.

Crime prevention agency, Europol claims that about ten years ago, the most common site of thefts was from cargo terminals and warehouses. Now it is the roads that are the

hunting grounds for organised crime, and their victims are the long-haul trucks.

Europol claims that the perpetrators are mostly international criminal organisations involved in roadside piracy and Anne E Jensen, substitute member in the EU Parliamentary Transport Committee, warns that if road transportation declines it will pose a serious problem for economic growth within the entire economic community.

For the past few years, she and the EU have been working on a project to build safe and secure truck-stops for transport industry drivers. The truck-stop sites are fenced and patrolled so that the drivers can sleep safely and soundly without having to worry about protecting their cargoes or being victims of violent crime. At present there are five such truck-stops: two in Germany, one in Britain, one in France and one in Belgium.

More than 200 secure truck sites are

planned for the European motorways.

Meanwhile, truck manufacturer, Volvo, is tackling the problem from the dual perspectives of the driver and vehicle safety using a tracking system that keeps the trucks under constant surveillance and provides drivers with an alarm button that will alert police if the truck, the driver or the cargo is threatened.

Volvo is developing a remote controlled, lockable fifth wheel that stops the trailer from being separated from the truck and if the entire rig is stolen Volvo is able to remotely restrict the truck from starting or can gradually reduce its speed electronically until it comes to a complete halt. Since the driver has no control over any part of this process, his or her safety is not jeopardised.

It certainly sounds like a technology that could be used in southern and central Africa where road transportation predominates.

France provides credit line for renewable energy projects

France's development bank, Agence Francaise de Development (AFD), has provided a €120-million (R1,5-billion) credit facility to banks in South Africa so that they can fund small and medium sized energy efficiency and renewable energy projects in this country. The banks include ABSA, Nedbank and the Industrial Development Corporation.

AFD will provide funding of up to €10-million per project. The funding is based on a 12-year reimbursable credit facility with no minimum amount specified. In addition, AFD will provide €700 000 in technical assistance for banks so that they can address issues such as capacity building and technology transfer.

AFD has developed a sophisticated carbon footprint tool that will allow project developers to assess the carbon footprint of the project. According to AFD's climate change expert, Olivier Grandvoinet, AFD developed this tool so that it could

accurately calculate the carbon emissions of projects it financed.

Since its development, the tool has been used to provide funds from AFD for the Bujagali hydroelectric scheme in Uganda, a 30 MW wind farm in China and a public lighting system in Dakar, Senegal.

In a separate development, Dr Andrew Taylor, managing director of CAE Energy says that about 200 MW of electricity could be generated from biogas-from-waste projects but he warns that NERSA's decision on the Renewable-Energy Feed-In Tariff (REFIT) will be 'pivotal' to the success of these projects.

He says that because the NERSA REFIT programme has not been finalised, between ten and 20 percent of the biogas currently being produced is used to generate electricity with the remainder being flared or wasted.

Taylor is hoping that NERSA will provide a tariff of at least R1/kWh and that Eskom will "respond favourably" to entering power purchase agreements with power producers. NERSA had originally suggested a tariff of 96 c/kWh.

He says that biogas producers would ideally need a tariff of between R1,20 and R1,40/kWh because of the extensive materials handling required to produce the gas before generating electrical power.





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Casio Winners of watches

Imagine owning a David Coulthard Edifice watch with a tough, stainless steel case and matching wristband that has been designed specifically to reflect the speed of the Formula One motor vehicles with which Coulthard is synonymous. Well three lucky subscribers to the WATTnow CPD Programme each received one of these magnificent timepieces valued at R5 000.

The stopwatch function of the Casio features both a minute and a

second dial and has been designed to make it easy for anyone keen to keep track of lap times on the race track to do so.

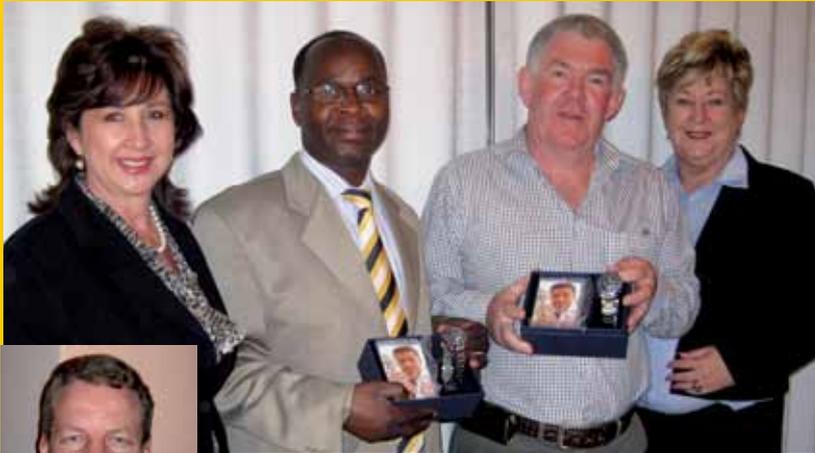
The watch has a tough mineral glass covering for the face that prevents scratching and the Neobrite luminous coating provides long-term illumination in the darkness for the face display after a relatively short exposure to any light source.

The key features of the David Coulthard Edifice watch include:

- 100 metre water resistance
- 12-hour chronograph and date function
- Stainless steel case
- Screw-in back
- A double-push clasp on the stainless steel watch strap
- A tachymeter

Jenny Warwick, publisher of WATTnow said that she was delighted with the promotion made possible by Casio and was really pleased that she had been able to reward three lucky subscribers with such a wonderful gift.

The winners of the competition were: William Rahalalani and Michael Vella from Gauteng and Wilfried Muller from KwaZulu-Natal and they each received a David Coulthard Edifice watch valued at R5 000.



The winners of the superb Casio David Coulthard Edifice watch were presented with their prizes at a function held at the Crown offices in Bedfordview. (From Left to Right): Veronica Breedt, sales executive, WATTnow; William Rahalalani, Michael Vella and Jenny Warwick, publisher of WATTnow . Inset: Wilfried Muller of KwaZulu-Natal who was unable to collect his prize in Bedfordview.

Starfish – smartcards designed by UCT students

The 2010 Soccer World Cup has accelerated South Africa's need to improve its public transport system and it is this that prompted a team of students from the University of Cape Town to design a computer system that may change lives of commuters visiting the city or regularly using public transport.

Every year the Department of Information Systems (IS) at the University of Cape Town hosts an Expo to showcase computer applications developed by senior students. Head of IS, Professor Jean-Paul van Belle, said: "These innovative systems address problems in society and form an integral part of third year and fourth year IS courses. The aim is to expose students to the rigours of development, as well as project management and life skills needed to meet deadlines while delivering a quality product."

The Starfish transport payment system developed by the students is similar in concept to the Oyster travel card used to access trains and buses in London, and the Octopus system used in Hong Kong.

However, the Starfish concept reduces the time spent by commuters or train users in queues, as well as making the public transport system safer and more efficient. It is called Starfish because there are five members of the team who built the system, Jerome Gristwood, Amber Osborn, David New, Kyle Martin and Ryan Gordon.

According to the lead programmer, Amber Osborn, the South African public transport payment systems are unreliable and inefficient and offer criminals and commuters plenty of opportunities to abuse the system.

In addition, buying fares on trains or buses requires an exact amount to be paid

and often the driver or ticket collector has to issue change to the commuters, causing delays and frustration, particularly when the conductor or driver claims to have run out of change.

The Starfish system is a public transport ticketing and revenue system which makes use of smartcards which are loaded with cash balance and when used, the exact fare is automatically deducted.

Each Starfish card has a photograph of the owner on the face of the card, making it impossible for criminals to use stolen cards. There is a mechanism to reclaim any funds paid into the card in the event of it being stolen.

Commuters will be able to use a single Starfish card to pay for multiple forms of transport, including buses, trains and taxis.



Blind faith at the heart of the toll system?

I sometimes think that the South African government has a blind, indefatigable faith in the people of South Africa, despite the widespread crime, corruption and lawlessness that prevails. Take its plan to toll the Gauteng freeways and, while there is evidence that offenders will be prosecuted for not paying fees, the Government's hope that most people are honest and law-abiding is admirable.

Senior project manager at the South African National Roads Agency Limited (Sanral), Alex van Niekerk, claims that the tolling system will work much like a prepaid cellular phone agreement and road users will be asked to set up an account with Sanral using a phone-in service, or by going to the agency's website and registering.

They will then be expected to load a predetermined amount of money into the account and, as the road is used, that 'float' will diminish. A free electronic tag or transponder will be provided to each road user. It must be displayed on the front dashboard or windscreen of the vehicle being used.

The tag may be used on any toll road in South Africa.

A gantry, housing the tolling equipment, will be installed along the freeway systems (and other toll roads) so that as the motorist passes underneath the gantry, a laser beam will read the tag and photograph the licence

plates of the vehicle as it goes by.

The gantries will be placed along entry points to the highway, such as the on and off ramps. Around Gauteng, the freeway system will be monitored by CCTV cameras linked to the ten satellite centres responsible for controlling incident management, dispatching of emergency vehicles or reacting to an accident.

If a vehicle does not have a tag, or there are insufficient funds in the account or the number plates are fraudulent, then Sanral hopes to send the errant motorist an invoice, followed by an infringement notice (the equivalent of a fine) then another courtesy letter, then an enforcement order and finally a warrant of arrest.

How this will be done when a vehicle is carrying false registration numbers remains a mystery.

Should a vehicle from outside the Gauteng area enter the tolling system, signage on the highways will warn the motorists to go the nearest centre and register on the system or open an account using a toll-free number. He says that it will be possible for visiting motorists to buy a day pass for the tolling system.

Apparently the initial toll was set at 50 cents per kilometre along the 185 kilometre tolled freeway system in the province but this is likely to rise because of inflation. Discounts will be offered to regular users of the freeway

system but Van Niekerk has not indicated what those discounts will amount to.

What are the problems that may arise? Here's a list of a few more obvious ones:

- Poorly manufactured tags that are faulty when purchased and incorrectly record the tolling information.
- Tags that have been modified or 'hacked' to change the account details or the billing information so that someone else actually pays the bills.
- Use of fraudulent vehicle licence plates.
- Untraceable or fictitious addresses of 'registered' users.
- Administrative blunders where users have purchased toll time but this has incorrectly been attributed to a different owner or account holder.
- Extensive manpower required to police the system once it is operative. It's bad enough today with taxis that have been legitimately stopped and issued with a fine, a warrant or a summons still using the roads. Imagine the problems that will occur when the controls are all electronically generated.

As always, I suppose, the proof of efficiency will be in the application of the system but I cannot help but wonder what sort of success ratio Sanral will achieve among the lawless drivers that still predominate on our roads today.



Soccer billboards beginning to spread



SEW Eurodrive's new soccer billboard visible to anyone going past the company's head office in Johannesburg.

Soccer fever is starting to spread through South Africa as the country prepares to host the FIFA 2010 World Cup next year. Jumping onto the bandwagon are a number of companies that have created some spectacular examples of their support for the event.

For instance, Telkom has converted its Lukasrand tower into a billboard, installing a fibreglass soccer ball at the top of the tower and then using the supporting pillars to provide branding for the event and for Telkom itself. It is believed to be the biggest billboard ever erected anywhere in the world and is awaiting official sanction from the Guinness Book of World Records.

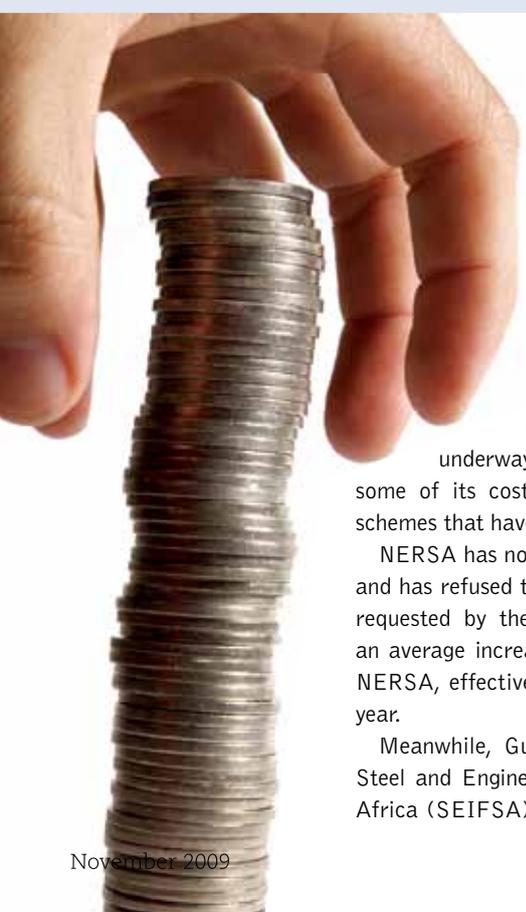
On a smaller scale, SEW Eurodrive has set up an interesting sculpture outside its head office in Johannesburg. Designed by Wideopen Platform, the sculpture is set in the company's parking area and will remain there for a couple of years.

As a multi-national company represented in 47 countries, SEW Eurodrive is determined to show soccer fans from all over the world that they too support the 2010 event and, according to Rene Rose marketing manager of the company, the sculpture is being used as a way of providing good wishes to all soccer fans who come to the event next year.



Telkom's towering billboard on the hills above Lukasrand at the entrance to Pretoria

Photo taken with an Sony 3.50



Eskom demands more money from NERSA

Eskom is believed to have asked the National Energy Regulator of South Africa (NERSA)

for a 60 percent hike in its tariffs in order to complete the R365-billion build programme that is already underway around the country and to recover some of its costs for the demand-side management schemes that have already been implemented.

NERSA has not commented on the tariff application and has refused to confirm the extent of the price hike requested by the electricity utility. Earlier this year an average increase of 31,3 percent was approved by NERSA, effective from July this year to March next year.

Meanwhile, Guy Harris, energy consultant to the Steel and Engineering Industries Federation of South Africa (SEIFSA), has warned that Eskom is trying to

pass on its funding difficulties to consumers and that industrial and manufacturing companies will have to bear the brunt of the higher prices if Eskom succeeds in getting NERSA to approve its tariff hikes.

Eskom has already warned consumers that excessive price increases in the years ahead are inevitable as the utility needs to generate enough money to keep its plants running and to supply the new infrastructure needed to keep pace with South Africa's economic growth.

Harris contends that it is unfair of Eskom to expect current electricity consumers to subsidise future consumers, which is what is happening right now. He believes it is the government's responsibility to take on the recapitalisation of Eskom.

He says that SEIFSA's members are generally large consumers of electricity and the effect of excessive price hikes has a direct impact on production, on the continued employment of workers and on the price of exports leaving this country.

Renewable energy: 'Hatching' new ideas

by Peter Middleton

In March 2008, Hatch Africa launched an energy project sector in South Africa to leverage its global capability and skills for power developments in South and sub-Saharan Africa. WATTnow speaks to Dieter Matzner, principle power consultant for Hatch about renewable power options – wind, solar and water power.



Abengoa's CSP facilities near Seville, Spain. The larger addition (foreground) is called PS20 and is currently the largest in the world with a capacity of 20 MW.

Globally, Hatch offers comprehensive engineering consultancy, project and construction management services in three key business areas: mining and metals; infrastructure; and energy. "We manage, for example, the Transnet project portfolios – for the harbour and railway extensions, the Richards Bay coal line and the Sishen-Saldanha line expansions. In our South African Woodmead offices we employ about 1 000 people and 8 000 people worldwide," says Matzner.

Energy expertise developed over the last 30 years includes: nuclear and thermal fossil fired power options, including co-generation plants and substantial involvement with carbon sequestration technology; oil and gas – non-conventional oils, oil sands and shale in particular; LNG terminals; coal gasification technology; and renewable energy projects including wind, solar and hydro-electric developments.

