

# WATTnow

Be Enlightened

## Water crisis - No says Water Affairs

### Cloned steaks coming

### Solar electricity at Upington

### Ruffini wins Siemens Award



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# PNEUDRIVE CHALLENGE 2008

## 8 UNIVERSITIES 1 PRIZE



**SEW Eurodrive** and **Festo** have launched a design competition for third and fourth year engineering students in the fields of mechanical, electronic and mechatronic studies. Eight educational institutions around the country have been invited to participate.

“The hands-on experience is invaluable. We are excited about what the students are going to come up with”

Adrian Buddingh, Engineering Manager at Festo.

“Growing the young engineers in the country and providing them with opportunities and the needed skills for the workplace is of huge importance to us”

Ute Bormann, GM Sales and Marketing at SEW Eurodrive

FOR FURTHER INFORMATION OR ANY QUERIES REGARDING THE PNEUDRIVE CHALLENGE PLEASE CONTACT

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**FESTO**

# Water, water everywhere but just some drops to drink

**W**hile South African's are in the grip of their electricity crisis yet another threat swells around us: a potentially severe and debilitating water shortage brought on because the existing infrastructure is not maintained.

Predictably, the government and the Department of Water Affairs and Forestry (DWAF) have vehemently denied that there is any cause for concern and claim, instead, that the drinking water in our taps is as good or better than tap water anywhere else in the world.

What else could they say?

These claims must be viewed against the background of more and more reports of contaminated water in our rivers and dams. The Water Research Commission found, for instance, that there were unacceptably high levels of pesticides, fertilisers, personal care products, heavy metals, industrial chemicals and pharmaceutical compounds in Rietvei dam outside Tshwane. It went on to say that endocrine disrupting compounds existed throughout the water systems of South Africa.

Environmental scientist, Claudia Holgate, described sewerage spills running into the Vaal River as a 'crisis' - something that members of the *Save the Vaal Environment* have been saying for years. She accused "non-performing government departments" for the high levels of faecal pollution in the water as well as parasites such as *Giardia* and *Cryptosporidium*.

DWAF has admitted that there are problems at the Vaal River, but says a long-term solution will take six years to implement. My immediate question, then, is what is DWAF going to do about it? Leave it for the next six years? Leave it until the entire Vaal waterway is contaminated?

The mind boggles when DWAF says that "interim interventions" are being put in place but the problems have been there for many years and the only solution is a total overhaul of the system.

The *Save the Vaal Environment* representative, Bernard Fourie, says that this organisation will take DWAF to court in an attempt to force it to repair the plant. The situation at the Vaal is just one of many similar events such as have happened in Standerton, Delmas, Louis Trichardt and Durban.

The Dusi canoe marathon between Pietermaritzburg and Durban left hundreds of paddlers with Dusi Guts and 45 percent of paddlers were left with diarrhoea or vomiting after the race.

Government departments, local and provincial authorities all concede that there are problems with water quality and maintenance at the water treatment plants, but do nothing about it.

South Africa apparently needs to spend about R180-billion on essential repairs and maintenance of the existing water treatment plants and water distribution infrastructure – something that the Minister of Water Affairs and Forestry, Lindiwe Hendricks has categorically denied.

The puzzling thing for me – particularly in the light of the Eskom debacle – is that government itself has once again not told South Africa the truth. Government denies the problems while its own Water Research Commission finds endocrine disrupting compounds in South Africa's water system. Scientists – some working for the government – warn of pending ecological disasters in South Africa's rivers but government says there is no problem. It smacks of the same sort of denials we got when the lights went out.

What we need now is a clear, accurate and direct communiqué from the government outlining the exact extent of the water problems and the remedial action planned or underway. Moreover, government should commission a detailed information campaign encouraging individuals, businesses, industrial concerns and mining companies to conserve water in this water-scarce country of ours.

Everyone has a vested interest in conserving water and government must take the lead by implementing maintenance programmes and building new plants where and when they are needed. And government needs to be accountable for their actions.

I wonder when it might become accountable? Perhaps when Hell freezes over.



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2 Theunis Street  
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Norma Massey  
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R199 (incl. Vat) per annum  
Postage extra outside RSA



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ISSN: 1991-0452  
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Printed by: CTP Web, Cape Town  
Distributed by: RNA

# WATT'S

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– Reports that South Africa's water infrastructure needs about R180-billion to keep it flowing smoothly have been discounted by Minister of Water Affairs and Forestry, Lindiwe Hendricks, but it seems there is some substance to these claims. Paddy Hartdegen investigates.

27> WATTnow contributing editor, Antonio Ruffini has won the Siemens Profile Award for the third time.

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A Concentrated Solar Power plant may be erected at Upington in the Northern Cape if Eskom receives the go-ahead from its shareholders once the Environmental Impact Assessment has been completed. Eskom believes that South Africa could generate 2 gigawatts of electricity using solar energy.

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ABC Certified  
Total Paid Circulation 419, Total Free 4586, Total Circulation 5005  
Apr-Jun 2007

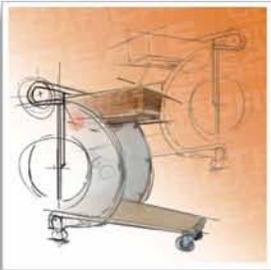
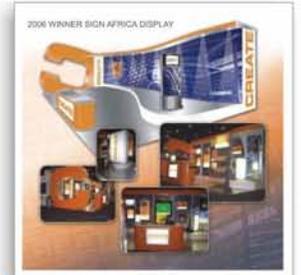


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- Rolltainers (Security Cages)

## Nokia – through the lens of the camera

**N**okia has released a new smartphone, the N82, which has a five megapixel camera, Wi-Fi and HSDPA 3G connectivity, 100 MB of internal memory and a 2 GB Micro SD card.

The Carl Zeiss-designed lens, with a built-in Xenon flash, makes it more of a camera than a phone and if it's anything like the N95 there will be a litany of user complaints and software changes to get it right.

The N82 provides unusually high video recording quality and has a facility to upload video clips or photographs directly to a social network or sharing site. It supports the Nokia Music Store and the N-Gage gaming platform.

It incorporates the iPhone-type of motion sensor technology that switches the screen from portrait to landscape mode, depending on how the phone is held. It comes with Quickoffice for e-mails and Adobe PDF to view documents directly on the phone.

The N82 is equipped with Nokia's Web Browser, which allows blogs to be posted directly to web sites around the world. It also has an Assisted GPS navigation system linked to Nokia Maps, which are available for a number of countries including South Africa.

However, as reviewers point out, the GPS and multimedia features on this phone tend to drain battery power quickly.



## Navigate your cellphone

**G**armin, well known for satellite navigation devices, has launched itself into the mobile phone market with its Nuvifone, which uses touchscreen technology and is being dubbed by some people as a rival to Apple's awesome iPhone.

The Nuvifone is almost entirely controlled through the touchscreen interface and comes with a host of Google applications that allow users to search for local businesses, check traffic or even find out what the weather's like.

I must say, these add-ons sound a bit daft to me; if I'm driving around with my phone in my pocket I'm pretty sure I know exactly what the weather's like ... Americans seem to like redundancy.

The Nuvifone has Wi-Fi and 3G HSDPA capabilities, offers multi-network instant messaging, gives users access to various mail services and supports both MMS and SMS.

Any pictures or videos taken using the built-in camera are automatically geo-tagged just in case you forget where you took the photograph or, worse still, forget what you were doing when the photograph was taken!