Hatch is involved in co-generation projects in South Africa and is currently engaged with the design and soon to be constructed plant at Richards Bay Minerals to use furnace off-gas, which will eventually generate more than 20 MW of power, this off the back of the experience gained at the Elgen plant with a rated capacity of 54 MW. "We are thermal specialists in co-generation projects, one of the few companies that has actually designed and constructed real co-generation plants," claims Matzner.

Hatch is currently busy putting together and training local staff to form specialist power teams in South Africa in wind, solar and hydro-electric technologies. It is bringing people from Canada and sending local engineers to Canada for training and real project exposure so that, through these exchanges, skilled local teams can be established. "Our team has already secured work for South African power developments in all the disciplines: thermal, oil and gas and renewable power," Matzner says.



The Elgen plant with a rated capacity of 54 MW. "We are thermal specialists in co-generation projects, one of the few companies that has actually designed and constructed real co-generation plants," claims Matzner.

The new local energy consultancy will deal with all power projects in South and sub-Saharan Africa. "I am responsible for the renewable power business, which is very topical at the moment; wind, solar-thermal and hydro-electric power across Africa," he adds.

"Africa north of our borders has provided Hatch with numerous opportunities on the hydro side, in East and West Africa – Kenya, Uganda, Tanzania, Ghana and Zambia," says Matzner, "and we will continue to pursue other opportunities as they arise." But, he believes, the two particularly exciting renewable opportunities for South Africa are wind and Concentrated Solar Power (CSP) technologies.

"Globally, Hatch has been instrumental in the development of 12 700 MW of wind power projects – roughly 10 percent of the world's 120 000 MW of 2008 wind capacity," he says, "as owner's engineers to developers offering EPCM services, or as lender's engineers offering EPCM services to the equipment vendors, who sometimes take on a complete project because a wind turbine is by far the largest cost item in a wind farm development."

He describes how a wind project usually begins: "A project starts with a wind resource assessment after a developer has identified a site. The first thing we do is put up a wind mast to measure the wind speeds. We are currently engaged in assessments along the coast of the Western Cape.

"Typically, we are looking for an annual capacity factor of better than 26 percent – that is if you run a 1,0 MW wind turbine for a year, 8 760 hours, then you would be looking to average 260 kW of power output for the whole year."

This would enable the operator to sell 2 278 MW hours of energy, which is worth about R2,85-million per year – based on the proposed REFIT tariff for wind of R1,25 per kWh. "Some developers may take on a contract at 22% capacity factor but that would be about the



A typical CSP plant based on the Fresnel mirror.

minimum,” explains Matzner, “because income from CDM carbon credits could be added to the revenue stream.”

The next step in a wind resource assessment is to calculate the annual energy production (AEP) estimate for the site: The AEP estimate needs to factor-in a conceptual wind farm site layout, taking into account the site constraints – technical, environmental, servitudes, waterways, distances away from borders, and so forth.

“On the basis of this layout, we would then go through a turbine selection process, to get the appropriate turbine for the specific conditions,” he adds. “Our turbine evaluation model evaluates over 100 factors in order to determine which turbine is best suited to the specific terrain – and not only to optimise power output. The ultimate criterion is the power output per unit cost, to maximise the net present value of the complete project taking all costs and revenue streams into account.”

We ask about maintenance, a common argument used against the viability of wind projects. “Maintenance is an important issue here because the skills have not yet been developed in South Africa. In countries like Germany, however, maintenance skills and routines are very well established and annual capacity factors are routinely being achieved,” he responds.

Once an AEP estimate has been established, wind data is correlated to long-term data trends to identify possible major deviations. “Hatch would then help the developer to put the whole business case together, combining construction schedules, capital cost estimates and annual energy production estimates (AEPs) into a business case.

Projects require the services of environmental impact assessment consultants, financial and legal advisors to secure the necessary legal agreements and regulatory approvals as well as the required financial loans and structures to achieve financial closure. “We would again get involved in project execution – the detailed engineering, the contracting of construction and equipment vendors, overseeing construction up to the hand over and commissioning of the facility,” claims Matzner.

Matzner believes that 2 000 to 3 000 MW of power wind capacity will be constructed in southern Africa in the next 10 years on wind

farms from 15 MW to 100 MW each. Already more than 6 000 MW are planned by independent power producers (IPPs) and there are more than 3 000 MW in applications for grid connections. “Of the current 400 entities wanting to develop wind projects,

perhaps 20 to 30 developers are likely to build something within the next 10 years,” he predicts.

Capital costs of wind farms are typically in the order of \$2 500 per installed kW, putting the cost of a 10 MW farm at around \$25-million or R200-million. In return, annual income based on a 26% annual capacity factor and a REFIT tariff of R1,25 per kWh would be in the order of R28,5-million per year, around 14%.

“The big disadvantage of wind,” adds Matzner, “is that it does not produce dispatchable power, ie you do not necessarily have power when you need it. But in the Western Cape, if you couple 3 000 to 4 000 MW of wind power with the newly installed 2 000 MW from the Open Cycle Gas Turbines (OCGTs), which can be connected to the grid virtually immediately, then any short-term load requirement due to poor wind conditions can easily be filled,” he suggests.

“Once the wind capacity is installed, the electricity is virtually free of charge whenever the wind blows, so there is an argument for installing significant amounts of wind power, and filling in the demand gap with OCGT and power from Koeberg. Once the additional transmission capacity from the Highveld has been installed (around 2013) surplus wind power should be transmitted into the interior to relieve the base-load demand or to store the energy in the Eskom-owned pumped storage schemes, which will service peak demand in the country,” he says.

CSP technology is the other very exciting renewable opportunity: “The sun is the biggest renewable energy source available in South Africa by far,” says Matzner “several orders of magnitude bigger than any other renewable resources.

“In the long term, we can comfortably accommodate 10 000s of MW of power supplied by modular, 50 to 100 MW in size, solar thermal plants. The resource is ample, and so is the space,” he claims. Most of these plants will be dry cooled in order to mitigate for the water shortages.

“As a country we should be placing a much bigger emphasis on developing home-grown CSP technologies,” he suggests. “The technology is maturing fast, and there is currently a drive to deploy it – in the USA, North Africa, Australia and Spain. In South Africa, we should be developing a national CSP strategy to develop home grown technologies and skills. If we had a big programme, similar to the PBMR programme, for example, then we could create a manufacturing industry around it and an export industry too. All it would take is the political will and a policy decision.”

Matzner believes that, starting in 2023, we should replace all end-of-life coal fired stations with CSP technology. “Then private developers, institutions like the IDC, the DST and other government



Dieter Matzner, principle power consultant for Hatch for the renewable energy options – wind, solar and water.

agencies could get involved," he advises. "Significant opportunities exist in the development of home grown technologies. The focus here would be to employ new technologies, materials and skills from other high technology projects, like the PBMR and hydrogen programme, and apply this knowledge to CSP technology."

Typical new areas would cover issues like more efficient heat transfer loops, coolants, heat storage systems, etc. "These technological developments would not only provide new products, but could be logically interfaced with other technical efforts in the energy space in the country, some of which are already funded by the DST. These programmes include the hydrogen project, water desalination, process heat applications and, of course, power generation," says Matzner.

One of the reasons why CSP is so attractive is that it can be used to store the sun's heat for later conversion into power, either directly as steam or as molten salt. This enables you to generate power while the sun is not shining.

The technology can therefore be used to supply the peak demand, from 6:00 am to 10:00 am and then from 18h00 to 22h00. The current expectations in the USA are that CSP-generated power will achieve grid parity cost status by 2020.

In South Africa, this could be the case by 2025. The current rapid rise in Eskom's generation tariffs and the likely real cost increases over the next 10 to 15 years for fossil-fired power, together with the future anticipated costs of carbon emissions, are providing a very plausible scenario to support CSP grid parity status by 2025 in South Africa.

"The minimum demand is ideally met by base load stations with capacity factors of around 90%. In South Africa, the next 50 years of base load supply should be made up of new nuclear build, imported hydro from Africa (only 7 percent of Africa's hydro potential is currently exploited) and the new coal-fired plants, Medupi and Kusile.

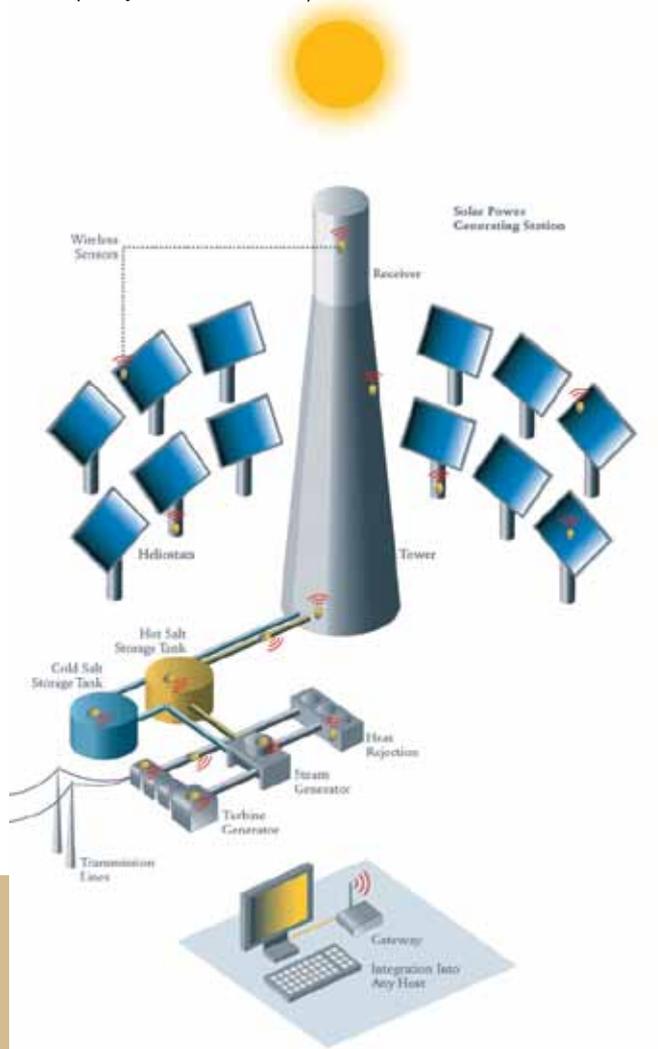
"At the other extreme, the peaking demand could be supplied by a combination of OCGT/wind and pump storage/wind facilities with capacity factors of less than 10 percent and 20 to 30 percent respectively. CSP with thermal storage is ideal as a mid-merit plant technology that can supply power at capacity factors of between 40 and 60 percent depending on the plant design. Ultimately, CSP could enable us to use renewable energy sources for all power needs above the minimum demand," he explains.

He cites the German example, where already coal fired stations are only being used at 70 to 80 percent capacity. "In many countries where renewable power is implemented aggressively, a situation is developing where more and more installed renewable power forces the focus of newly built plants into the direction of mid-merit and peaking plants," Matzner says.

He suggests that it is very important to begin to develop a sustainable, environmentally acceptable, secure and affordable (with all external and full life cycle costs accounted for) energy supply for the future.

"By 2050, we should aim to have a power supply mix of 15 to 20 percent nuclear, 20 percent coal and two thirds of our power supplies from renewable resources – half of which can comfortably be supplied by CSPs with storage (30 to 35 percent), a third from imported hydro from other countries in Africa (15 to 20 percent) and the remaining 10 to 15 percent made up of a combination of wind, photovoltaics and biomass," he says.

"Even now, we should be targeting the replacement of all existing coal-fired stations, which will start reaching their end-of-life by 2023. We should be constructing CSPs rather than building new additional coal-fired power stations. We should be looking to develop technological and industrial capability, initially for the local market and eventually for the export market, and providing the necessary skills capacity at the same time," he adds.



A diagram of a concentrated solar power plant. Mirrors are used to focus sunlight onto a single point at the top of the tower.

Cell phone banking – an African technology

There are few major technological fields where Africa has taken a lead and cellular telephone banking is one.

The success has not been immediate. After some initial excitement about the potential of mobile phone technology for banking applications in the 1990s, made possible by wireless application protocols, cell phone banking looked as if it may have been heading for the 'it seemed like a good idea at the time...' bin.

In 2004, First National Bank (FNB), which is now a leader in mobile phone banking, had a grand total just over 1 000 people using its cellular phone banking service.

But then it took off. In February 2007, the number of the bank's clients who regularly used cell phone banking reached 100 000, and in the third quarter of 2009 that number passed the million mark; accounting for about a fifth of FNB's banking client base.

In addition, most of its customers also subscribe to inContact, a subscription service that informs customers of their banking transactions via SMS.

Something changed, but what?

Len Pienaar, CEO of FNB's mCommerce business unit, and his team had a lot to do with it. "In the beginning people did not take up cellular phone banking because it was just too complex. It made the error of trying to take what was on the internet and putting that on a cell phone," he says. "The result is you had a few people doing it because they could, for the technological thrill of being able to, but it was strictly for technophiles." For the average person it was too much hassle, not worth the effort.

However, the pent up demand has always been there. It just needed the right application of the technology.

The majority of people using cell phone banking today have not migrated from their PCs in search of the next phase of technological progress, mobility. It turns out, based on FNB's experience, that nearly 70% of those who use this service earn less than R100 000 a year, and typically don't own PCs.

In many ways, the cell phone banking base resembles the broader banking base. According to FNB statistics for its own customers, some 60% of people using mobile phone banking are under the age of 32, this statistic bolstered only to a degree by the young and early adopters of technology. If there is one group that is under represented in comparison with traditional banking it is the 40 plus age group where there is lower acceptance, as resistance to new technologies come into play here.

However, the key figure is that 67% of cell phone banking customers are



Black, as opposed to Asian, Coloured or White, and it makes a lie of any contention that this is yet another technology for the benefit only of an elite, predominantly White, upper market. Cell phone banking has drawn relatively little interest from the private banking sector.

“In private banking, customers have so many other options and ways of doing their banking that the convenience factor is less relevant, unlike the mid and entry markets.”

In fact, many who use cell phone banking are what one could call the marginally banked. These are people who have opened a bank account; in essence, for whom a bank has been a place where they store their money as opposed to under the mattress. Little more. Prior to mobile phones, their interfaces with banks were ATMs and personnel at bank branches. These are customers who, if they wanted to check if money has been deposited into their account, would have to take a taxi to the nearest ATM, and if it was not there yet, have to return the next day to do so again.

“The item on the top of the list of what the market wants is ease of use. Most of the 100 or so changes we make a year to our platform have that goal, these implemented in batches of up to ten times a year. We are not talking high tech changes in many cases,” Pienaar says. “An example is moving the location of the ‘Press 1 to continue function’ from the bottom to the top of the screen. After we implemented that we saw a significant increase in usage of that particular function.”

Affordability, ensuring people have enough time to complete transactions comfortably, and have trust in the service are the next most important areas, with increased functionality only now starting to raise its profile.

To better understand the impact of cell phone banking, and where and how it has penetrated the market, one can look at it in two ways: in terms of volume and in terms of value.

Today, about six million transactions, worth more than R700 million, are completed on FNB’s cell phone banking service each month. Over half of the cell phone banking volume among FNB’s customer base is for pre-paid purchase transactions, such as people getting more minutes for their cell phones. The other half is made up of informational transactions and payments. However, although payments and transfers only contribute 12-15% of the transactions by volume, it accounts for 80-85% of the value.

Tellingly, the peak transaction period is 7:00 pm to 10:00 pm and the system offers 24/7 availability. “Airtime was our first breakthrough.

Someone wants to make a call but has run out of airtime and the shop from which additional pre-paid minutes can be purchased is closed, or a distance away.”

To accommodate the night activity peak, the bank had to reassess its major internal data moving functions it undertook at night, a historically low volume period for traditional banks. The cell phone banking system rests atop the existing mainframe. The application of the cell phone banking system from FNB’s viewpoint is more about channel management.

FNB has been cautious. As a bank it must be. If one is selling services such as ring tones and the transaction goes awry, one just sends a replacement. Banks have no such leeway and this is reflected in their systems. FNB has slowly increased the offering of pre-paid services, to include electricity payment, lottery ticket purchases, and data and SMS bundle purchases. “We do airtime transactions for all four cellular phone operators in South Africa; Telkom’s pre-paid service; pre-paid electricity purchases; Mixit transactions; data and SMS services through Vodacom; Soccer Six accounts for betting on soccer games; and even the payment of traffic fines. If it is a service that does not require a physical product transaction, it is possible for us to do so using cellular phones as the transaction medium,” Pienaar says.

The transaction menu tries to mimic ATMs as much as possible. The FNB pop-up menu on the phone for transactions lists nine options, of which the three most popular are pre-paid airtime, banking and lotto. To date, air-time transactions have dominated the pre-paid transaction volumes, accounting for more than 50% of these.

The ideal is to minimise the number of clicks a user has to undertake to complete the transaction. This depends on the transaction; once done it can be saved and repeated with a single click, such as for topping up phone minutes.

“The system remembers all the key-strokes so that if a transaction is not completed in the session, assuming it is revived within the next two minutes, users do not have to repeat the entries made and can continue where they left off. It requires the bank having a shadow database to keep track of all of the transaction in progress, but any increment in convenience is reflected in increased transaction volumes.”

These transactions are free of charge to the customer, with the bank getting paid a commission from the vendor per transaction, a cross selling model. The same no-cost approach is in place for banking transactions using a cell phone and Pienaar says, while one can never say never, the plan is for this to remain the case in the short to medium



SANEA

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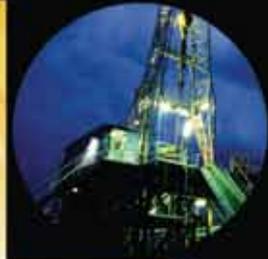
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term. "By getting customers to do their banking by cell phone we create savings in physical infrastructure use and are moving our customers from assisted transactions to self service"

Interestingly though, in 90% of the cases where people opt to convert to cell phone banking they bring their cell phone into the bank branch and look to be talked through the process by a live person. "It is a cost, but we have found that acceptance levels of the technology and perseverance with it are much higher than in cases where people don't come to the bank initially."

FNB has started providing cellular phone banking services in other countries. The market for these across the continent is huge, and the bank has spread its wings into Namibia, Botswana, Swaziland, Lesotho, and Zambia. FNB also offers cross border pre-paid airtime purchases from South Africa to Namibia and Lesotho, though this entails navigating cross border regulations, which makes the process more complicated. This however is the start of inter-country services that will radically change the face of cross border remittance in Africa in the future.

"We are still a decade to a decade and a half away from a scenario where there are any common standards and systems in place for cell phone banking platforms." Pienaar says this is probably a good thing since it fosters creativity and will allow the most successful systems to succeed. "Only at that stage should standards, based on the best practices learned from those best of breed systems, be implemented."

In developing its own system, FNB opted for Linux open source software and Pienaar says it has worked well and the savings have been large. FNB uses all the backup and disaster recovery systems necessary for a bank to ensure the integrity of its system, and offers a money-back guarantee in the event of a customer losing money through using the service.

Aside from pre-payment services, the bank offers balance checking and mini statements, transfer of funds between accounts and facilitates payment transactions by clients using cell phone facilities. "We are proceeding slowly and cautiously. We enable payment transactions, though we limit them to amounts under R20 000 and to a total value of R20 000 a day. They can only be made to accounts that cell phone banking customers have created previously."

FNB implements three layers of security. The first is obviously technological, where the best practices in terms of appropriate security technology are in place. However, the second layer, that of process, is where the key breakthroughs most often occur in solving problems.

"First, we only allow transactions to be made by the person using his/her own phone number and that person has a pin number for this. Thus, even if the phone is stolen, or taken by someone else, the owner still has the pin code, which should be kept secret.

"That leads to the third layer, which is education. We spend as much on education as we do on marketing and technology. We educate people on how not to disclose confidential information, such as their pin number, to anyone. Very often when a transaction is done without the person's permission it is by someone known to the victim. Our education translates directly into increased use of cell phone banking."

The growth this year in cell phone banking just seen through the eyes of one bank has been phenomenal, tracking at about 130% year-on-year and the market for it is nowhere near saturated. Not only has it increased options, and in some cases become the primary option for the marginally banked, it raises hope of reaching the unbanked.

"The biggest barrier to entry for the unbanked is the cost of the cell phone, the device itself. If the US\$10 cell phone is ever developed successfully this will have a big impact," Pienaar says.

Another area where the unbanked feature, is the youth. Few people under 19 have bank accounts, even though they clearly have and spend money. This technology could be the ideal entry point for young people, many of whom are cell phone savvy.

FNB was the first bank to reach half a million cell phone customers and then a million, but ABSA has also reached a million customers and with its larger retail customer base will grow its numbers further. The other banks have lagged initially, but in South Africa's sophisticated and competitive banking sector it is unlikely to be long before all the major banks are competing on a par.

Internationally, Asia, specifically Japan, has a sophisticated cell phone banking infrastructure in place, but Western Europe and the USA have only lately started showing interest in this sector. When Pienaar says the cell phone banking technology race will be between north and south, he means between South African companies and competitors in the form of the Nigerian banks and Kenyan cell phone operators, not competitors from Europe and the US.

It is in Africa and not elsewhere that this major technological evolution is playing itself out and it is to this continent that people will come to learn. Africa needs to find a way to solve the problem of providing entry level bank accounts and make it possible for marginally banked people to be part of a meaningful banking system. This is how it is happening.

DRC blames Eskom for Inga project failure

by Jean Thomas Lokala J'Ifaso, Technical Director SNEL
(responding to the article published in WATTnow in September)

I am a keen reader of the technical journals published in South Africa and recently I particularly appreciated an analysis given by Dr Ian McRae of the electricity situation in South Africa. I witnessed firsthand the leadership qualities of Dr McRae, but his greatest achievement, in my opinion, was his contribution to co-operation in the region and to peaceful change in South Africa before the first democratic elections. "Happy the peace makers, they will be called the children of God."

In February 1993, I was privileged to attend a meeting between Dr McRae and CEO of SNEL at the time, Prof. Bingoto, where they discussed regional co-operation and the establishment of North-South corridors so the entire region could benefit from the Inga potential.

Thanks to the efforts of Dr McRae, the Southern African Power Pool (SAPP) became a reality two years later and in 1996 the utilities could start, at last, to buy and sell electricity for their mutual benefit within an agreed set of rules.

My country, called Zaire at the time, now DRC, was not a member of the SADC, but nevertheless it became a member of the SAPP, thanks to Eskom's influence.

To my recollection, Dr McRae and Prof. Bingoto were the first persons to envisage the creation of a 'Western Corridor', which would link Inga to Angola, Namibia, Botswana and South Africa.

The idea took a few years to mature but, in 2002, the end of excess capacity in South Africa was recognised and Westcor was created shortly thereafter. At a meeting of the SAPP in Durban in April 2002, the utilities each undertook to approach their respective Governments.

In October 2004, a Memorandum of Understanding was signed between the five Governments, including DRC, and another one between their respective utilities. It specified that Inga 3 would be dedicated to Westcor. But, there was no time table.

This was unusual as any concession contract normally defines a schedule of milestones to be reached, otherwise the concession lapses. A shareholder agreement was signed in September 2005 and each utility contributed US\$ 100 000 to Westcor.

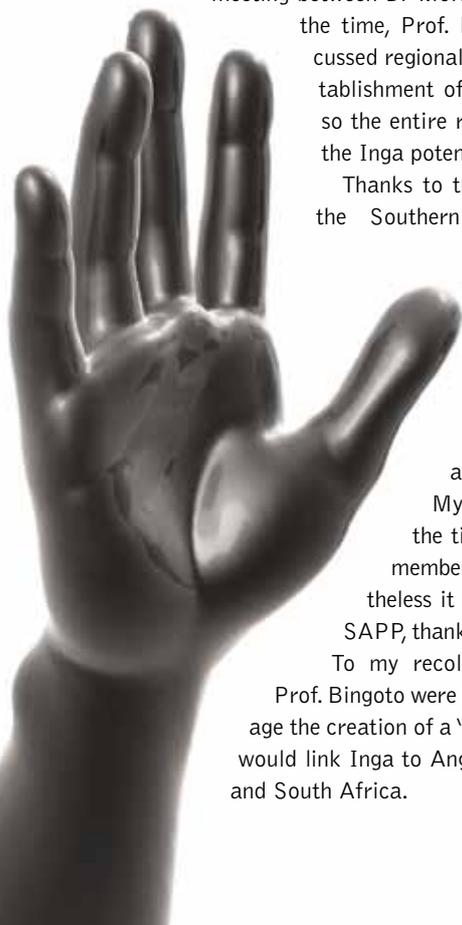
As you are aware, 80 to 85% of the electricity in the SADC region is consumed in South Africa. For this reason, there was plenty of electricity for everybody as long as Eskom had an excess of generation. Once there was a deficit in South Africa, there were shortages everywhere.

You must also be aware that among the five utilities involved in Westcor, Eskom was the only one capable of moving the project forward. The other utilities were too small and did not have the necessary resources for a project of that size. The US\$ 500 000 received by Westcor was insignificant compared with the cost of the studies, let alone the cost of the project itself.

As the first COO of Westcor, I was acutely aware of the importance of Eskom's attitude and prepared my business plan accordingly. However, to my great disappointment, Eskom never allocated any monies or expertise to the project to enable us to start our own organisational structure, negotiate concession contracts with each country, conduct feasibility studies (Inga 3 plus 3 500km of transmission lines) and produce a bankable document.

This was even more disappointing as the Chairman of the Management Committee of Westcor was Jacob Maroga, now CEO of Eskom. On several occasions, I proposed to him that Eskom provide bridging finance to enable us to start with the studies, but I had no success.

Preliminary studies conducted at the time for Eskom showed that the costs of delivering electricity to Cape Town, either from a new coal-





fired station in the Matimba area or from Inga 3 via the Westcor lines, were the same, in spite of ample provisions for logistics, which are always a problem in countries such as DRC and Angola.

To understand this, one must remember that Inga 3 is a unique site.

Some 4 000 MW can be developed with a high load factor and without constructing a dam. This big advantage was underlined in a feasibility study conducted in 2007 by SNC Lavalin of Canada, which concluded that Inga 3 could accommodate 4 320 MW (16 x 270 MW).

The electricity produced at Inga 3 will therefore be of the cheapest in the world (this study was jointly financed by SNC Lavalin, the DRC government and the Canadian government).

In April 2007, my Government asked me to become the Technical Director of SNEL, a request I could not really turn down, and I was replaced by Dr Naidoo as CEO of Westcor.

In the meantime, BHP Billiton approached my Government with a request to establish a 2 000MW aluminium smelter at Muanda on the Atlantic coast in DRC. This smelter would be supplied from Inga 3 and what DRC did not require for its own needs, could be exported to Westcor.

It immediately became clear to everyone familiar with the Westcor project, that the BHP smelter and Westcor were mutually exclusive. Even with 4 320MW, Inga 3 was too small to satisfy both projects. The economies of scale in high voltage transmission between 500MW and 3 500MW are still significant and, to be economically viable, Westcor had to transmit a minimum of 3 000MW to the South.

If only 500 MW could be exported, the Central Corridor via Zambia and Zimbabwe was far cheaper because most of the network was already in place. BHP immediately started negotiations with the DRC Government and soon their project was more advanced than Westcor.

They also approached Eskom to find out to what extent Eskom was committed to Westcor. The reply they received from a member of the Executive Committee was that "Westcor was not a priority project for Eskom".

This confirmed the fact that Eskom had made no provision for Westcor in its budget. That was the case then and is still the case today. With this information, both my Government and BHP Billiton drew their own conclusions and negotiations for the aluminium smelter continued in earnest.

I am afraid that your editorial headline "DRC spurns its African partners" is inaccurate and shows that a proper analysis of the facts has not been conducted. Also, the bitterness expressed by Dr Naidoo in the article "DRC hijacks the Inga projects and turns its back on Africa" is understandable, but is directed at the wrong people.

It should be directed at Eskom, who neglected the project from the beginning by depriving it of any resources. In other words, the main culprit in the collapse of the Westcor project is not the DRC Government but, instead, Eskom which was in a position to make it work but did nothing because it was not one of their "priority projects".

Now, my message to Westcor is as follows: Please wait for Grand Inga; your project is not dead but postponed; please be patient. You had your chance but you did not grab it. DRC waited a long time for you but nothing happened. Any Government would have behaved like my Government. Westcor can only blame itself".

Most of us at SNEL believe that if Eskom had shown the same drive as when Dr McRae decided that the Cahora Bassa lines would be rebuilt (in spite of the landmines, armed bandits and other perils), Westcor would be a reality and Cape Town would be receiving non-polluting energy from Inga 3.

This letter is written in my private capacity. I was Generation and Transmission Manager at SNEL from 1995 to 2006, COO of Westcor in 2006 and 2007, and currently I hold the post of Technical Director of SNEL, a position I have held from May 2007.

Hartdegen Responds:

While I appreciate Jean Thomas's opinions and his recollection of circumstances surrounding the Westcor project, I do not agree with his point that there is an incorrect analysis of the facts or that the headline *DRC spurns its African partners* is inaccurate. My point is that the Billiton deal represented lots of cash in the bank for SNEL. The option was regional co-operation with four African partners (of which South Africa was one). SNEL chose Billiton and the cash in preference to regional co-operation and probably less money too. It seems, therefore, that both the headline and my assertions are correct – although they might be unpalatable.

A digital camera for happy snappers or professionals

For the past couple of months I've been using the Sony Alpha 350 camera and let me tell you that it is probably the best value-for-money camera on the market if you are an enthusiastic photographer who wants a single-lens reflex, interchangeable lenses and a host of manual or automatic functions.

The package that I've been using comprises the 14,2-megapixel body, an 18 to 70 mm zoom and a 70 to 300 mm zoom as well. It retails for R7 999 – a bargain price considering just how much camera you get for your money.

Don't be fooled by those people who tell you that megapixels don't matter. The great joy of having high quality images is that you can crop your pictures with amazing freedom and, as any photographer knows, it's seldom that you will achieve perfect composition using a viewfinder alone.

Of course, the picture might be different for studio photographers who have the time and equipment to set up a shot, test it, refine it, recompose it and then shoot it.

But most ordinary mortals, who are not working in studios, are capturing moments and often those moments are just that: moments. So we don't spend enough time on the composition – as we all know that the picture can be cropped and when you have a lot of megapixels to use, you've got a lot of freedom to enlarge your picture and capture the essence of the photograph.

In a previous life, I spent five or six years earning a living as a press photographer and relied heavily on the old Nikon F that was the workhorse of the international press corps.

Battered Nikon Fs, and later F2s and F3s, adorned the shoulders of thousands of photographers around the world and were used to cover wars and uprisings in places such as Vietnam, Afghanistan, Somalia, Ethiopia and Rwanda.

Slowly the digital camera revolution occurred and these workhorses were replaced with similar digital versions that cost the equivalent of a Steinway baby grand piano.

A Canon or Nikon (and by most accounts, Canon had a better CMOS sensor than the Nikon) with a couple of interchangeable lenses could easily set you back R150 000. If you were lucky you'd get eight or ten megapixels to go with the camera.

Along came the new-boy in digital photography as Sony released its first range of digital cameras. The models were rather silly little things that were fully automatic, gave you reasonable quality pictures and were little more than point-and-shoot happy-snap instruments.

But that changed rapidly as Sony researchers perfected their technology and developed their own range of single-lens-reflex

cameras for more serious photographers. The strides they made were phenomenal.