## FreeBSD now available from Mozilla

The newest version of FreeBSD Unix operating system has been released and contains significant performance and scalability advantages. It can be installed from bootable ISO images that can be downloaded directly from the FreeBSD website.

According to benchmark tests done on FreeBSD 7.0, the new operating system offers performance increases of about 350 percent at normal loads and at high loads this rises to about 1 500 percent. Among the changes in FreeBSD are:

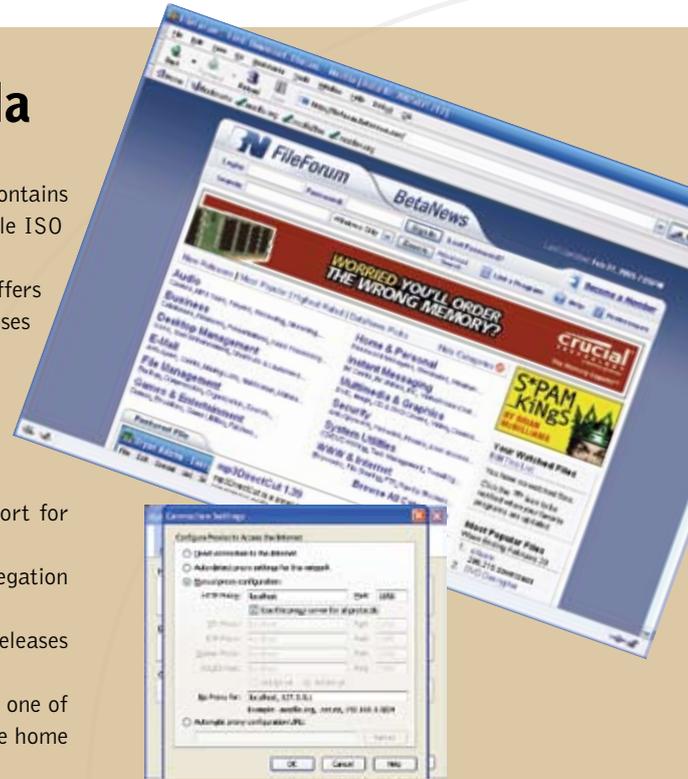
- The 1:1 libthr threading model is now the default.
- It has finer grained IPC, networking and scheduler locking.
- It offers optimised SMP architecture.

The ULE scheduler has been significantly re-engineered to provide improved performance and interactive response. Moreover, the software has read-only support for XFS file systems and bugs in the unionfs file system have been fixed.

FreeBSD has much improved wireless 802.11 support and the network link aggregation and trunking has been imported from OpenBSD.

Moreover, FreeBSD update provides officially supported binary upgrades to new releases in addition to security fixes and errata patches.

There are a wide number of Unix operating systems on offer and FreeBSD is just one of these. It is not as widely used as Ubuntu or Red Hat, which still tend to dominate the home user Unix market.



## Xbox's Lost Odyssey on SA shelves

The wait is over, and the journey has begun. Microsoft has announced that *Lost Odyssey*, the exciting next generation role playing game is available exclusively on Xbox 360. It was created by game producer Hironobu Sakaguchi of Mistwalker game studio in conjunction with Microsoft Game Studios and Feelplus.

The game sets out to help the immortal Kaim and his friends discover secrets of the past, in time to change an uncertain future. It set out an emotional story written by award-winning Japanese novelist Kiyoshi Shigematsu, has incredible cinematics inspired by renowned Japanese comic artist Takehiko Inoue and provides players with life-like and realistic graphics.

To further enhance the traditional Japanese role-playing experience, Mistwalker adds new levels of skill and strategy with innovations like the *Aim Ring* battle system. The massive environments, memorable characters and epic storyline will engage gamers, immersing them in the volatile and exciting world of *Lost Odyssey*.

Mistwalker is a creative company founded by Hironobu Sakaguchi, the original developer of *Final Fantasy* and *Blue Dragon*. Operated by a handful of experts, the direction of new Mistwalker is influenced by Sakaguchi's extensive industry experience.

Microsoft's Xbox 360 is a powerful video game and entertainment system, delivering the best games, the next generation of the premier Xbox Live online gaming service, and unique digital entertainment experiences that revolve around gamers. The system was launched in 2005.



# WANTED

## CREATIVE IDEAS FOR EFFICIENT LIGHTING!

Eskom's Energy Efficient Lighting Design Competition is challenging the finest design talent in the country to merge creative flair and trend-setting artistry with no-nonsense functionality – and come up with beautiful solutions in lighting design that will last a lifetime.

A thing of beauty is a joy forever, or so they say... yet,

when it comes to lighting – a veritable magic wand in the hands of any designer, home owner or artistic soul – this might not always seem the case. Whilst the creative possibilities of this versatile medium are endless, the resources that power it are not – in fact, they're depleting quickly.

### WHAT TO DO?

If the thought of doing your bit for sustainability conjures up images of deprivation and serious cut-backs on creature comforts, Eskom's Energy Efficient Lighting Design Competition invites you to think again. This exciting initiative is challenging the most daring minds out there to take energy efficient lighting design to a new level of creativity.

### THE BRIEF:

Design a lamp shade that makes use of an energy efficient globe. Demonstrate your ability to achieve that magical mix of artistry and functionality. Let your imagination run wild – and transform this humble household appliance into an *object d'art!*

And whilst science and art may at first glance seem worlds apart, the link between what works and what defies the imagination in terms of aesthetics is more obvious than one would imagine. Creativity is, in fact, the very key to efficiency – unlocking new ways of overcoming challenges. The functional and the beautiful are simply two sides of the same coin. US architect and engineer, R Buckminster Fuller, expressed this truth so well when he said, "When I'm working on a problem, I never think about beauty. I think only how to solve the problem. But when I have finished, if the solution is not beautiful, I know it is wrong."

### COMPETITION DETAILS

Designers are invited to design a lamp shade which makes use of, and complements, an energy efficient globe. The closing date for entries is 1 August 2008 and entrants may participate in any of two categories: a student category and a professional category. The total prize money of R250 000 definitely warrants participation, while the registration of a new patent, of course, also holds lucrative possibilities for the patent holder.

Full details are available on the following website: [www.savingenergy.co.za](http://www.savingenergy.co.za) or from the competition organisers on tel (012) 997-1334 or via e-mail at [amroux@mweb.co.za](mailto:amroux@mweb.co.za).

### LEDs offered at discount

LEDs (light emitting diodes) are available in a variety of models and colours so that users can easily adapt the LED technology to suit their designs. They are small light sources ranging from 1.8 mm to 20 mm in diameter and are built into modules of any description from a linear array to square or round tiles. The technology allows the LEDs to be mounted as single units or as an array on a board. VS Lighting will make LED lamp-holders and control gear available to entrants at a discount price. Contact Barry Hall, VS Lighting Controls Pty Ltd, tel: 027-11-314-4340, fax: 027-11-314-5287, cell: 027-82-576-6848, e-mail: [barry@vslc.co.za](mailto:barry@vslc.co.za), or visit [www.vslc.net](http://www.vslc.net).



## Vodacom's new fixed line service

Vodacom is investing R2,5-billion in its new Vodacom Business operation, which will offer a combination of voice, data and Internet solutions to businesses in South Africa. The new division will offer fixed and mobile telecommunications services in competition with Telkom and Neotel.

Vodacom Business launched its leased line services in March and its ADSL and WiMax services in April. While Vodacom has not yet released prices for its new services

it has claimed that these will be highly competitive.

The company also intends moving into the corporate Internet arena and is currently laying 11 fibre optic cable networks in various metropolitan areas around the country. One of these networks is believed to be in Sandton where 22 companies have apparently already signed contracts for the new service.