So much so that an old photographer friend of mine, Roger Bull, who I've known for 30 years and more, stopped taking his Canons out and about with him and chose instead to carry a simple little eight megapixel Sony for most of the routine work he was doing.

There were a number of good reasons for this: First of all, Roger had twice been mugged by exploitative thieves who held him at gun or knifepoint, and took all the cameras (and even once stole his car) and attendant filters, tripods and flashguns he was carrying.

They made off with the lot, beating him with their fists just for good measure.

Yes, he was insured and yes, he did get some of his kit replaced but after the second mugging, the insurers put up the premiums to such astronomical levels that he couldn't afford to insure them.

Who can blame the thieves?

Photographers are easy targets. They work when the light is interesting – usually around dawn or in the evening sky as the sun sets – and they often work alone too.

As Roger says, photographers are sitting ducks for an attack and anyone with a knife or a gun can take everything they own. Even the instruments they use to earn a living.

With an R8 000 camera that does almost everything that the Canon or Nikon can do, what's the point of taking the risk by carrying the enormously expensive equipment in the first place?

Thieves are always on the lookout for easy targets, be they tourists or photographers.

I have to agree.

In fact, for a short space of time I was delighted to carry the Sony Alpha 900 with its magnificent 25-megapixel sensor, its G lenses made by Zeiss and its powerful external flashgun. But I was acutely aware of the fact that the little bag on my shoulder was worth about R100 000 and that I was a sitting duck for any mugger anywhere.

That's one of the real attractions of the Sony A350. It's affordable. For just R8 000 you get a helluva lot of camera with lenses to boot.

Here, in one little camera bag, is everything you need. A camera that can be insured; a camera that offers full professional functionality (although it does not have the full frame 35 mm sensor) 14,2-megapixels of picture quality and a unit that is both easy to use if you're a keen amateur who wants a quality product or professional who needs and uses all options and controls that make great photographs.

And if someone mugs you for your Sony then you can replace it without having to take out a new bond on your house.

So, for anyone who wants to buy a really good camera, the Sony Alpha 350 is a perfect option. Its built-in features are exhaustive and include:

- 14,2-megapixel CCD image sensor with built-in self-cleaning and sensitivity that ranges from ISO 100 to 3200 in one-stop increments.
- Optimised BIONZ image processor that provides JPEG, RAW and RAW+JPEG in fine and standard formats with in-built noise reduction filter at shutter speeds of longer than one second.
- Nine point centre cross auto-focus sensor with the choice of manual focus along with options for single-shot, automatic or continuous auto-focus as well.
- TTL light metering that uses a 40-segment honeycomb pattern with a sensitivity range of EV-2-20 or EV-4-20 in spot-metering mode. It provides a choice of multi-segment, centre-weighted or spot-metering for precise control of your exposure, too.
- The exposure modes offer auto exposure, aperture priority, shutter priority or manual and they have a range of scene selections including portrait, landscape, macro, sports, or sunset. The camera also has night compensation and provides built-in exposure compensation of 2EV in one-third increments. There is an exposure-bracketing feature that gives you three continuous or single exposures selectable in 0,3 or 0,7 increments.
- The viewfinder uses a fixed eye-level penta-Dach-mirror that provides 95 percent coverage.
- It has an electronically controlled, vertical-traverse focal-plane type shutter with speeds that range from 30 seconds to 1/4000th of a second as well as a bulb function that keeps the shutter open indefinitely. The flash synchronisation speed is 1/160th of a second.
- The Live View facility uses the full LCD screen to portray the scene being photographed and it provides 90 percent coverage so precise composition is not accurate as there is some difference between the screen view and the final image.
- The built-in image stabilisation feature uses an image sensor shift mechanism to provide what Sony calls Super Steady Shot and can be used in low light conditions.
- The camera has a continuous shooting speed of 2,5 frames a second and will keep shooting in JPEG in L or fine mode until the memory card is full. In RAW or RAW+JPEG, continuous shooting is limited to three frames.

By anyone's standard, the Alpha 350's a fully functional camera and, having used it myself, I

reckon that it is the best value-for-money option available on the market today.

Sony in South Africa has released a range of new cameras and perhaps they might offer an enthusiast additional features that are not available in the 350. But then one must remember that like most computer technology (and digital cameras are mini-computers these days) the features and technology expand exponentially over time and every 18 months or so a whole host of new features are made available on the newer models.

If I were in the market for a new camera, let me assure you that the one I would choose, buy and use is the Alpha 350 because I've used it, know how it works and have achieved some great results too.

What do I like most about it?

First of all it's really easy to use and you don't have to be a rocket-scientist to fathom what the different functions mean.

Secondly, it gives me the option of automatic or manual so I can control my pictures and shoot them in the way I want to. I set my own rules – the camera doesn't set the rules for me.

Thirdly, I've got lots of megapixels to work with so even ordinary pictures can be recomposed to make something that is worth publishing.

Finally, the Sony Alpha 350 is affordable – and that makes it really attractive, particularly as it comes from a widely respected manufacturer with loads of digital experience and a proven track record in making camera sensors too.

Sony represents quality anywhere in the digital world and its cameras are no exception.



South African Institute of Electrical Engineers Centenary Memorabilia Order Form



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Single lens camera to film in 3D

Sony has developed a single lens camera capable of shooting three-dimensional images by taking the single image and splitting it with mirrors and then recording it on two different sensors. The results apparently provide a much 'smoother' three-dimensional image.

The prototype camera has been unveiled in Japan but unfortunately viewers still have to watch the 3D images using special polarised glasses. Without them, the images look like ordinary two dimensional television pictures.

The company says that its camera is particularly suited to filming sports events. Normally three-dimensional images must be recorded using a two-camera system and this makes it difficult to film high-speed action such as sport.

Sony is confident that it will succeed in developing affordable 3D television.

The company has also developed a technology that uses three fixed cameras to record images on a football pitch, allowing the images to be mapped and then, using software, enhanced to create a 3D view. According to John Stone, general manager of Sony Professional's European research laboratories, the group is hoping to record live events using the three-camera technology in 2010 and then edit these into shorter 3D highlights for broadcast.

Scientists and researchers have been working on creating 3D movies and television broadcasts for years. The first commercial 3D movie, *The House of Wax* was made in 1953 but the early technology provided unsteady images that induced nausea in a number of viewers.

The technology has improved dramatically since then and in 2008 the BBC broadcast

the world's first live sporting event in 3D, beaming a game between England and Scotland to a cinema in London.

The BBC is currently developing the technology that will allow it to film some of the events at the 2012 Olympics in 3D. Sky is even more ambitious and says it will launch its first 3D channel in 2010, sending signals through its high definition infrastructure via satellite to a Sky set-top box.



'CHEMICAL TECHNOLOGY' AWARDS 2009 ORGANIZED ANNUALLY BY CROWN PUBLICATIONS AND SAICHE

These awards for work undertaken during 2009 and judged in February 2010 will be categorized as follows:

'CHEMICAL TECHNOLOGY' UNDERGRADUATE STUDENT OF THE YEAR 2009

This award is open to all final-year students in the chemical engineering departments at universities in South Africa.

'CHEMICAL TECHNOLOGY' RESEARCH PAPER OF THE YEAR 2009

This award will be open to all post-graduate students in the chemical engineering departments at universities in South Africa.

'CHEMICAL TECHNOLOGY' INDUSTRY AWARD

Awards will be for application, not innovation. Open to anyone, individuals and groups, in industry.

'CHEMICAL TECHNOLOGY' SPECIALIZATION AWARDS

These awards will cover two specialization areas each year, this year being A) Water and B) Energy. Once again, awards will be for application.

Each category will be sponsored and accompanied by a monetary prize.

In all cases, team submissions are allowed, but prize money will be divided evenly among team members (or in a ratio agreed to by all team members).

CLOSING DATE FOR ENTRIES (which should not be longer than five typed pages, double-spacing) is 12 January 2010. Email the Editor, Glynnis Koch, at chemtech@crownc.co.za, for more information and an entry form, or telephone 011 622 4770 and ask for Glynnis.

Winning articles will be published in the February 2010 issue of 'Chemical Technology'.



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Storm2 completely revised – we hope...

Having written a rather scathing review of the BlackBerry Storm, I'm delighted to hear that the company is now introducing the Storm2 smartphone, which addresses and allegedly resolves many of the criticisms that I – and millions of others – had with the first version of the phone.

The second generation phone apparently significantly improves the touch-screen technology used on the Storm. According to the manufacturers, Research in Motion (RIM), the SurePress technology that provides the user with tactile feedback when the screen is pressed, has been completely rewritten to increase accuracy and ease of use.

The new system apparently responds equally to gentle or firm pressure applied anywhere on the surface of the screen and allows the user to type letters with one thumb while the other thumb may be touching or resting on another key.

This apparently makes typing on the virtual keyboard that much quicker and more accurate and even provides simple multi-key functionality such as using the shift key to type a capital letter or the alt-key to access a special character.

Evidently I was not alone in disliking the original version of the smartphone considering RIM has completely revised its first attempt at building a touchscreen phone. Hopefully the new model works.

The new Storm2 has a 3,25 inch high resolution display and a capacitive touchscreen with integrated functions such as Send, End, Menu and Escape (used by so many original Storm owners to end their experience and buy another phone).

RIM claim that the Storm2 provides a host of connectivity options including Edge, GPRS, GSM and WiFi. It comes with a 3,2 megapixel camera with variable zoom, a built-in flash and limited video recording capabilities. It has 256MB of flash memory and 2GB of onboard memory. There is a microSD card slot that can take cards of up to 32MB once these are available.

According to RIM the Storm2 uses background noise suppression technology, offers a loud, distortion-free speaker phone and even has a proximity sensor for face detection when taking pictures. It also comes with a built-in media player for videos, pictures and music and is able to synchronise with both Windows and Mac OS-X computers and Apple's iTunes software. It has built-in GPS for location-based applications, and photo geotagging.

BlackBerry has not given any indication of when the new Storm2 will be available in South Africa or what it will cost when it finally lands here.



Robots used to treat prostate cancer

High-technology robotic equipment is increasingly being used by surgeons for delicate procedures such as operating on the prostate. However, some medical organisations in America are concerned that the doctors using this equipment are inadequately trained and not applying the correct standards.

Apparently many doctors in the United States are already using Intuitive System's Da Vinci surgical system rather than undertaking a procedure themselves; especially when operating on the prostate gland as the robotic procedure is less invasive and allows for greater precision. Last year more than 80 000 robotic prostatectomy procedures were performed in the United States.

The device's robotic arms are equipped with tiny instruments and a camera. The instruments are inserted through small incisions and do the prodding and cutting of the prostate while the surgeon operates the robotic controls, viewing the procedure via a magnified three-dimensional screen.

The rate of failure for robotic surgical procedures is comparable with that of traditional procedures. According to Dr Kevin Zorn, Chief of Urology at the Weiss Memorial Hospital at the University of Chicago, the more practise doctors have in using the robotic procedure, the better they get.

Zorn is behind the move by medical authorities to insist that all surgeons using robotic operating procedures must undergo extensive training in using the equipment before being allowed to work on patients who need surgery. Currently there are no systems in place to assess the competence of doctors who use the equipment and Zorn believes that this is now essential.

He wants medical authorities to insist that simulators are developed and used to train doctors in using robotic surgical procedures and only once they have demonstrated their competence on a simulator will they be licensed to work on living patients.

Prostate cancer is the second most common cancer in men and it kills more than 250 000 people a year.





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Grumpy rubbish bins and park benches



How astonished would you be if, like the conscientious citizen you are, you tossed your empty Energade bottle into a nearby rubbish bin on the pavement only to hear an angry buzz and have the dustbin throw the bottle back at you?

Well this is what some clever American engineers and scientists have invented. They call it the smart trash can and it forms part of an exhibition being held in New York called Towards the sentient city, which explores how lives might change once computers are able to be embedded into anything and programmed to do just about everything.

The grumpy dustbin was invented by David Jimison and JooYoun Pek, who also created a street sign that points at pedestrians and a park bench that tips you off it if it decides you been sitting there for too long.

Apparently the two researchers are trying to imagine what life would be like if the technology being invented and used went wrong in the future. For instance, they wonder what would happen to an elderly, osteoporotic granny who was tipped off a bench and broke her hip.

Jimison and Pek want to stimulate public debate around embedded computers and their use and how they can be made to contribute to improving quality of life rather than damaging it. The vision of the future is one of five projects commissioned for the exhibition. Others include a Trash Track developed by a team from the Massachusetts Institute of Technology in Boston who attached tags to hundreds of items of New Yorkers' rubbish so they could track where it goes from the moment it is thrown away.

There is also the Amphibious Architecture section developed by a team from New York and Columbia universities who floated sensors and lights in two of the city's rivers so that passers-by can send a text message and find out exactly what creatures are living under the water and what the water quality is like.

London-based architect Usman Haque created a network of houseplants attached to an electrical system, which monitors energy use. If the system's members use too much electricity the plants are killed but if they collectively reduce energy use the plants thrive, increasing their ability to capture carbon.

According to Mark Shepard, curator of the exhibition, the potential of technology to change human behaviour by helping them interact with unusual or unseen places such as rubbish dumps or rivers or by holding house plants hostage may stimulate debate on how cities could change and how citizens could be made more aware of their environment and ways to protect it.

I guess that the first rubbish bin that threw something back at a passer by in Johannesburg's Market Street would probably be shot, stabbed, kicked, and then burned.

Until the rubbish bin shot back ...

Computers learn to spot unspoken meaning in human conversations

Researchers at the University of Surrey have created an automatic system to spot non-verbal social signals in natural conversation so computers can better understand meaning in speech. The technology enables more intuitive computer interfaces to be developed and used.

Tim Sheerman-Chase, Dr Eng-Jon Ong and Dr Richard Bowden within the Centre are leading the research for Vision, Speech and Signal Processing at the University. The project was originated by an EPSRC study into lip reading, which identified the need to provide more than the literal words for useful understanding.

Humans unconsciously use body gestures, emotions and gaze direction to understand the meaning of spoken language. The automatic recognition of communication signals provides a valuable tool for computer interfaces and the study of social situations.

Human conversation was recorded with minimum intervention of the experimenter. Interesting clips from these conversations were rated by 21 annotators in a web browser. This provided clear examples of 'thinking' and 'not thinking', along with positive and negative examples of the other non-verbal signals. A computer learned which parts of the face could be used to identify each social signal in video.

According to Sheerman-Chase the findings represent a new direction in emotion recognition and enable computers to understand meaning in natural conversation. He says the accuracy of the system is far from perfect but it is comparable to human performance for some types of social signals.

He says the complexity of everyday conversations makes even humans disagree on what is happening. Recognition of communication signals can be applied to a range of applications including making computer game characters interact in more natural fashion, determining user experiences in real or virtual environments and developing safety critical applications.



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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Online advertising in SA and UK just keeps growing

Online advertising expenditure in the United Kingdom has overtaken television expenditure for the first time, according to a report compiled by the British Internet Advertising Bureau and PricewaterhouseCoopers.

Online spending grew by 4,6 percent to £1,75-billion in the first half of 2009 while television spending shrank by 16,1 percent to £1,64-billion. Overall, advertising in Britain fell by 16 percent compared with the same period in 2008.

E-mail campaigns, classified advertisements online, display ads and search marketing (for example, when a search term is entered in Google and the search results contain sponsored links) are all classified as online advertising.

According to the study, the current recession in Britain has accelerated the migration of advertising spending to digital technology and traditional media such as print, radio and television have all suffered as a result.

Technology firms were the biggest spenders on online advertisements, making up about 19 percent of the market, followed by telecommunications firms, the finance sector and entertainment and media.

In South Africa, online advertising is expected to overtake cinema advertising expenditure this year and research from World Wide Worx says that online advertising expenditure grew to R419-million this year – an increase of 32 percent – compared with last year.