According to CEO Allan Knott-Craig, the company's expansion comes in response to an increasingly saturated cellular phone market where cellphone SIM card penetration is already over 90 percent.



## Reference work on Life for life

The *Encyclopaedia of Life*, with catalogues and detailed references to more than 1,8-million known species on Earth, will take ten years to complete but the first 30 000 pages of information are freely available to Internet users around the world. It can be explored at [www.eol.org](http://www.eol.org) and has already been swamped by millions of people eager to see what's on offer.

The encyclopaedia provides free access to all current knowledge about plants, insects, fish, reptiles, birds and mammals that populate the Earth. It will eventually contain information on all living species documented over the past 250 years since scientific research into life on Earth began.

The *Encyclopaedia of Life* will constantly be updated so that any new discoveries will be included in the reference work – even if the species is, or becomes, extinct.

Project director, Jim Edwards says the encyclopaedia will be a useful tool for scientists, researchers and scholars as it is a readily accessible repository of valuable information collected over the past 250 years about all known species on the planet.

He says the huge reference website uses advanced search engines and online visualisation technologies to provide extensive information on these species and eventually it will be broadened to include reference material on microscopic life as well.

The *Encyclopaedia* is a collaborative effort by scientists, botanists, national history museums, botanical gardens and dedicated individuals working together to create a comprehensive biodiversity database on the web.



## Poster-size Resolution from Sony

Sony has developed a 24-megapixel prototype digital single lens reflex camera that it has dubbed the Flagship Alpha. It has Carl Zeiss Vario-Sonnar lenses and at least one of these is like to offer an f2.8 aperture. The Flagship is due to be released onto world markets by the end of 2008 and is expected to sell at a price that is well above the A700 series, which offers models starting at \$1 300. Sony will have various common accessories including battery grips



## Your steak – medium, rare or cloned?

Restaurateurs can now truthfully advertise that their steaks, lamb chops or pork schnitzels are consistently great to eat because the Food and Drug Administration in the United States has approved cloned meat for human consumption. Cloned animals are not yet available in butchers' shops but the first samples are expected to be sold within the next few months.

Advocates of cloning claim that researchers can limit the gene pool of these cloned animals and birds to 'the most desirable genes only' making the meat tenderer, enhancing its flavour and ensuring consistency. What they haven't taken into account, though, is the 'ick' factor that makes humans reluctant to eat cloned food.

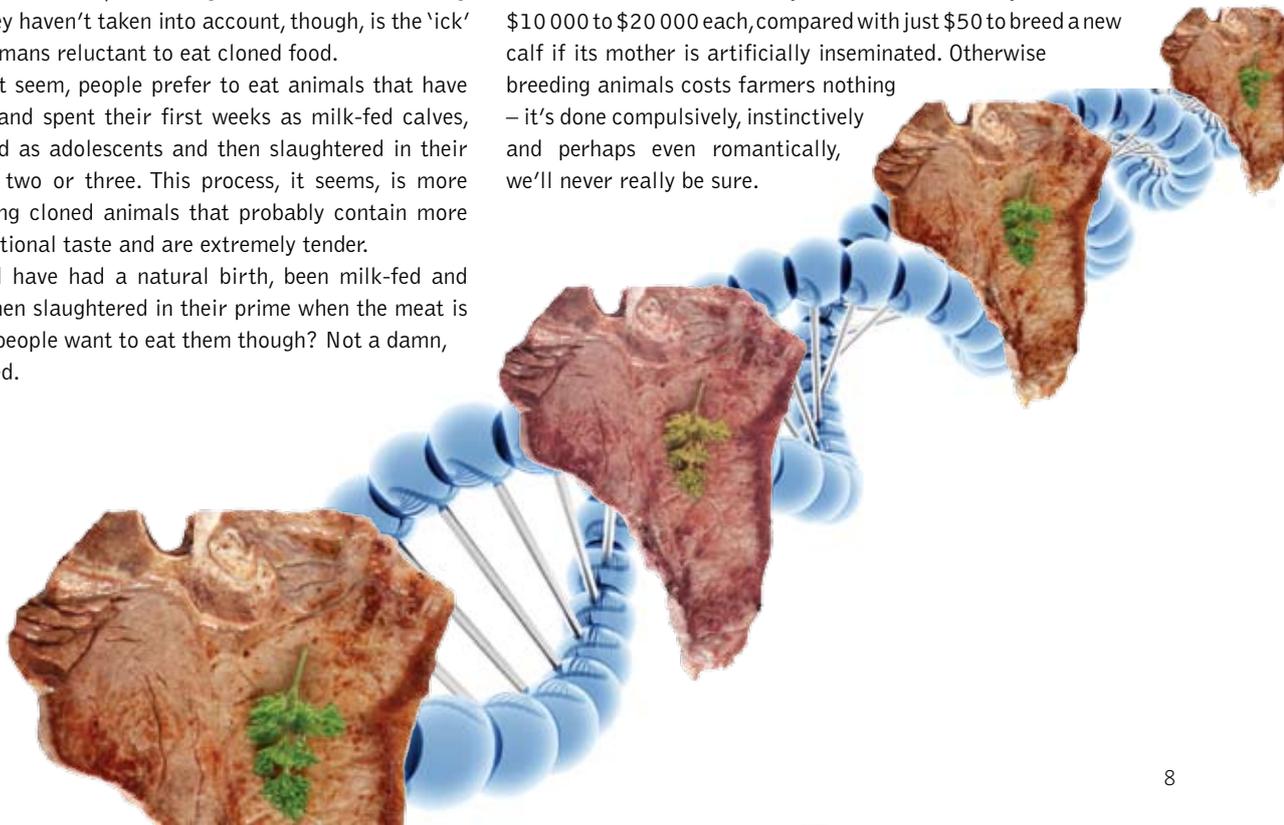
Bizarre as it might seem, people prefer to eat animals that have had a natural birth and spent their first weeks as milk-fed calves, before being neutered as adolescents and then slaughtered in their prime at the age of two or three. This process, it seems, is more acceptable than eating cloned animals that probably contain more nutrients, offer exceptional taste and are extremely tender.

These animals will have had a natural birth, been milk-fed and nurtured naturally, then slaughtered in their prime when the meat is tender and tasty. Do people want to eat them though? Not a damn, because they're cloned.

To complicate matters, people in the US will not even know they are eating cloned meat products because the FDA has said that no special labelling is required on these products.

There are currently about 4 000 cloned animals around the world and these creatures are apparently being used mainly for breeding purposes. In fact, farmers in the US, the European Union, Australia, China, Japan and New Zealand currently use cloned cattle and pigs for breeding.

Cloned animals are not easy to create and cost anywhere from \$10 000 to \$20 000 each, compared with just \$50 to breed a new calf if its mother is artificially inseminated. Otherwise breeding animals costs farmers nothing – it's done compulsively, instinctively and perhaps even romantically, we'll never really be sure.





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## New version of Internet Explorer on its way

Microsoft is working on its new Internet Explorer 8, which has been released on an 'invitation' basis to a limited number of testers. It is expected to have a public Beta release within the next few months.

The new IE8 is likely to support Microsoft's controversial 'version tag' system, which will allow developers to force the browsers into 'super-standards' mode that will correctly render web pages that adhere to the W3C standards.

The basic idea of version tagging is that developers add a meta tag to their pages instructing Internet Explorer how to render the page – whether in traditional mode, standards mode or super-standards mode. Firefox, Opera and Safari web browsers have been doing this for the past five years or so.

Unless IE8 has some killer features it might lose out to other web browsers, which have steadily been gaining ground on Internet

Explorer, which still dominates the web with a market share of more than 60 percent.

However, as analysts point out, the new IE8 will not be able to piggyback on an operating system upgrade and without some compelling new features, it's unlikely that users will upgrade from the stable IE7 platform.



## Pearl 8110 and 8120 in SA

Research in Motion's BlackBerry Pearl smartphones are available in South Africa and will have built-in Global Positioning System software (SatNav) and full Wi-Fi connectivity. Two phones, the Pearl 8110 and 8120, are now available.

The BlackBerry Pearl 8120 smartphone has a stylish, slim design and weighs just 90 grams. It offers quad-band GSM/GPRS/EDGE support for faster web browsing and expanded wireless data coverage via Wi-Fi networks.

BlackBerry Pearl 8110 provides rich multimedia features combined with the powerful communications capabilities with built-in GPS and navigation software allowing users to find an address and track their location on a map. Voice commands will help to guide the driver with step-by-step directions.

"BlackBerry Pearl smartphones are ideal for people who want business grade functionality in a small unit," claims Charmaine Eggberry vice president and managing director for RIM's Europe, Middle East and Africa office. Each of the new units has built-in e-mail, web browsing and text messaging, along with a host of other applications.

Both BlackBerry Pearl smartphones have a two megapixel camera with 5X digital zoom and enhanced flash. They also support video capture in two resolutions (240x180 or 176x144) for sharing via MMS. The Roxio media player allows users to create and edit playlists on the handset.

The phones use trackball navigation system and RIM's popular SureType keyboard, which allows for a narrower handset design while maintaining easy phone dialling and message typing.





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## Get into a suit for a good night's sleep

Researchers in the Netherlands have designed and built a sleep suit that is threaded with micro-pipes filled with warm water which, they claim, promotes deeper sleep and will solve the problem of insomnia for many thousands of people.

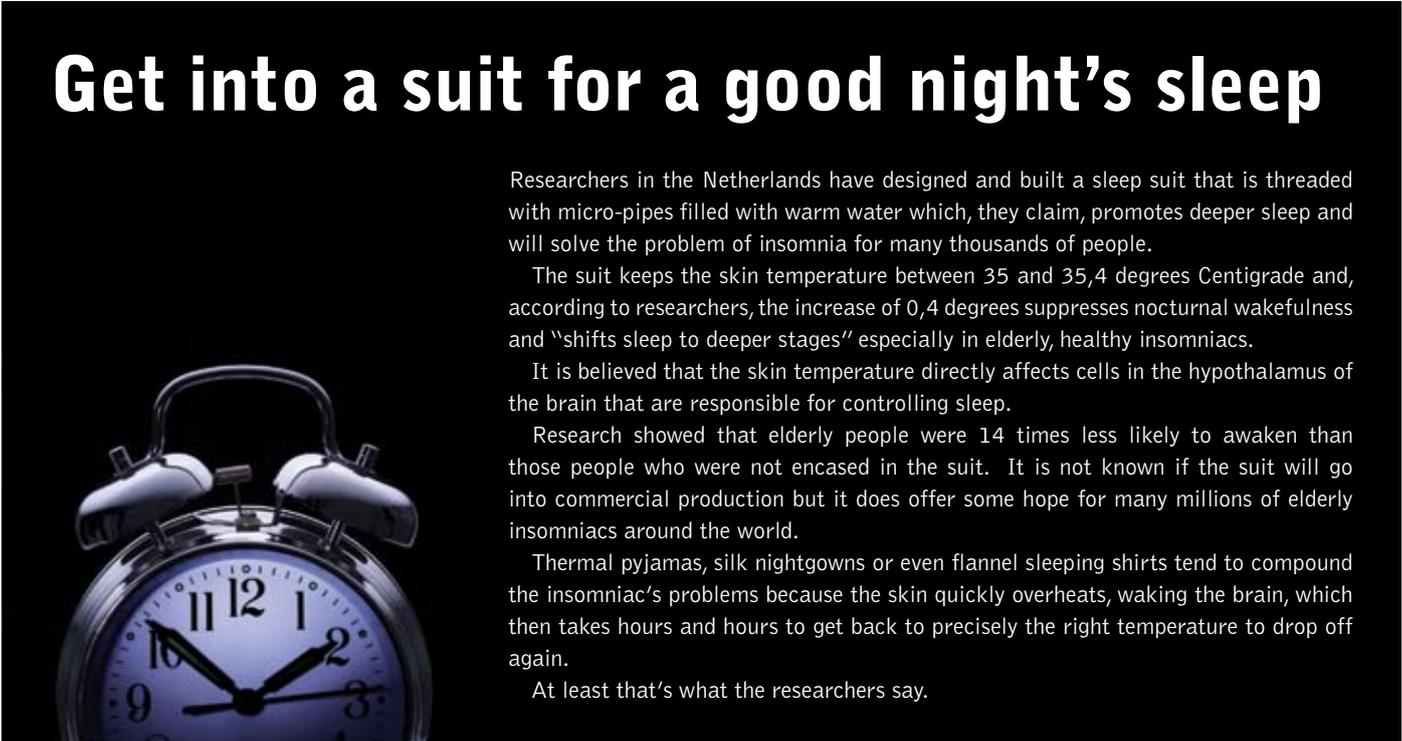
The suit keeps the skin temperature between 35 and 35,4 degrees Centigrade and, according to researchers, the increase of 0,4 degrees suppresses nocturnal wakefulness and "shifts sleep to deeper stages" especially in elderly, healthy insomniacs.

It is believed that the skin temperature directly affects cells in the hypothalamus of the brain that are responsible for controlling sleep.

Research showed that elderly people were 14 times less likely to awaken than those people who were not encased in the suit. It is not known if the suit will go into commercial production but it does offer some hope for many millions of elderly insomniacs around the world.

Thermal pyjamas, silk nightgowns or even flannel sleeping shirts tend to compound the insomniac's problems because the skin quickly overheats, waking the brain, which then takes hours and hours to get back to precisely the right temperature to drop off again.

At least that's what the researchers say.



## Mandriva's Linux 2008 available for download

The first Release Candidate of Mandriva's Linux 2008 is available for free download from the company's website at [www.mandriva.com](http://www.mandriva.com). The release includes new artwork, improvements to software management tools, WPA-EAP support in the network configuration tools and the latest pre-release of OpenOffice.org 2.4.

The beta software is available on DVD in Free and One editions.

According to a statement from the company, researchers are 'particularly interested' in testing the NTFS file support and making sure that RPMdrake has no problems.

Mandriva has been relatively successful in converting users from Windows operating systems to the free Linux system and was chosen as the Product of the Year 2007 at Russia's Softool exhibition held in Moscow.

It is also being used in a pilot project in Nigeria where Intel's Classmate PC is supplied to 17 000 pupils at schools in that country. The Classmate PC is a small, rugged, mobile computer specially designed for students in emerging countries. It competes headlong with the *One Laptop Per Child* initiative introduced by Nicholas Negroponte.

Mandriva has been working closely with Intel since the Classmate PC project was announced. It uses Mandriva's Flash technology, which has been tailored to Classmate PCs. Each computer has a low power Intel processor to extend battery life, 2 GB of internal flash storage and WiFi mobile technology. Each computer is also equipped with anti-theft applications and content filters.



# Water supplies threatened? Not so says Water Affairs



**R**eports that South Africa is facing a severe water crisis from extensive contamination of its rivers and a rapidly deteriorating infrastructure have been denied by the Department of Water Affairs and Forestry (DWAf) and by the Department's Minister, Lindiwe Hendricks.