Moreover, online expenditure is expected to grow by at least a further 32 percent between 2009 and 2010.

According to Arthur Goldstuck, managing director of World Wide Worx, the increase in online advertising is a reflection of the low base from which it has been growing and shows that online advertising is now starting to take its place alongside traditional forms of advertising in the industry.

The South African advertising expenditure figures compiled by Nielsen for the first six months of this year (January to June) show Internet advertising sales increased by 20,9 percent compared with a 5,1 percent decline in cinema advertising.



New \$200 gadget to monitor energy consumption

Google has joined forces with an American energy company, Energy Incorporate, to provide households with free energy management software, bypassing the smart meters installed by many electricity utility companies. The software is aimed at boosting energy efficiency throughout the country.

PowerMeter is a tool that allows consumers to monitor how much electricity they use at home, but there is a catch. Users have to install a smart meter in their home to measure energy usage.

Now, consumers can buy TED 5000, Energy Incorporate's power-usage measuring device, for about \$200 and use Google's software in conjunction with the device without having to install a smart meter.

The device comprises two main components: the measuring unit that must be attached directly to the home's main circuit breaker panel and the 'gateway', which plugs into any conventional outlet and receives energy data through the electrical wiring in the house.

The measuring unit must be professionally installed and, once it is in place, the gateway is plugged directly into an outlet and into a router or modem so that it can connect to the Internet.

The unit connects directly to Google's PowerMeter software which monitors, in near real time, the energy being used in the home and keeps track of the energy consumed during the month – or over several months or even years.

According to Google, research has shown that users who monitor their electricity usage using gadgets such as a smart meter or the TED 5000 initially reduce their electricity consumption by an average of seven percent. However, over time and with an accurate record of past performance, this percentage tends to rise to at least ten percent, making a significant difference to the amount of energy saved.



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Dear Paddy,

Although the matter hardly warrants further attention, following your response to my letter published in the September issue of WATTnow, my feeble brain is more confused than before. I am still unable to grasp the concept of a 150% reduction – be it in elephants, raiding elephants, raids, or anything else. Once something is reduced by 100%, surely you have none left ...

I can thus only assume that the measures taken were so effective that 50% of the previously rogue elephants returned and re-instated the vegetable patches and mended the fences.

Best regards,
Roy Macey, Mace Technologies

Dear Roy,

This little debate of ours has stimulated quite a lot of interest and comment (not written, but verbal) among engineers who keep telling me that I am trying to defend the indefensible. Engineers are clever, so they are no doubt quite right. But let me give it a go anyway.

Let's say that there used to be ten raiding elephants a day and this was calculated over a 60 day period, giving villagers 600 raids. When the bees were introduced, the elephants became cautious. In the first month there were no raids (previously there would have been 300). In the second month there were ten raids every second day (that is, another 150 raids). So over the two month period, when 600 raids should have occurred only 150 raids occurred; an accurate and effective reduction of 75 percent over the two-month period. So far so good.

Here's where the figures get distorted: No raids in the first month = 300 raids saved or 100 percent. Only 150 raids in the second months = 150 raids saved. Effective 50 percent saved. Combined total saving = 100 percent in the first month plus 50 percent in the second month. 150 percent saved.

I am more than willing to concede that the figures do not stand up to scrutiny and your contention is perfectly correct. The correct figure (journalists don't let too many facts spoil a good story) should have been a saving of 75 percent (450 as a percentage of 600)

But I'm sure you'll find some addled logic in my explanation – no matter how flimsy.

Paddy

Hi Paddy,

Every drop counts for energy and CO₂ emissions.

According to a recent article in Beeld, South Africa has a national toilet paper standard of 500 sheets per roll, with a width of 100mm and a sheet length of 110mm. At dimensions like that, the sheets might just as well be square at 100mm, a saving of 9%.

By making sheets fractionally smaller at 95mm square, a further saving of 10% could be achieved, to give a total of 19% saving in paper. This would save energy used for ground preparation, planting of trees, plantation management and maintenance. It would also help to reduce costs of harvesting, transportation of logs to the mills, pulping of timber and so forth.

In fact, it would save energy and reduce the excessive volume of chemicals used to make paper too.

Considering how much toilet paper is used in South Africa every year, such a saving could be meaningful. And I doubt that anyone would even notice the smaller sheet size.

I do hope that SANS reads this and can be enlightened by my suggestions.

Yours faithfully,
LE Hunt

Hi Paddy

Thanks to you as a driver of this fantastic magazine. This month (October) is particularly interesting for its coverage of lack of service delivery; something we witness daily.

Your magazine, however, does not escape. Remember that if you want to make everybody equally rich you cannot do this by taking money from the rich, it does not work.

Your first world magazine does not escape the service delivery sickness (like swine flu, it's contagious).

In the October 2009 issue, I'm just in time for the 'Power Cables & Switchgear Conference 2009' on page 50 for 7th and 8th October 2009, but must travel back in time to attend the 'ISH 2009 proceedings' in Cape Town on 24 - 28 August 2009 on page 28.

Keep this 1st world magazine in the 3rd world, but try not to get caught in the trap.

Regards
Henk Lantermans Pr.Eng.

Hi Paddy

Thank you for your vital October 2009 editorial, and particularly for your excellent article, 'Poor Service Delivery: Nothing's Changed'.

I would very much like to forward these to my friends and colleagues. Is it possible that you could e-mail them to me in .doc or .pdf format, please?

Kind regards,
Peter Chubb, SMSAIEE





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Russian mission may unlock Morning Star's secrets

For many years Russian scientists have been planning to visit Venus and, after a lull of almost 30 years, the country is now planning a new mission to the densely clouded, acid-laden misty planet. The scientists have invited Western scientists to participate in the plan.

Russia plans to send a mission to Venus in 2016 and is hoping that scientists from the European Space Agency and America's NASA will join them in the project. The mission leader, Oleg Korablev, confirmed that a conference between a number of western nations had been held to pool ideas and determine the best approach to this project.

The Soviet Union, working with a number of European nations, sent twin Vega probes to Venus in 1985. Prior to that, it had sent 16 Venera missions to the planet between 1961 and 1983. The new mission, known as Venera-D, will probably comprise an orbiting spacecraft, multiple air balloons, a surface lander and an innovative wind-flying instrument.

The project is in its preliminary stages and faces enormous technical and financial challenges but according to Korablev, European scientists are keen to participate. The European Space Agency's Venus Express is currently orbiting the planet after its successful launch on a Russian rocket in 2005.

Venera-D would be the second attempt by European and Russian scientists in the past few years to explore Venus. Unlocking Venus's secrets is proving difficult, as equipment has to be able to survive extremely hot temperatures.

In previous missions, Russian landers have only been able to survive for about an hour. Already scientists have cut the initial goal of a lander surviving for 30 days to just one day because of the extreme conditions on Venus's surface. If the landers can remain on the surface for longer than an hour, they will listen for tremors that may provide some clues as to the internal structure of the planet.

This is where the plan to use air balloons comes in. Scientists have proposed that a number of balloons, designed to float in the misty atmosphere would be deployed either from the main lander during its descent or from protective capsules capable of penetrating the acidic and misty atmosphere.

Scientists are hoping to study the isotopes of noble gases such as xenon and krypton that are contained in the planet's atmosphere.

Russia is also hoping to deploy a vetrolet – a Russian term meaning wind flyer – which is a kite-like device that could use the winds on Venus to stay aloft almost indefinitely, flying at a height of between 45-50- kilometres and equipped with lightweight instruments and transmitters.



A monster that could swallow a crocodile

The fossilised skull of a ferocious and colossal sea monster known as a pliosaur that lived on Earth about 150-million years ago has been found on a beach in Britain. The skull alone is 2,4-metres long and experts say that the complete reptile probably measured about 16 metres when it was alive.

The fossil was found on the UK's aptly-named Jurassic Coast off Dorset and has been sold to the Dorset County Council by a local fossil collector.

According to palaeontologist Richard Forrest the pliosaur was part of a group of

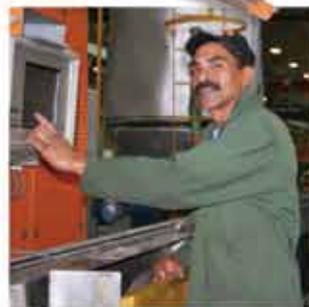
aquatic reptiles that dominated the seas at about the same time as the dinosaurs were roaming around on land.

The pliosaur is similar to the plesiosaurs, had a short neck and huge, crocodilian-like heads with razor-sharp teeth to slice their prey in two.

It had four paddle-like limbs to propel its bulky body through the water and would make short work of prey such as the huge dolphin-like ichthyosaurs and even other plesiosaurs.

Experts suggest that this fossil probably represents the largest pliosaur ever found anywhere in the world.





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GOCE and Sumbandila in orbit around Earth

An arrow-shaped spacecraft, the GOCE (Gravity Field and Steady-State Ocean Circulation Explorer) satellite, has started to make what is expected to be the most detailed global map of the Earth's gravity field as part of a plan to help scientists better understand how oceans move.

The GOCE satellite can sense tiny variations in the planet's gravity from its relatively low altitude of 255km. The 1 100kg satellite is built from rigid materials and carries fixed solar wings. The solar cells produce 1 300W and cover the sun-facing side of the spacecraft.

The side of the satellite that is not facing the sun is used to radiate heat and keep the spacecraft cool. The accelerometers are so sensitive that they can measure accelerations that are as small one part in 10 000 000 000 of the gravity experienced on Earth. There are six accelerometers housed in a device called a gradiometer.

The engine, built in Britain, ejects xenon ions at velocities exceeding 40 000 m/s and the engine throttles up or down to keep it at a steady altitude. Data collected by the craft is downloaded to the Kiruna ground station in Sweden. Processing and archiving is done at the European Space Agency's centre in Frascati, Italy.

In a separate development, South Africa's own Sumbandila satellite is being commissioned and all its systems tested to ensure it communicates with the Electronic Systems Laboratory's ground station facilities used by SunSpace at Stellenbosch University.

Once it is fully operational, command of South Africa's second satellite will be transferred to the mission control centre at the Satellite Applications Centre at Hartebeesthoek, west of Pretoria.

The spacecraft is an 81kg Earth observation micro-satellite that was designed and built by SunSpace & Information Systems based in Stellenbosch. Its main payload is a small multi-spectral imager, operating in three bands (red, green and blue) with a resolution of 15m (meaning that one pixel equates to 15m x 15m).

The SumbandilaSat (*Sumbandila* means lead the way in the Venda language) was launched from Baikonur Cosmodrome by the Russian Space Agency, Rocosmos.



This artist's impression shows the GOCE satellite (Gravity Field and Steady-State Ocean Circulation Explorer), that will map the Earth's gravity field. It will orbit at a relatively small distance of 260 kilometres from the surface of the Earth. For this reason, GOCE has a sleek aerodynamic design and comes equipped with special ion thrusters. Credit: ESA.

Spring tyres for Moon and Earth

A highly specialised airless, rubberless, tyre is being developed by Goodyear to transport large, long-range vehicles across the surface of the moon for NASA. The tyres are made from a wire mesh used on previous Lunar roving vehicles.

Because of the increased load and life of the tyre, fundamental changes have been made to the original lunar tyres developed by Goodyear. Already NASA has tested the first interwoven spring tyres on the electric roving test vehicle at Johnson Space Centre's Rock Yard in Houston.

Goodyear engineers who worked on the original space tyres say that the development of the new spring tyre was driven by the fact that rubber,

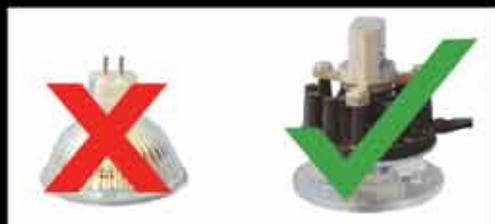
pneumatic tyres are of little use on the moon because the rubber properties change dramatically between the very hot and very cold temperatures experienced in the sunlit or shaded regions of the moon.

To complicate matters, the unfiltered solar radiation degrades the rubber, making pneumatic or solid rubber tyres unsuitable for sustained use on the moon. The spring tyres apparently do not have a single point of failure since, if there is some sort of damage to the tyre, only one of the 800 load-bearing springs will be at risk. The tyres provide a combination of stiffness and flexibility, suitable for fast travel over rough terrain and might be made commercially available to all-terrain vehicles used in inhospitable conditions on Earth.



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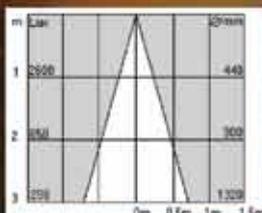
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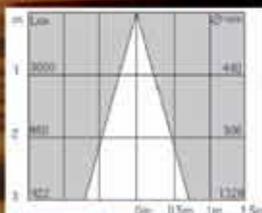


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15 degree beam spread
warm white 2800 - 3000 K

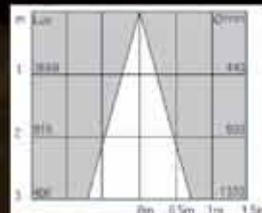


MR16 LED retrofit - source 3 x Cree or Osram LEDs - 350mA driving current
15 degree beam spread soft white 4000 K

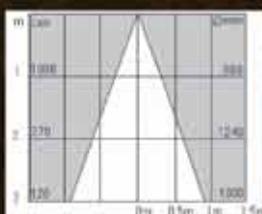


7 W LUMINOUS INTENSITY DIAGRAMS

AR111 LED retrofit - source 3 x Cree or Osram LEDs - 700mA driving current
15 degree beam spread
warm white 2800 - 3000 K



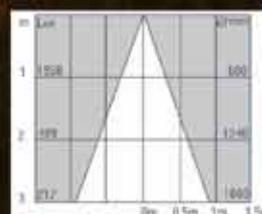
MR16 LED retrofit - source 3 x Cree or Osram LEDs - 350mA driving current
30 degree beam spread
warm white 2800 - 3000 K



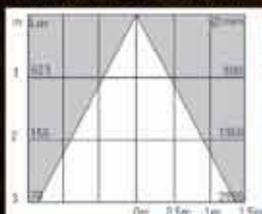
MR16 LED retrofit - source 3 x Cree or Osram LEDs - 350mA driving current
30 degree beam spread soft white 4000 K



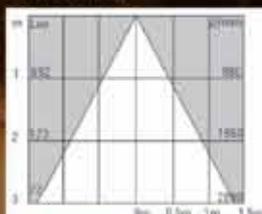
AR111 LED retrofit - source 3 x Cree or Osram LEDs - 700mA driving current
30 degree beam spread
warm white 2800 - 3000 K



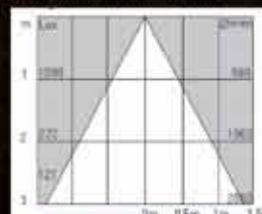
MR16 LED retrofit - source 3 x Cree or Osram LEDs - 350mA driving current
50 degree beam spread
warm white 2800 - 3000 K



MR16 LED retrofit - source 3 x Cree or Osram LEDs - 350mA driving current
50 degree beam spread soft white 4000 K



AR111 LED retrofit - source 3 x Cree or Osram LEDs - 700mA driving current
50 degree beam spread
warm white 2800 - 3000 K



For soft white 4 000 K, add 10% light levels.

LHC reaches deep space temperatures

After more than a year of extensive repairs, the Large Hadron Collider (LHC) has started working again and all its eight sectors have been cooled to an operating temperature that's colder than deep space at 1,9 K, equivalent to -271 °C.

The large magnets that are used to bend particle beams around the LHC are kept at this temperature using liquid helium. The magnets are arranged end-to-end right around the 27km circular tunnel buried under the Alps, straddling the border between France and Switzerland.