According to a secret report compiled by the National Nuclear Regulator there is evidence that water supplies are carrying high levels of radioactive contamination and that certain crops that use contaminated water from rivers are also carrying higher than permitted levels of radiation.

Added to this is the allegation that the municipal water distribution infrastructure is gradually collapsing as metropolitan and local authorities battle to replace or repair the existing infrastructure.

All these allegations have been denied by DWAf, which is spending R1.25-billion on improving the dams and assisting 'smaller' local authorities to cope with damaged infrastructure. The money, allocated by the National Treasury in April 2006, will be spent over five years.

Here is a summary of what is known:

- 160 dams around South Africa currently do not meet the Department's safety standards.
- Vast amounts of money – estimated at R180-billion countrywide, but denied by the DWAf – need to be spent on rehabilitating existing infrastructure.
- Safety and rehabilitation programmes are underway at 42 dams. There is no clarity on what is being planned for the balance of 118 dams that are not safe or need to be rehabilitated.
- Water contamination incidents have been confirmed in Louis Trichardt, Delmas, Standerton, the Klip River, Tweelopiespruit, Wonderfonteinspruit and at Rietvlei outside Tshwane. At Delmas and Standerton hundreds of people have had to be treated and several deaths have occurred.
- Municipal infrastructure in major metropolitan areas and smaller local councils is battling to cope with water distribution to its residents, with sustained water cuts of up to a week in areas of Johannesburg to several months in smaller outlying areas such as Groblersdal.
- Last year alone, the DWAf supplied basic sanitation services to 940 000 people and connected 1.25 million people to the water grid around the country.
- A number of sewerage works and water recycling plants have contaminated municipal areas because electricity power cuts have prevented the plants from working, allowing raw effluent to flow into nearby rivers.
- Several waste water plants are no longer functioning properly – particularly those near the Vaal River – where residents have set up Resident's Committees to try and force the authorities to stop discharging untreated effluent into the Klip and Vaal rivers.
- High levels of Endocrine Disrupting Compounds (EDCs) were found in the Rietvlei Dam, which was used by the Water Research Commission as a study site to establish what contamination exists in dams around South Africa. EDCs are man-made chemicals found in pesticides, fertilizers, personal care products, heavy metals, industrial chemicals and pharmaceuticals. These chemicals have an adverse effect on the endocrine system of living organisms, including humans. EDCs typically enter water through runoff or wastewater discharges. The report found that there were hormones, industrial compounds and pesticides in South Africa's water systems.
- Chinese Development Aid grants have supplied more than 3 066 kilometres of piping and 166 500 water meters to local authorities around the country. The water meters have been installed in new homes around the country.



In a statement released by Hendricks, she claims that South Africa's drinking water quality is rated among the best in the world. However, the DWAF's annual report for 2006/07 indicates that 50 percent of dams are seriously impacted by waste discharged from treatment works.

It says that challenges facing irrigated agriculture include high sodium absorption ratios, electrical conductivity, pH and chloride. This is compounded by eutrophication or excessive plant growth, including algae in dams (particularly the Hartebeespoort Dam outside Tshwane) around the country.

In the same annual report the DWAF concedes that in order to meet its targets of supplying basic water services to the more than four million people who do not have access to a water supply, there will need to be a 400 percent improvement in service delivery by local governments. It says this is a result of insufficient funding and a lack of implementation capacity.

The DWAF annual report also admits that the "sustainability of existing infrastructure is becoming a threat to progress made in providing water to communities" and says that it "will take the lead" in developing a strategy to ensure sustainable water services delivery.

So far 37.4-million people have access to free water but the DWAF says that the lack of basic infrastructure is limiting the provision of water to needy communities.

While the DWAF and its Minister deny that there are "problems" with South Africa's water, it is clear that contaminated water from mining operations has flowed into the river systems and that vegetables and fish specimens collected in the Wonderfontein spruit Catchment Area west of Johannesburg contained radioactive uranium. The tests, by the National Nuclear Regulator, have been extended to cattle and milk.

At least 30 percent of the country's water treatment works need "immediate intervention" to prevent further outbreaks of waterborne diseases that include dysentery and typhoid. In a major sewage spill in Durban, some rivers were found to contain bacteria hundreds of times higher than the recommended limit. There was a similar sewage spill in Louis Trichardt late last year.

Researcher Jeff Rudin of the South African Municipal Workers' Union says the breakdown of effective monitoring and treatment services in municipalities around the country is a "national disaster" just waiting to happen. He says that it's only a matter of time before water contamination reaches catastrophic proportions.

These allegations, too, are denied by the DWAF although its deputy director general Cornelius Ruiters admits that the department is battling to retain its skilled staff and support under-resourced municipalities, which cannot maintain a consistent, clean water supply to all citizens in specific areas.

In terms of water quality, Water Service Authorities around the country reported acceptable drinking water quality of 60 percent nationally, up from 50 percent the previous year with Gauteng having the best figures of 75 percent compared with just 36 percent in Northern Cape and 37 percent in Mpumalanga.

South Africa is classified as a 'water scarce' region with rainfall that is less than the world average. Just over 1 200 kilolitres of fresh water is available for each person each year and with the growth in population, this allocation is dropping fast. South Africa has less water per person than the drier neighbouring countries of Namibia and Botswana.

Much of what the DWAF and the larger local authorities appear to have achieved seems, at least on the surface, to be aimed at providing sustainable water supplies to all South Africans.

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Potential problems lie in the fact that:

- Millions of new water connections have been installed but little has been done to increase the capacity of the municipal water supplies.
- Water borne sewage programmes have been implemented but the new treatment works have not been commissioned and treatment facilities may not be able to handle the increased flow of raw effluent.
- The water infrastructure and the supply of bulk raw water will only be significantly increased once new dams have been built or construction projects to increase dam capacities have been completed.

Cape Town is believed to be on the point of running out of water unless a new dam is built and comes on stream rapidly. There have been numerous studies done to provide Cape Town and certain other coastal areas with desalination plants so that sea water can be used to augment fresh water supplies, but these projects are extremely costly.

Large parts of South Africa, such as the Karoo and the Northern Cape have abundant ground water resources but most of this water is brackish and is not fit for animal or human consumption. Purification of this water resource is also extremely costly.

South Africa shares its water resources with several other countries: Namibia and Botswana in the west, Swaziland and Mocambique in

## Managing water demand

South Africa will be able to reduce its average *per capita* domestic water consumption from 200 litres per day to just 150 litres per day if it introduces a water demand management system. This is according to Professor FAO Otieno, executive dean of the Faculty of Engineering and the Built Environment at Tshwane University of Technology and president of the Water Institute of Southern Africa.

He says that effective water management has three facets:

- Water losses from leakages in the water supply system must be kept low. With this in mind, old pipes and connections must be replaced and methods of detecting leaks in the water supply system must be put in place.
- Consumers need to become 'water efficient' by practicing good water saving habits and making use of water-saving devices such as thimbles in taps and water-saving bags in cisterns.
- The value of water must be emphasised and reinforced through appropriate pricing levels.

He says that by harnessing technology it is possible for South Africa to find other sustainable sources of water. For instance, advances in separation technologies through membrane filtration have made it possible to treat water that previously was impossible to treat using convention treatment technologies.

He claims that with membranes, brackish, saline and even used

water can be used to produce water that matches or surpasses international drinking water standards.