The collider is due to restart towards the end of November before scientists attempt to create a simulation of the 'Big Bang' that occurred in deep space billions of years ago.

In September last year the LHC had to be shut down after a magnet leaked, causing about a ton of liquid helium to spill into the LHC tunnel. The particle accelerator had to be warmed up from its freezing

operating temperature before the repair work could begin.

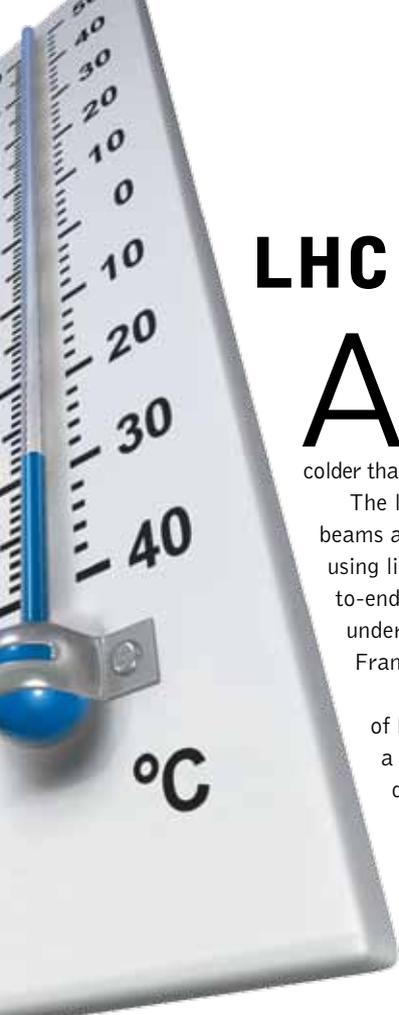
Scientists are planning to fire two beams of protons in opposite directions around the tunnel until they smash into one another releasing a cataclysmic amount of energy. They hope to identify new particles in the debris that follows these collisions. The experiment is expected to give scientists fundamental new insights into the nature of the cosmos.

The operating temperature of the LHC is just a shade above absolute zero (-273,15 °C). By comparison, the temperature in remote regions of outer space is 2,7 K (-270 °C).

The magnets are designed to be superconducting, which means they channel electric current with zero resistance and very little power loss.

The LHC is the largest particle physics facility in the world operating in these frigid conditions. Scientists are now planning to test fire a low-intensity beam along part of the LHC and will, towards the end of November, smash low-intensity beams into each other, providing the first data.

The high-energy collisions are set to take place sometime during December or January.



Nobel prize rewards work done 40 years ago

Apioneer in fibre optics, Shanghai-born Charles Kao and two scientists, Willard Boyle of Canada and George Smith from the United States, who, between them, figured out how to turn light into electronic signals, share the \$1,4-million Nobel Prize for Physics.

Kao's work on fibre optics in 1966 formed the basis for the production of the first 'ultrapure' fibre four years later and it set the stage for much of the communications infrastructure around the world, allowing for text, music, images and video to be transferred around the globe in a few seconds. It was these first low-gloss glass fibres that facilitated what is now known as the global broadband communication infrastructure.

Boyle and Smith invented the first successful imaging technology using a digital sensor and this invention revolutionised photography in all its forms as light could be captured electronically instead of on celluloid film.

The work by Boyle and Smith, both employed by United States group Bell Laboratories, and who both retired more than 20 years ago, led to progress in areas as diverse as microsurgery and space exploration. In fact, the camera that roamed around inside the Mars rover was similar to the one that Boyle and Smith developed.

While at Bell Laboratories, Boyle led the group's research into optical and satellite communications, digital and quantum electronics, computing and radio astronomy. He helped NASA's team choose a site for the Apollo landing on the moon in 1969.

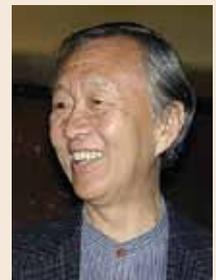
Smith was head of the research team that worked on creating lasers and semiconductors at Bell.



Willard S. Boyle



George Smith



Charles K. Kao



CSIR still plays a key role in scientific innovation

South Africa's Council for Scientific and Industrial Research (CSIR) has had an extremely good year. Its research and development findings, published in international journals around the world, have increased by 32 percent while its number of collaborative projects has grown from 50 to 120.

The organisation's operation income rose by 21 percent to R1,49-billion and while the Parliamentary grant was increased by 12 percent to R480-million, contract income increased by 23 percent to R955-million.

Income from royalties rose by an impressive 119 percent to R36-million and the CSIR earned R15-million in royalties from the consumer electronics industry for its development of lithium-ion batteries that were invested by the council and patented in 1982.

These batteries were licenced by Japanese multi-nationals in 1995 for use in computers but only started being widely accepted and used some years after that, indicating that there is often a significant time lag between the invention of a product and its eventual commercial application.

The CSIR currently has 201 permanent staff studying for Master's or PhD degrees, 60 staff in its science leadership programme, 59 staff in its research and innovation skills programme, 97 interns and it supports 172 studentships. In terms of science, engineering and technology employees, 53 percent are black and 33 percent are women.

Capital investment in scientific equipment and facilities exceeded target by R40-million and totalled R188,3-million.

In the health sector, the CSIR has developed a novel and economically competitive manufacturing process for thymidine, a valuable intermediate in the preparation of AZT and stavudine, used in first- and second-line combination HIV treatment regimens.

It has also developed two series of potential anti-malarial compounds with activity levels equal to the best medications available but with no toxicity and which are active against resistant malarial parasites. The foliate antagonists under development show activity that is more than 1 000 times higher than cycloguanil against resistant strains of *Plasmodium falciparum* the causative parasite of malaria.

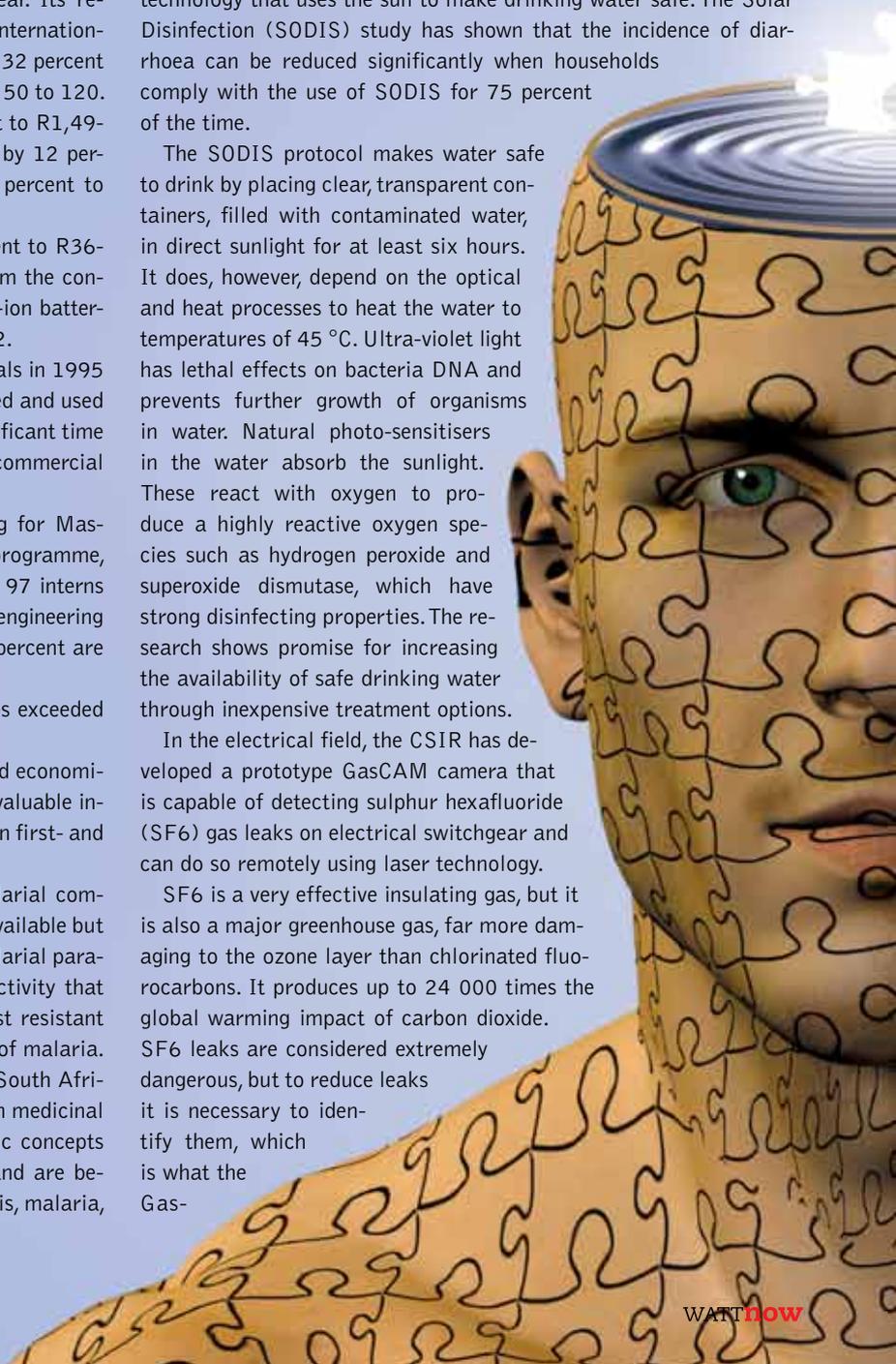
After extensive engagement with traditional healers in South Africa, the CSIR captured 250 local claims for cures based on medicinal plants. At least 72 claims were identified for therapeutic concepts and 15 of these claims have produced positive results and are being developed further for the treatment of asthma, arthritis, malaria, analgesics and HIV.

In other research, the CSIR is investigating the use of a zero-cost technology that uses the sun to make drinking water safe. The Solar Disinfection (SODIS) study has shown that the incidence of diarrhoea can be reduced significantly when households comply with the use of SODIS for 75 percent of the time.

The SODIS protocol makes water safe to drink by placing clear, transparent containers, filled with contaminated water, in direct sunlight for at least six hours. It does, however, depend on the optical and heat processes to heat the water to temperatures of 45 °C. Ultra-violet light has lethal effects on bacteria DNA and prevents further growth of organisms in water. Natural photo-sensitisers in the water absorb the sunlight. These react with oxygen to produce a highly reactive oxygen species such as hydrogen peroxide and superoxide dismutase, which have strong disinfecting properties. The research shows promise for increasing the availability of safe drinking water through inexpensive treatment options.

In the electrical field, the CSIR has developed a prototype GasCAM camera that is capable of detecting sulphur hexafluoride (SF₆) gas leaks on electrical switchgear and can do so remotely using laser technology.

SF₆ is a very effective insulating gas, but it is also a major greenhouse gas, far more damaging to the ozone layer than chlorinated fluorocarbons. It produces up to 24 000 times the global warming impact of carbon dioxide. SF₆ leaks are considered extremely dangerous, but to reduce leaks it is necessary to identify them, which is what the Gas-



CAM does. It has already been successfully demonstrated to a number of potential international companies and organisations.

Within the energy sector, the CSIR has been examining various technologies including concentrated solar thermal power, and the use of selective solar absorbers to offer low-cost solutions for clean energy, particularly in rural communities.

It is also conducting research on lipid-producing algae that can be transformed into biodiesel and is conducting experiments on using biogas and biofuels from municipal waste to generate electricity.

Already the CSIR has investigated 20 percent of South Africa's aquatic environments, finding 150 algal isolates of which 52 produce lipids. Six of these strains could be used as a biodiesel feedstock. One of the isolates has demonstrated production of ecosapentanoic acid, a highly valuable omega 3 fatty acid. Proof-of-concept studies are currently underway.

The institution is also investigating the use of industrial waste water and carbon dioxide flue gas to grow algae that can be used to produce biodiesel.

Selective solar absorbers that harness the energy of the sun have the potential to provide low-cost clean energy to rural communities. However, a key factor is the material that is used to absorb the sunlight and CSIR researchers have succeeded in tailoring the optical and structural properties of materials to achieve a solar absorber made with a composite structure embedded with carbon nano particles.

Laboratory tests show that this material is

about 30 percent more efficient than the best alternatives available on the market today.

The sol-gel recipe used to make the material is environmentally friendly and has a low production cost. Researchers are working on a roll-out strategy to make this technology available to the South African community.

In addition, a separate research study by the CSIR is helping to accurately map the Waterberg coalfields so that precise calculations of the coal reserves in the region can be established. The Waterberg coalfield is believed to have enough coal to host eight power stations and to have enough reserves for 150 years of production. However, until now scientists have interpreted airborne magnetic and radiometric data to produce their estimates.

The CSIR project to create a structural map of the Waterberg is the first step to unravelling the largely unknown structure of the Waterberg area. When complete, it will provide more detailed information so that more reliable strategic decisions about the location of new power stations in the Waterberg region can be made.

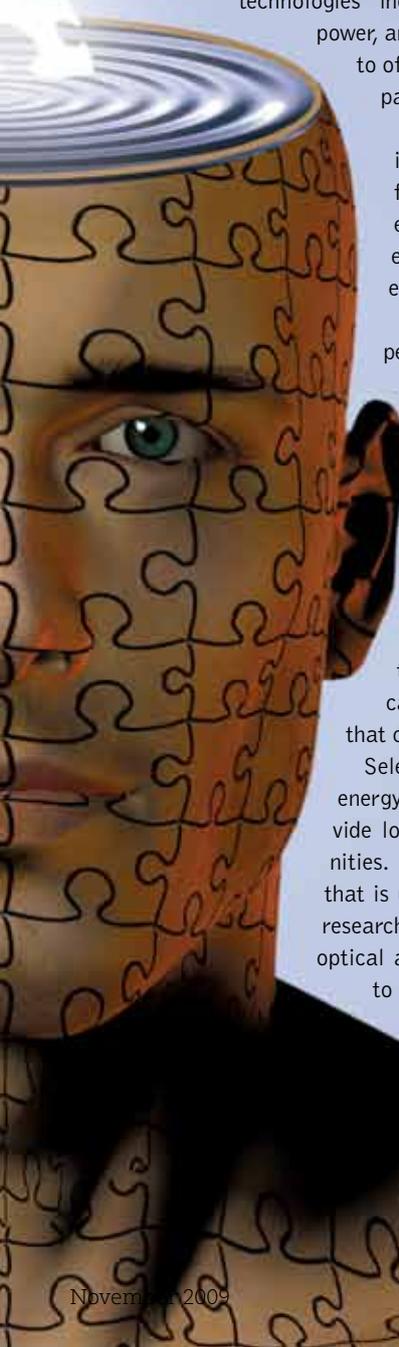
The CSIR is also focusing on development, evaluation and improvements to the key electrochemical components (catalysts, membranes, gas diffusion layers and electrodes) for use in hydrogen or alcohol-based fuel cells. The focus of the research includes:

- Developing a novel approach for making 'designer catalysts' for fuel cell electrodes.
- Optimising catalysts in hydrogen fuel cells.
- Developing more efficient catalysts for alcohol fuel cells.
- Investigating different membranes for use in alkaline direct alcohol fuel cells.

Scientists are experimenting with different types of alcohol fuels including ethylene glycol and glycerol instead of methanol for these fuel cells. For the catalytic inks used in hydrogen fuel cells, the CSIR has developed three ammonia-doped membranes.

Given the poor state of many of South Africa's roads, the CSIR has developed a construction method that uses ultra-thin (50 mm thick), continuously reinforced concrete to provide an all-weather surface with a life-span of up to 40 years. The technology can be applied in rural communities where dust and gravel roads predominate. Demonstration projects have been undertaken in Shoshanguve, Atteridgeville and Mamelodi in the Tshwane municipal area.

The organisation received an unqualified audit from the Auditor-General, one of just a handful of government-funded organisations to do so.



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Air Multiplier is just a bladeless desk fan

I sometimes think that people invent things for the fun of it, rather than because they have any practical application. The Air Multiplier is one of those gadgets that manufacturer, Dyson, claims is a “major technological breakthrough” because it is a desk fan without rotating blades.

It uses a combination of basic physics and advanced aerodynamics to create a flow of air without blades. The device has a plastic loop, situated on a round base with an electric motor inside it.

The manufacturer says that a jet of air passes over an airfoil-shaped ramp, which channels its direction. The surrounding air is drawn into the airflow. It works because a tiny fan on the electric motor at the bottom of the gadget pushes out small amount of air, which passes

over a curved surface, shaped a bit like an aircraft wing.

This curved surface creates a more powerful jet stream, drawing more air from behind and beside the fan. In fact, the Air Multiplier apparently blows out 15 times more air than its motor creates.

The Air Multiplier was originally developed for a range of hair dryers that the company planned to launch, but Dyson decided to launch it as a desk fan for the British market. It costs £199 and is only available from boutique retailers. Oddly enough, Dyson chose to launch the Air Multiplier in October when temperatures in Britain start to plummet as winter approaches and icy winds set in.

Some clever engineering dudes might pick up the idea of the Air Multiplier and use it to make bladeless wind turbines that can be used to generate vast quantities of electricity, the wind output being 15 times greater than the input.

Now that might have some value – even to Britain in mid-winter.

African farmers want more handouts for climate change

A ccording to speakers at the first Pan-African Climate Change hearings held in Copenhagen, it is because of widespread crop failures that African women farm workers are turning to prostitution in an effort to feed their families.

Caroline Malema, a small farmer and mother of six in Malawi, said that the increased cycles of floods and droughts made it difficult for her to feed her family. She said that many women were selling their bodies because of crop failure, resulting in an increase in HIV/AIDS. In Malawi, more than 800 000 people have died from this disease.

A pastoral farmer, Omar Jibril from the Wajir district in northern Kenya, blamed prolonged droughts for decimating his cattle and goat herds while Ugandan farmer Constance Okollet Achom said heavy rains and excessive heat had destroyed her crops.

Countries from the African Union are demanding compensation worth billions of dollars annually from Western nations, which they

claim are responsible for the droughts and floods affecting large parts of the African continent.

Officials from various African countries met at a special forum held in Burkina Faso’s capital, Ouagadougou, to establish a common position ahead of the December summit of the World Forum on Sustainable Development.

The World Bank estimates that the developing countries will suffer about 80 percent of the damage that climate change will inflict on the world. After the Burkina Faso meeting, six African heads of state issued a final declaration for industrialised nations to cut carbon emissions by at least 40 percent by 2020 compared with 1990 levels.

Leaders from Benin, Burkina Faso, Central African Republic, Congo, Mali and Togo attended the summit while leaders from Africa’s major economic powerhouses such as Angola, South Africa, Nigeria, Kenya and the Democratic Republic of Congo did not.



Boy proves enterprise cannot be hampered by circumstances

The remarkable story of a young, self-taught Malawian boy, William Kamkwamba, who transformed his village by building windmills out of junk to generate electricity has been captured in a new book entitled *The Boy who Harnessed the Wind*.

Kamkwamba was forced to quit school at the age of 14 when his family could no longer afford to pay the \$80 annual school fees. He returned to his village of Masitala carrying with him the dreams of bringing electricity and running water to his village.

In 2002, when one of Malawi's worst droughts killed thousands of people and left his family on the brink of starvation, Kamkwamba enrolled at the local library where he came across a tattered textbook about windmills. The chapter in the book detailing with the use of windmills to generate electricity and pump water particularly intrigued him.

Predictably, the community was not interested in his ideas and believed that he was "smoking too much marijuana" whenever he spoke to them about his dreams.

It took him a long time to realise them too. Kamkwamba finally erected his windmill after fashioning blades from plastic pipes that were flattened by being held over a fire and then cooled. He made a turbine using spares from a bicycle, a tractor fan blade and an old shock absorber.

He then erected the five-metre tower, made from a blue-gum tree, installed the blades and turbine and called the community together

to witness his achievement. The bemused villagers thought that he was off his head but their eyes sparkled as

they watched him scramble up the tower, attach a car light bulb to the turbine, which flickered into life as the windmill turned in the breeze.

Within a few months, the youngster was providing 12W of pumping power to the family home. Then he made a circuit breaker from nails and magnets from a disused stereo speaker, and fashioned a light switch using bicycle spokes and rubber. His family home had electricity and they used it to light up the house, replacing the paraffin lanterns that had been in use for years.

Soon, scores of people from the village were bringing him their cellular phones to charge. In 2006 a reporter from the Daily Times in Blantyre wrote about his remarkable achievements and soon after that, a solar-powered mechanical pump was donated to his village by well wishers. Then water storage tanks were added and potable water was available to all the villagers.

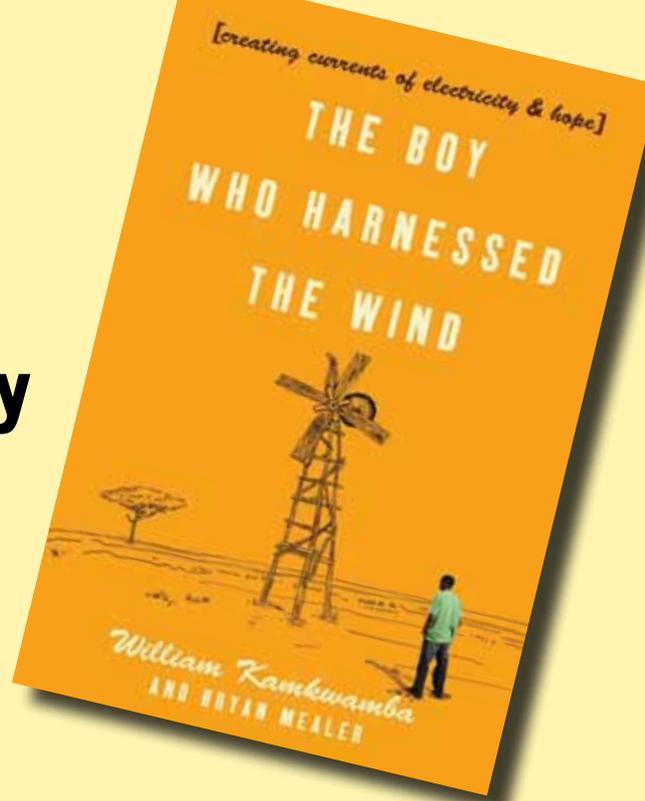
Having built the first five metre tower, he upgraded it to a 12-metre tower that allowed him to generate 48V of electricity. It was anchored to a concrete floor after termites chewed through the wooden base and it collapsed.

Today, his achievements have bought him a degree of fame and fortune. He is now enrolled at the elite African Leadership

Academy in Johannesburg, and has even been featured in the internationally respected Wall Street Journal for his achievements.

The timeline for Kamkwamba's achievements include:

- **2002** – Leaves school and sets about building his first five metre tower.
- **2006** – Daily Times writes about him and his achievements. He builds a 12 metre windmill.
- **2007** – Solar powered pump donated to the village to provide potable water for the community.
- **Mid-2008** – builds a new Green Machine 12 metre tower anchored in concrete and enrolls at the African Leadership Academy in Johannesburg.
- **2009** – Builds a replica of the original five metre windmill built in 2002.



Magnetricity is no Magna Carta for energy production



Artist impression of spin ice.
Credit: William McConville and Ruifang Wang Penn State.

British scientists have discovered a magnetic equivalent to electricity where single magnetic charges can behave and interact like electrical ones. The scientists use magnetic monopoles that exist in special crystals known as spin ice.

The researchers showed that monopoles gather to form a 'magnetic current' like electricity and they have dubbed the phenomenon 'magnetricity', suggesting that it could be used in magnetic storage or computing.

The team's findings have been published in the respected journal Nature.

Earlier this year, two groups independently reported the existence of monopoles in spin ice crystals. The crystals are made up of pyramids of charged atoms, or ions, arranged in a way that, when cooled to exceptionally low temperatures, show tiny, discrete packets of magnet charge.

A team, led by Stephen Bramwell from the London Centre for Nanotechnology showed that these 'quasi-particles' of magnetic charge can move together, forming a magnetic current just like the electric current formed by moving electrons.

This was achieved using sub-atomic particles called muons, created at the Science and Technology Facilities Council's ISIS neutron and muon source near Oxford.

Muons decay within millionths of a second after their production into other sub-atomic particles but the direction in which these particles dissipate is an indicator of a magnetic field in a tiny region around the muons.

Bramwell's team implanted the muons into spin ice to demonstrate how the magnetic monopoles moved around and showed that when spin ice was placed in a magnetic field, the monopoles piled up on one side – in exactly the same way as electrons pile up when placed in an electric field.

Bramwell says that by engineering different spin ice materials to modify the way monopoles move; the materials could be used in 'magnetic memory' storage devices in spintronics – a field that could boost future computing power.

Kiss the Coega smelter goodbye

Plans to build a \$2,7-billion aluminium smelter at Coega in the Eastern Cape have been shelved because of the electricity supply constraints currently facing the country. The decision to build the smelter was based on an electricity supply agreement signed by Eskom and Rio Tinto Alcan in 2006.

Rio Tinto and the Industrial Development Corporation have invested \$130-million in the project since the power supply agreement with Eskom was concluded. Details of the agreement – or any penalties that Eskom might have to pay – have not been released.

The new smelter was due to be commissioned in 2010 but this was delayed to 2012 to ensure that Eskom could provide enough power for the first potline, which would have used 650MVA of continuous power.

Rio Tinto Alcan was hoping to build a 720 000tpa plant at Coega and its decision was partly based on the low cost of electricity in South Africa. However, price rises projected to reach 250 percent by 2015 have meant that the project is not economically viable.

Rio Tinto Alcan will certainly continue with its expansion plans to increase production by 720 000 tons a year, but not in South Africa because of the cost of electricity coupled with the fact that it is remote from the major manufacturing regions of China, the Far East, Eastern Europe and Asia.

Eskom is currently attempting to renegotiate its commodity-price-linked electricity tariffs agreed between it and BHP Billiton in the 1980s when the utility had a significant surplus of generating capacity. These agreements, signed in the 1980s are due to run for between 30 and 40 years.

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Swedish bunnies turned into biofuel



Residents in Stockholm, Sweden appear to be sharply divided over the use of rabbit carcasses as a feedstock to make biofuel. The bodies are burned in an incinerator that is used to fuel a heating plant in central Sweden.

For Stockholm, rabbits have been a major problem for years because they are not indigenous to the country, have no natural predators and devastate the capital's parks and green spaces.

The rabbits are mainly the offspring of pets released by owners who buy them and then get sick and tired of looking after them. Rabbits breed prolifically, creating an over-population problem that led to about 6 000 of the creatures being culled last year.

In fact, Stockholm authorities employed hunters to do the dirty work of killing the creatures and, once culled, freezing them until they have a sufficient number to incinerate.

The frozen carcasses are taken to an incinerator at Karlskoga where the heat is used to heat homes in the suburb. According to Leo Virta, managing director of Konvex, the supplier of the heating plant, the company has developed a new way to process animal waste.

This system allows raw animal material to be crushed, ground and then pumped into a boiler where it is burned with wood chips, peat or other vegetable matter to produce renewable heat.

Perhaps a similar system could be adapted for places like Soweto and Tembisa, where rats are said to be the size of small dogs and run riot through these and many other townships.

Of course, the bodies of the culled or poisoned rats could be used to fuel a small generator to make a renewable energy source that could be used to provide free electricity to those residents who are currently helping themselves to Eskom's electricity through their own, illegal, connections.

Where there's a will, there's always a way.

Nuclear batteries may last for hundreds of years

Researchers have developed tiny 'nuclear batteries', about the size of a R5 coin, that produce energy from the decay of radioisotopes, which can be harvested to create electric current.

The tiny nuclear batteries were developed by researchers at the University of Missouri and can hold a million times as much charge as standard batteries. They were developed primarily to reduce the size of the power source in tiny devices that are used in micro- and nano-electro-mechanical systems.



What makes these new batteries particularly attractive is that they can provide a useful and consistent amount of current for periods of up to a hundred years or more. They are seen as a solution for power in spacecraft that are fired deep into the cosmos. However, because of the size of existing nuclear batteries, their use on Earth has been extremely limited.

According to Jae Wan Kwon, lead researcher of the Missouri team, a liquid semiconductor is used to capture and utilise the decay particles. Most nuclear batteries use a solid semiconductor to harvest the particles but the extremely high energies of the particles mean that the semiconductors get damaged over time.

To build a battery that will last as long as the isotope inside it, the semiconductors must be larger. By using a liquid semiconductor, the particles can pass through it without causing any damage and it is this technology that has allowed researchers to reduce the size of nuclear batteries to a point where they can be used in nano technologies.

Of course there are some fears that the batteries could deteriorate and cause serious damage if the radioactive material started to leak out but Dr Jae says that the devices are extremely safe under normal operating conditions.

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Trillions needed for renewable energy projects

At least \$10-trillion will have to be invested in renewable energy, biofuels and nuclear power in the next 20 years to mitigate against the debilitating effects of climate change, according to the Paris-based International Energy Agency.

The agency serves as a policy adviser on energy matters to 28 countries and it has warned its members that if governments fail to commit to an investment in re-modelling the energy sector, greenhouse gases will more than double above safe levels in the longer term. The energy sector (including oil, gas and coal) represents about 85 percent of all carbon dioxide emissions.

In a separate report, Australian researchers estimate that almost one percent of the world's classified 1,9-million species are threatened by climate change and 9,2 percent of the major vertebrates are particularly at risk. The government-funded Biological Resources Study, apparently the world's only census of animal and plant life, found that 20,8 percent

of mammals were endangered along with 12,2 percent of birds and 29,2 percent of amphibians.

Researchers across the globe are looking at ways of reducing the effects of climate change caused by greenhouse gas emissions and new technologies are being tested to remove carbon dioxide from the air rather than trap the gas as it emerges from factories or power plants.

Chemical giant BASF and glass and ceramics company, Corning, are working with a team from Columbia University in New York, which is attempting to develop technologies that will do this.

According to Columbia University physicist and earth scientist, Peter Eisenberger, who used to work for Exxon Mobil, if carbon can be put into the air then it must be possible to get it out.

Various devices are being developed by the university including vast, thin-wall structures that stick up into the air and strange-looking objects that resemble large telescopes that can suck carbon molecules from the air. Details of the different research projects have not been released.

Eisenberger says that there are currently 390 carbon dioxide molecules in the atmosphere for every one million molecules of air and that this needs to reduce to at least 350 parts per million. He says that if air capture technology becomes viable this may more rapidly reduce carbon concentrations in the atmosphere.

Eisenberger says that if a successful and affordable air capture technology is developed it could be widely deployed in places like Africa, Latin America and Asia where high carbon emissions continue to be pumped into the atmosphere every year.



Green energy projects increase dramatically

Major international engineering companies such as Foster Wheeler, Bechtel, Jacobs and Fluor are working on green building technologies that are being deployed in different cities around the world. It is these same engineering companies – and many more besides – that were responsible for building nuclear and coal-fired power stations decades ago.

According to green energy analyst, Heiko Ihle of Gabelli & Co, engineering companies in the United States have already embraced a variety of renewable energy projects and

are quickly adapting technologies to run on renewable sources of energy.

Bechtel, the largest engineering group in the United States, says that it has been actively providing renewable energy solutions for the past 25 years. It built the first utility-scale photovoltaic solar plant and established and still operates the National Renewable Energy Laboratory.

Bechtel recently agreed to take an equity stake in a company called BrightSource, which is building a 440MW solar-thermal project in the California desert.