He called on South Africa to implement an integrated water resource management system to maximise economic benefits and social welfare in an equitable manner, without compromising the sustainability of vital environmental systems. He says that strong government leadership and better water governance is needed to improve water supplies.

Otieno believes that the application of integrated water resource management in river basins remains a challenge in South Africa and will only be achieved by building trust and creating and using inclusive planning processes. He says improving governance is urgent in the delivery of water services and the management of water as a resource. Furthermore, Otieno says there is a need to promote packaged investments that include support for reforms and capacity development along with financing of infrastructure, operation and maintenance.

According to Otieno, managing South Africa's water resources requires a concerted effort from the government, industries, communities and individuals as this will be critical to sustaining economic growth and improving the quality of life for millions of South Africans.



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the east and Lesotho in the central part of the country. A significant amount of water comes into South Africa from Lesotho and it mainly flows into the Orange River Basin towards the Atlantic Ocean. The water in this system must be shared with Botswana and Namibia.

As a result, South Africa cannot just 'help itself' to the water supplies that flow through the country and has to ensure through a complicated structure of water agreements that the water it receives does not harm its neighbours, and has to pay for the water that is used – particularly from Lesotho.

Moreover, the economic growth, the increase in mining activities – particularly in Mpumalanga and Limpopo – greater industrial growth and the social pressures for water mean that the country is facing a range of enormous demands that, without proper management, cannot be fulfilled.

The worrying factor, though, is that much of the water that is available in South Africa at this stage is being wasted through leaks in the distribution grid at a municipal level, poor water controls leading to higher levels of contaminated water and an ever-present shortage of proper maintenance of the existing infrastructure.

While the DWAF and certain municipal authorities may reassure

the public that water supplies are sufficient to meet the needs of the country now, the real concern is how much the picture will change if South Africa enters a period of severe drought.

While some planning has been done and some money is being spent on new dams around the country, it seems that much more will need to be done to preserve a constant water supply for all citizens.

And given recent experiences with government inaction with regard to adequate electricity supplies there could be strong reasons for concern. That old adage of 'where there's smoke, there's fire' might well apply to the recent reports that R180-billion is needed for a sustainable water resource for all South Africans.

Water shortages are probably even more catastrophic and possibly more life-threatening than electricity cuts. **Wn**



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## Call for private sector participation fell on deaf ears,

In 1997 South Africa needed to spend between R50-billion and R80-billion to meet the backlogs in water supply services in urban areas around the country. In rural areas R10-billion to R15-billion was needed to get water supplies to a basic level of service. An additional R2-billion was needed for sanitation services.

The figures were compiled by Barry Jackson, principal political analyst at the Development Bank of South Africa, and were published in a paper entitled *Private Sector Participation in Municipal Water Supply and Sanitation Services*.

At the time, the government made it clear that public-private partnerships were required as South Africa could no longer rely solely on the fiscus or central government to provide all infrastructure in the country.

According to Jackson, many municipalities around the country were reluctant to embrace these private-public partnerships believing that water supply and sanitation service should remain 'natural monopolies', which should be controlled and managed by public sector agencies.

With this in mind the Department of Water Affairs and Forestry issued its own interim guidelines, which laid down some basic principles including the need for transparency, competition, consultation and full coverage.

To further complicate matters, the municipal workers' unions did not support the concept of these partnerships, believing that jobs would be lost if water services and sanitation were privatised. They openly voiced their opposition saying that the private sector "only wants to make a profit" and will not participate in the upliftment of people.

Jackson urged the government to create what he called an enabling environment to improve infrastructure by:

- Creating a regulatory and enhancement environment to encourage private sector investment.
- Introducing rational long term planning especially when it comes to the choice of levels of service.
- Making local government utilities more attractive to private sector investors primarily by improving performance and 'borrower attractiveness'.

As things currently stand many of these guidelines appear to have been ignored entirely and the Department of Water Affairs has now stated that it will step in to ensure that the water infrastructure, particularly in smaller municipalities, is properly maintained and operated.

In March the *Save the Vaal Environment* representative Bernard Fourie said the organisation will seek a court order compelling Water Affairs to repair the pumping stations and treatment plant that consistently releases faecal matter into the Vaal River. Apparently the entire treatment plant must be overhauled or replaced.

## SA's main water resource – the Orange River system

South Africa does not have enough water for its people or its activities. Apart from a few rather wet areas around the country, South Africa does not receive enough annual rainfall for dryland farming. Yet water usage in this country has grown rapidly over the past 25 years and there is some concern that water resources are not being used sustainably.

Country	Minimum Annual Rainfall	Maximum Annual Rainfall	Mean Annual Rainfall
Botswana	165	520	285
Namibia	35	415	185
Lesotho	575	1040	755
South Africa	35	1040	325

The Orange River is one of the largest rivers in southern Africa. It rises in the Drakensberg and travels for more than 2 300 kilometres to the Atlantic Ocean in the western part of the country. It has a catchment area of about 900 000 square kilometres, which serves South Africa and its neighbours, Namibia and Botswana. More than 95 percent of the water in the Orange River Basin originates in Lesotho.

There are 29 dams and reservoirs that control the flow of water in the Orange and it has an extensive infrastructure for inter-basin transfer of water. Major withdrawals of water from the system along with high evaporation have reduced its annual flow by about 50 percent. The dams are used for irrigation purposes and to produce some hydroelectric power.

Very little of the water in the Orange River system is used for industrial and domestic purposes. In fact about 50 percent of South Africa's annual water consumption goes into crop farming.

The populations of Lesotho, Botswana and Namibia are relatively small, ranging between 1,8 and 1,9 million people, whereas South Africa has close to 48-million residents who all need and consume water.



10

Check time.

9

Thank speaker.

8

Summarise points.

7

Bring about decisions.

6

Allocate tasks.

5

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Hi Paddy,

May your editorials for the rest of the year be as good as the one for January!

I am in complete agreement with your sentiments regarding nuclear generation. However, I can possibly add another string to your bow!

I design overhead powerlines for 132 kV and below. During my employment (I am now semi-retired), one of the key issues that kept on cropping up was the dreaded Environmental Impact Assessment (the EIA). The EIA, amongst other matters, takes into account where a new power line is to be built and to what extent it will affect the environment. The environment, as such, includes plants, animals and terrain plus Interested and Affected Parties. Even the appearance of the power line structures has to be approved! Woe betides the designer who does not adhere to the Record of Decision (otherwise known as the ROD; which is quite appropriate!). Nowadays, compared to say, ten years ago, the EIA and ROD are far stricter.

However, the problem arises when a new power line has to be built through a protected area (e.g. indigenous forest or such) to supply

electricity to an isolated town or industry (e.g. a mine). It may not be possible to get approved power line servitude or a suitable servitude may just not be possible, or, on the balance of costs, the line may be long and VERY expensive as a result. (A 132 kV double-circuit line could cost in the region of R3 million per kilometre; depending on conductor and structure choice.) A PMBR may be a viable alternative source of electricity, installed right at the point of use.

[A typical PMBR produces in the order of 165 MW and costs about R5-billion (your figure). I thought I saw a cost of R3-billion in a recent Eskom-related document. A single-circuit 132 kV Kingbird line has about the same supply capacity as the PMBR and costs about R2-million per km. So, all things being equal (which they aren't), the PMBR cost is equivalent to 2 500km of power line; which is a l-o-o-n-g way, if the line can be built!]

Regards

Robin Scott PrEng, FSAIEE

34deg 04' 17.15"S 18deg 52' 25.55"E



Dear Paddy,

Thanks to you, Antonio and your team for a great magazine - WattNow is the one magazine I always find time to read!

In your January 2008 edition, you have an article titled 'No electric bicycles in Beijing'. It is stated that the lead batteries each give off 3 kilograms of lead fumes, which cannot be correct.

Lead-acid batteries do not emit lead fumes during normal use and due to their recyclability, are actually quite environmentally friendly. In fact, a European Parliament workgroup, functioning under FP6, that was reviewing alternatives for Electric Vehicle batteries, found that although Lithium batteries were a clear winner, lead-acid batteries were acceptable and need not be phased out of their current applications.

Kind regards

Gerhard Swart

Optimal Energy (Pty) Ltd

Dear Editor,

I enjoy WattNow more than ever. I find the layout appealing, especially restricting adverts to one or two page ads. The result is an uncluttered editorial. The short stories are current and to the point. I suspect you had some fun with T-Bone, Saffron and PacMan. Stylish!

Congratulations on a great new look!

Kind Regards,

Jan Laubscher Pr Eng

Dear Paddy,

Greetings from Mozambique.

Watt now is used in our technical training centre's library. The learners and training officers are very impressed with the articles, especially Brain Busters. Keep up the good work.

Regards,

Hendrik van Niekerk

## Aspire to Inspire

We received the following responses to an editorial concerning the defence spending on new equipment needed in South Africa:

It is time to finally get a politically correct editor for WattNow. We engineers need to summarily reject the unpatriotic notion that the real purpose of the arms deal was to allow government and its cohorts to pocket millions of illegal commissions (often referred to as bribes) and that the 'technology transfer and manufacturing expertise' given in return by the suppliers were only a hypocritical ruse to cover up this corruption of incredible proportions.

It is high time that our editor takes up the challenge to justify the arms deal against reactionary and racist elements.

**Prof. Ian Shaw**  
Retired Senior Member

P.S. Sorry, I suddenly feel nauseated.

## And in response to the same article:

Dear Mr P. Hartedegen

On behalf of the South African Air Force I want to thank you for the excellent article you wrote and published on the *Air Capability Demonstration* that was held on 13 September 2007 at Roodewal bombing range.

Your remarks under Editor's Comment highlighted the positive side of the story, in contrast to that of the critics. This is what we need to hear to build a nation. One cannot be creative and innovative if bogged down with negativity.

Once again, thank you very much for the positive reporting, and the South African Air Force is looking forward to engaging with you in future corporate events.

Best regards

**Colonel J.W. Janse van Rensburg**  
Personal Staff Officer for Chief of the South African Air Force



Dear Sir

With reference to your editorial comment 'Powerless when cuts come', Wattnow February 2008, I was bitterly disappointed and ashamed, as an SAIEE member, of your recommendation to your readers to procure generator capacity, convert to gas and simply 'roll over and play dead' until 'Eskom can turn the lights back on'. How can such statements be made in a magazine representing the South African Institute of Electrical Engineers! The institute that South African's from all walks of life are looking to for solutions in this time of crisis in which the country finds itself.

Many engineers from various disciplines are engaging their minds and rolling up their sleeves to solve the situation in innovative and sustainable ways. Yes, it will not be an overnight solution and power cuts will be a reality for the near future but comments such as yours do not represent the engineering fraternity and in my opinion are not representative of the SAIEE.

The power crisis in South Africa has highlighted the incredible value added by the engineering fraternity, furthermore it has made South Africans intensely aware that electrical energy is finite and that it has to be used efficiently. In addition to the above, Eskom's troubles have opened the doors to the adoption of renewable energy sources as a viable alternative to electrical power generated through the burning of fossil fuels. This bodes well for the future of our planet.

As South Africans we have the capability to pull our country out of this mess and prove to the world that Africa can solve its own problems, because we are African does not mean that we have to be like the rest of Africa.

As a member of the SAIEE, I would expect your editorial comments to be reviewed by the institute's President prior to anything of this nature being published in future. I look forward to your response to my concerns.

Yours sincerely  
**Ian Curry**

## Editor responds:

A couple of points:

The opinions expressed in all editorials are mine. They do not reflect the opinions of the SAIEE and they are not sanctioned, censored or approved by the SAIEE, its office-bearers, its staff or any other committee or delegation.

Editorial independence is, I believe, essential if the magazine is to maintain the high levels of credibility it is achieving among consumers and members of SAIEE. *WATTnow* is not a pamphlet or a propaganda publication aimed purely at promoting electrical solutions.

I will be interested to hear your comments with regard to the subsequent issue, which covers South Africa's power problems and possible solutions more extensively.



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# Ruffini wins Siemens Profile Award



**W**ATTnow's contributing editor, Antonio Ruffini, was awarded the Siemens Profile Award for Research and Development. This is the third time that Antonio has been honoured at the Siemens Profile Awards. The awards are held annually and aimed at promoting accurate reporting on science and technology subjects in Africa.

Ruffini's story on Super Computing published in WATTnow last year while he was still editor of the publication was judged as the best entry in the Research and Development category.

A record number of entries for these awards were received from South Africa, Egypt, Algeria, Ghana, Benin, Kenya, Tanzania, Nigeria and Rwanda.

WATTnow's sister publications – all part of Crown Publications – *Chemical Technology* and *Electricity+Control* were also rewarded with contributors Barry Bredenkamp of *Electricity +Control* winning the award in the Energy category and Rod Prior receiving a merit award in the Safety and Security category for *Chemical Technology*.

Crown's publisher Jenny Warwick said that she was delighted with the awards that the three group publications had won and emphasised that the awards are a true reflection of the editorial excellence of the publications produced by the company.

"We foster an environment of editorial excellence at Crown and ensure that our journalists are highly skilled and highly experienced people with the creative flair that allows them to convert complicated issues and concepts into simple English that can be understood by the lay-person," Warwick said.

In his keynote address, Science and Technology Minister, Mosibudi Mangena, said that he was gravely concerned about the scarcity of science reporting on the many interesting subject-related stories.

"While we are agonising to find ways of making mathematics and science interesting and fun to learners, we are equally concerned that the South African public is being adequately lobbied and informed about the value of science and technology in society," he said.



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# Solar power could yield 2 GW electricity

Concentrated solar power (CSP) is probably South Africa's biggest source of renewable energy, particularly as sites in the Northern Cape and the North West province can provide several gigaWatts of power according to Eskom's Dr Louis van Heerden.

Addressing delegates at the South African Institute of Electrical Engineers' Power Generation conference held in Midrand in February, he said that CSP was the only large-scale renewable energy technology with proven energy storage.

Eskom has been examining the feasibility of introducing CSP into its electricity grid and has investigated 14 different technologies used in other parts of the world. The organisation has also completed a pre-feasibility study with a detailed techno-economic analysis to determine which technology would be best suited to Eskom and to South African conditions.

CSP technology uses a central receiver which concentrates the sun's energy through a number of large mirrors or heliostats and this concentrated thermal energy produces steam to drive a conventional steam turbine to generate electricity.

The feasibility studies done so far indicate that Upington is ideal for such a receiver as the town regularly records the highest aggregate of sunny days a year worldwide. Eskom started examining the concentrated solar power in 2001 and, after seven years, is completing its feasibility study and the environmental impact assessment.

In terms of the pre-feasibility study undertaken by Eskom it was found that a pilot plant using concentrated solar power could produce the world's lowest cost solar energy. Tower technology offers a lower cost generation although the unit cost of concentrated solar power will still be higher than coal fired power.