According to president of Bechtel, Ian

Copeland, about 40 percent of new power capacity in the United States comes from wind farms and he expects that solar energy projects will grow by 54 percent globally in 2010.

David Dunning, group president for the power division at Fluor, says that renewable energy projects represent the future growth for engineering companies working in power generation and that this is fuelled by widespread legislation that is making renewable energy projects mandatory.

In a similar vein more and more companies are looking at renewable energy as a solution for South Africa.

CALL FOR PAPERS AND PROPOSALS



IEEE International Conference on Communications (ICC 2010)

will be held in Cape Town, South Africa, from 23-27 May 2010, prior to the Soccer World Cup also being held in South Africa. The conference is aimed at addressing key themes on "Communications: Accelerating Growth and Development." The program will feature major Symposia, Tutorials, Panel Discussions, and Workshops. Full details of submission procedures are available on the IEEE ICC 2010 website, www.ieee-icc.org/2010/.

The organizers of IEEE ICC 2010 as well as our attendees expect accepted papers to be presented at the conference. IEEE reserves the right to exclude a paper from distribution after the conference (e.g., removal from IEEE Xplore) if the paper is not presented at the conference.

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(wj@uark.edu)

PLANNED TECHNICAL SYMPOSIA

> Paper Submission: 10 Sep 2009

Authors are invited to submit original technical papers for presentation at symposia and publication in the conference proceedings from the following list: oriented information in a broad range of communication areas from cognitive radio networks, ultrawide bandwidth systems and automotive networking and telematics to cognitive and cooperative wireless networks and peer-to-peer communications.

General Symposium on Selected Areas in Communications

Tarik Taleb, talebtarik@ieee.org
Sumit Roy, sroy@u.washington.edu
Chunming Qiao, qiao@computer.org
Yacine Ghamri-Doudane, ghamri@ensie.fr
Riccardo Raheli, raheli@unipr.it

Communication Theory Symposium

Daniela Tuninetti, danielat@uic.edu
Holger Boche, holger.boche@mk.tu-berlin.de
Guosen Yue, yueg@nec-labs.com

Signal Processing for Communications Symposium (SPS)

S. Boussakta, s.boussakta@ncl.ac.uk
Donglai Xu, d.xu@tees.ac.uk
T.J. Lim, limtj@comm.utoronto.ca

Wireless Communications Symposium

Yi Qian, yqian@nist.gov
Ranjan K. Mallik, rkmallik@ee.iitd.ernet.in
Sennur Ulukus, ulukus@umd.edu
Wei Chen, wchen@tsinghua.edu.cn

Wireless & Mobile Networking Symposium

Thomas Hou, thou@vt.edu
Randall Berry, rberry@ece.northwestern.edu
Hai Jiang, hai.jiang@ece.ualberta.ca
Farid Nait-Abdesselam, farid.nait-abdesselam@lifi.fr

Optical Networks and Systems Symposium

Mounir Hamdi, hamdi@cse.ust.hk
Andrea Bianco, andrea.bianco@polito.it
Srinivasan Ramasubramanian, srini@ece.arizona.edu

Next-Generation Networking and Internet Symposium

Wanjiun Liao, wjliao@cc.ee.ntu.edu.tw
Achille Pattavina, pattavina@elet.polimi.it
Hussein Mouftah, mouftah@site.uottawa.ca

Communication QoS, Reliability and Modeling Symposium

Nelson Fonseca, nfonseca@ic.unicamp.br
Charalabos Skianis, cskianis@aegean.gr
Toshinori Tsuboi, tsuboi@cs.teu.ac.jp

Ad Hoc, Sensor and Mesh Networking Symposium

Nirwan Ansari, Nirwan.Ansari@njit.edu
Walaa Hamouda, hamouda@ece.concordia.ca
Nei Kato, kato@it.oci.tohoku.ac.jp
Hongchi Shi, hs15@txstate.edu

Multimedia Services, Communication Software and Services Symposium

Mohammed Atiquzzaman, atiq@ou.edu
Zhu Li, zhu.li@ieee.org
Marcus Brunner, brunner@nw.neclab.eu

Communication and Information System Security

Wenjing Lou, wlou@ece.wpi.edu
Pranode K Verma, pverma@ou.edu
Abderrahim Benslimane, abderrahim.benslimane@univ-avignon.fr

TUTORIALS

> Tutorial Proposal Due: 10 Sep 2009

Proposals are invited for half- or full-day tutorials in communications and networking topics. Proposals should be submitted to liye@ece.gatech.edu and mischa.dohler@cttc.es for review.

PANEL DISCUSSIONS

> Panel Proposal Due: 28 Aug 2009

Submissions are sought for panel discussions on the latest technical and business issues in telecommunications topics. Proposals should be submitted to gibson@ece.ucsb.edu and dngwenya@icasa.org.za for review.

WORKSHOPS

> Workshops Proposal Due: 30 June 2009

Submissions are sought for workshops on the latest technical and business issues in communications and networking topics. Proposals should be submitted to a.jamalipour@ieee.org and molisch@usc.edu for review.



FROM THE CENTENARY PRESIDENT ... du Toit Grobler

COUNCIL MEMBERS

I am delighted to be able to tell you that Mr Victor Wilson, SAIEE President 2008, is recovering well after his bone marrow transplant earlier this year. He attended the SAIEE Centenary BPML 2009, his first SAIEE event since his transplant, on Wednesday 30 September 2009 at the Great Hall of the University of the Witwatersrand.

On the 7th of September, Mr Les James, Honorary Treasurer of the SAIEE, underwent a hernia operation and he is currently recovering at home. Mr Viv Cohen, Chairman of the Investment Oversight Committee was appointed to act as Hon Treasurer during Les' absence.

We praise the Lord for their progress and pray for their full recovery.

THE SAIEE AND ECSA

On the 30th of September, Prof Hu Hanrahan concluded his stint as Acting CEO of ECSA and Dr Ossie Franks took up his position as CEO of ECSA a day later on the 1st of October. We wish them well for the future.

SAIEE CENTENARY BERNARD PRICE MEMORIAL LECTURE (BPML) 2009

From the 14th of September to the 29th of September 2009 Prof Dr WA (Bill) Gruver, Distinguished Lecturer of the IEEE and the SAIEE Centenary BPML 2009 guest speaker delivered his address entitled: 'Intelligent Systems for a Global World' at the six centres and both interest groups of the SAIEE around the country. He was accompanied on the BPML tour by the President and the President's wife, Elize, where possible, from Bloemfontein, to Vaal Triangle, to Western Cape, to Southern Cape, to Eastern Cape, to East London to KwaZulu-Natal and finally to Secunda. The main event took place at the University of the Witwatersrand on the 30th of September 2009. A total of 400+ individuals attended the lecture presented at the nine venues. Prof Gruver also presented three Joint SAIEE-IEEE lectures at the Universities of the Witwatersrand, Pretoria and Cape Town.

The BPML, a joint event between the SAIEE and the University of the Witwatersrand, has taken place annually since 1931. The SAIEE thanks the Man, Machine and Cybernetics Chapter in South Africa of the IEEE for their assistance in bringing Prof Gruver from the Simon Fraser University, Vancouver, BC, Canada to South Africa for these events.

ACHIEVEMENT BY THE EDITOR OF WATTnow

Congratulations to Paddy Hartdegen on being selected as the regional winner of the Vodacom Journalist of the Year competition held on in Johannesburg in October.

FORTHCOMING SAIEE EVENTS

The Centenary Banquet takes place on 19 November 2009 and the Hon Trevor Manual, Minister in the Presidency is our guest speaker. The banquet will be held at the Wanderers Club, Illovo, Johannesburg. Remember to book a seat or a table and to nominate your candidate for the SAIEE Prestige Awards.

The SAIEE Centenary Conference and Exhibition is to be held at Sci-Bono, Johannesburg, on 20 November 2009. The theme of the conference is: Engineering the next 100 years – Impact of Future Electrical and Electronic Technologies.

The inauguration of the SAIEE Centenary Legacy, a Thermal Imaging Display, will take place at Sci-Bono immediately after the Centenary Conference on 20 November 2009.

The Annual SAIEE National Student Project Competition at the University of KZ-N, Durban also takes place on the 20th of November. EE Recruitment is sponsoring the competition, which has two categories, i.e. one for final year electrical B.Eng and one for B Tech students.

Kind regards

du Toit Grobler Pr Ing, Pr Dipl Ing FSAIEE
 SAIEE Centenary President 2009

Student competition – results out soon

The SAIEE's National Student Project Competition will take place at the University of KwaZulu Natal's Durban campus in November. According to Mike Crouch of the SAIEE, the purpose of the annual SAIEE National Student Project Competition is to:

- Provide a platform for undergraduate students to present their final year projects to their fellow students, academia, industry and the interested public. This enables students to develop and display their academic and innovative talents, engineering competency and presentation skills to the invited audience.
- Provide an opportunity for tertiary educational institutions to select project team(s) to be entered into the competition, and to use the opportunity to showcase the intellectual output of their universities.
- Provide an opportunity for the electrical engineering fraternity, industry and the wider community to witness the contest and see

the quality and standard of training given to graduates of South Africa's tertiary engineering institutions.

The 2009 SAIEE National Student Project Competition will be opened by SAIEE President, du Toit Grobler, and a total purse of R25 000, sponsored by EE Recruitment and EE Publishers, is up for grabs. Travel and accommodation costs of entrants are absorbed by the SAIEE.

Crouch says that for tertiary engineering educational institutions, the benefits of participating in this event are manifest as it fosters closer contact between the electrical engineering sector and industrial companies in South Africa. It also assists students in terms of skills development and career opportunities and allows companies to identify and recruit some of the best engineering students in the country.



Deputy Vice Chancellor at the University of the Witwatersrand, Professor Yunus Ballim, visiting speaker for the Bernard Price Memorial Lecture, Professor William Gruver (IEEE) and SAIEE President du Toit Grobler.



Andre Hoffmann, SAIEE council member who delivered the vote of thanks to Bill Gruver presenting him with a commemorative gift after the presentation at Wits in September.

The SAIEE recently held its annual golf day at the Pretoria Country Club and raised over R10 000 for charity. Through the generous sponsorship of our supporters there were also a number of great prizes for the winners. The annual golf day is one of the highlights of the SAIEE's calendar and it supports a worthwhile cause as all proceeds are donated to the Maria Kloppers Children's Home.



du Toit Grobler welcomes the guests.



Mike Engelbrecht, du Toit Grobler and Quentin Richardson - won the prize for the Nearest to the Pin and longest drive.



First Prize winners.



Second Prize winners.



Third Prize winners.

SAIEE visit to the Gautrain project site

By Arnold Starke

On 22 October this year, fifteen members and guests of the SAIEE visited the Gautrain project offices in Linbro Park.

Bombela, the concession holders, gave a presentation on the scope of the project and the technical details and this was followed by a talk on safety and risk assessment on a project site. It looks as though the link from Sandton to the OR Tambo airport could be operational in time for the FIFA World Cup in May 2010, but it will be a close finish.

We went in a bus to the Marlborough Station, which is currently being built. The architecture is imposing and gives a light and pleasant impression. We were able to see ongoing work on the finishing touches to the roof, buildings and surroundings.

No electrics or controls have been installed yet.

The group was disappointed at not being able to see a train, clamber into a rail car and view the technical aspects, which is what we had thought was going to happen. Due to safety considerations we were also unable to get to see the tunnels.

Our thanks go to Gautrain and Bombela for arranging the outing. We hope to visit your maintenance facilities soon so that we can see what your trains look like from the inside and from the bottom.





Photo taken with an Sony 350

The SAIEE, as part of its centenary celebrations, presented a cheque of R100 000 to the chairman of the Sci-Bono Development Centre, Phiroshaw Camay. The money will be used to establish a SAIEE Centenary Legacy Thermal Imaging Display. The SAIEE has a membership of more than 5 000 engineers, technologists and technicians and the majority of its members are registered as engineering professionals with the Engineering Council of SA(ECSA).

The SAIEE Publications Company was established in 2006 and this picture was taken at the Board of Directors meeting held at the Observatory Offices in July 2009. The sole shareholder of this company is the SAIEE Members represented by Council. Currently *WATTnow* and the *Africa Research Journal (ARJ)* are published under the auspices of the company.



Shown from left to right are Stan Bridgens (Dir), Viv Crone (Dir), Les James (Dir), Ian McKechnie, Bea Lacquet (Dir), Mike Cary (Vice President) and du Toit Grobler (President).



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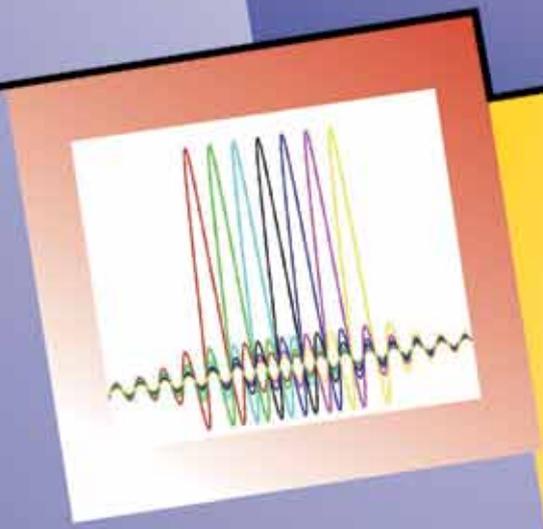
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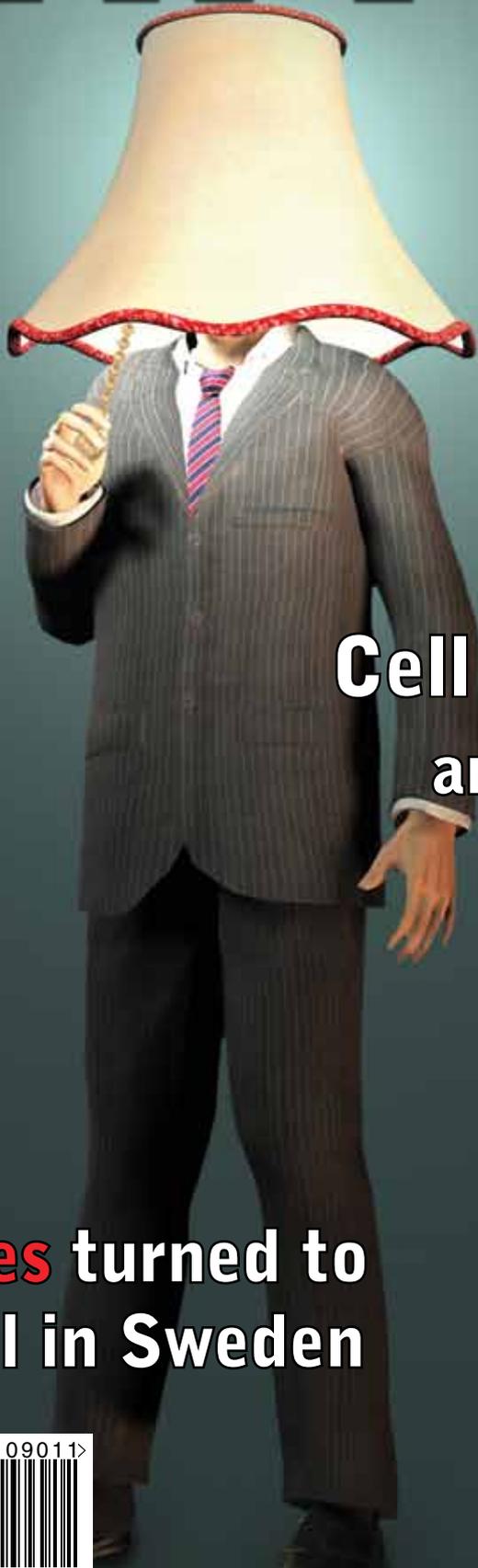
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