Although Eskom has not given any indication of the cost of building a CSR plant at Upington, figures compiled in 2002 estimated that R2,2-billion would need to be spent before one kilowatt of energy was generated. The pilot plant will have a generating capacity of just 100 kilowatts and it is likely that construction could begin later this year.

Van Heerden says that before the plant can be built, a positive record of decision has to be received from the environmental impact assessment, several technical issues must be resolved and, most importantly, a viable business case must be put forward and accepted by Eskom and its stakeholders.

The plant itself will have about 8 000 heliostats, which will represent about 40 percent of the plant's overall costs. Each heliostat is 127 square metres and will be custom designed for conditions at Upington. A prototype of the heliostat is being tested at Eskom's research facilities.

The heliostats each have their own drives and are made from low-iron glass. The heliostats concentrate 540 MW of solar energy into a central receiver tower. A heat transfer medium of molten salt is pumped through the receiver, absorbing the highly concentrated radiation reflected by the

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heliostats. This heated fluid is then circulated through a heat exchanger where the thermal energy generates steam to power a conventional steam turbine. Temperatures in the system reach about 600 degrees Centigrade. The used fluid is stored in the cold salt storage tank before going into the central receiver again in a continual cycle.

The salt comprises 60 percent sodium nitrate and 40 percent potassium nitrate and about 45 000 tons will be used at the plant, which will have a water requirement of about 300 000 cubic metres. The plant's capacity is 100 MW (e) generating over 24 hours in the summer solstice and has an average expected load factor of about 70 percent.

The central tower is built from concrete and rises to a height of 190 metres. At the top it will be 17 metres in diameter where the cylindrical central receiver will be fitted. It will have 24 panels, each just less than two metres wide with tubes made from high nickel alloy.

The steam turbine will have a generating capacity of 100 MW using a live steam pressure of 125 bar at a temperature of 550 degrees Centigrade and a reheat steam pressure of 30 bar.

In terms of maintenance van Heerden is confident that it will have scheduled maintenance outages for just two weeks of the year although forced outages have been assumed at a further two weeks a year.

Turbine maintenance will only be needed after about eight years of operation and will take between three and five weeks to complete. However, the heliostats will need to be washed regularly and two operating regimes have been proposed using six trucks in a single shift or three trucks in two shifts working on a continual basis.

Van Heerden says that at other plants around the world the heliostats only had two or three gearbox failures in any given year indicating that sun-tracking devices were exceptionally reliable and would not need much maintenance at all.

The coating used on the heliostats is applied with a spray gun and then baked using the collector field and would have to be replaced every five years during a scheduled maintenance outage.

The pumps used in the salt tanks do need to have the bearings replaced every three years.

Van Heerden says that based on statistics from other CSP plants around the world, the start-up time at the new plant will be just 45 minutes and this process includes pre-heating the receiver with heliostats, flood filling the receiver with molten salt and then ramping to full power by concentrating all the heliostats on the central receiver.

During the pre-heating stage the steam generating system vessels and turbine piping are warmed up at specified thermal ramp rates and at the end of the pre-heating stage, steam can be sent directly to the turbine.

While the pilot plant – if it gets the go ahead – will generate just 100 MW of electricity, van Heerden says that the potential in the Upington and Northern Cape region is sufficient to build plants that generate 200 MW each and the sun concentration is such that CSP has the potential to generate gigawatts of renewable energy each year. **Wn**



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## BRAIN BUSTERS

Here are some more brain busters to exercise your grey cells. To gain the maximum effect you should attempt to answer them before looking at the answers, which will be available on our website, [www.crown.co.za/wattnow](http://www.crown.co.za/wattnow)

### Question 1

Only a small fraction of the electrical energy fed into a common, household light bulb is transformed into light. What happens to the rest?

### Question 2

Devices implanted in the brain are being used to treat various diseases. Could they also be used to improve our minds?

### Question 3

Safeguarding sensitive information on the Internet depends upon math that even the world's fastest computers can't handle. Is that method secure?

### Question 4

As you type in your credit card number to purchase that holiday gift, do you know what's stopping computer hackers from swiping it as it travels through cyberspace?



### Question 5

If you determine the work done by a battery, with emf  $E$ , in charging a capacitor, with capacitance  $C$ , to a full charge, you'll find it is equal to  $CE^2$ . However, if you look at a textbook, you'll find that the energy stored in the capacitor is only  $(1/2)CE^2$ . What's going on ... what's happened to the other  $(1/2)CE^2$ ? Is this a violation of the law of conservation of energy?

## Hamster-in-rain emergency prompts 999 call

South Wales police force has published a list of top time-wasting 999 calls during the past year in an attempt to convince people not to pick up the phone unless it's really necessary.



According to icWales, the highlight of 2007 came when one woman demanded officers come and cuff her boyfriend because he'd put her hamster out in the rain. Another caller explained:

"My husband has the TV remote and won't let me watch EastEnders."

The list continues with the anxious citizen who admitted: "I don't have £1 for a supermarket trolley", and one flustered bookworm who offered: "A friend has my library card, can you come and arrest her?"

Our favourite, though, is the chap who enquired: "Can the police come round and take my mother-in-law away? She has been here for 18 days."

The South Wales cops said one in ten emergency calls they receive is either "inappropriate or a deliberate misuse of the 999 system", and they now plan to use psychology to stem the tide.

Traditionally, the 999 operators have greeted callers with a cheery "South Wales Police, how can I help?" They will in future declare "South Wales Police, what is your emergency?", which will apparently prompt the person on the other end of the line to ponder whether or not their situation really is a matter of life or death.

This subtle but significant change in wording has reportedly proved successful in New York and San Diego. Calling 999 with an unnecessary non-emergency call could block a genuine call for vital seconds and put lives at risk.

Source: [theregister.co.uk](http://theregister.co.uk). Story by Lester Haines

## New light glows for 12 years



According to a recent posting on Neatorama website (<http://www.neatorama.com/>) Litroenergy is a new type of material that emits light for 12 years without needing electricity or sun exposure. The self-luminous micro-particles are called Litrospheres and are said to

be non-toxic, inexpensive and equivalent to a 20 watt incandescent bulb.

The Litrospheres give off a continuous illumination, and can be designed to glow in any colour. In addition, they are not affected by heat or cold, and are 2 268 kg crush-resistant. They can be injection-moulded or added to paint. The fill rate of Litroenergy microparticles in plastic injection moulding material or paint is about 20%.

The constant light gives off no UV rays, and can be designed to emit almost any colour of light desired. What a cool product!!



# Moving pictures? Quo vadis?

by Glynnis Koch

Watching the broadcast of the 2008 Oscars the other night (to a worldwide audience of over a billion viewers), made me think of the tremendous strides the motion picture industry has taken since the first 'movie' was shown. And how we take for granted the technical wizardry that enables us to see, not only the glamorous event itself, but also all the inserts on past films and stars of yesteryear and even the announcement of the winner in one category by servicemen and women in Iraq – live and in real-time!

A far cry from the early days of movie-making when the first filmstrips, made in Thomas Edison's Black Maria Kinetograph Theatre on the grounds of Edison's laboratories at West Orange, New Jersey, were given their first public demonstration in early May of 1893 at the Brooklyn Institute of Arts and Sciences. The inventor was one of Edison's assistants, William Dickson, an English engineer with a passion for film-making, who deposited the first motion pictures made in the Black Maria for copyright at the Library of Congress in August of the same year. The very first 'film' was called 'The Edison Kinetoscope Record of a Sneeze' (or 'Fred Ott's sneeze', after the fellow assistant whose sneeze was captured on film). Dickson was able to persuade major show business figures to travel to New Jersey to star in Edison's films.

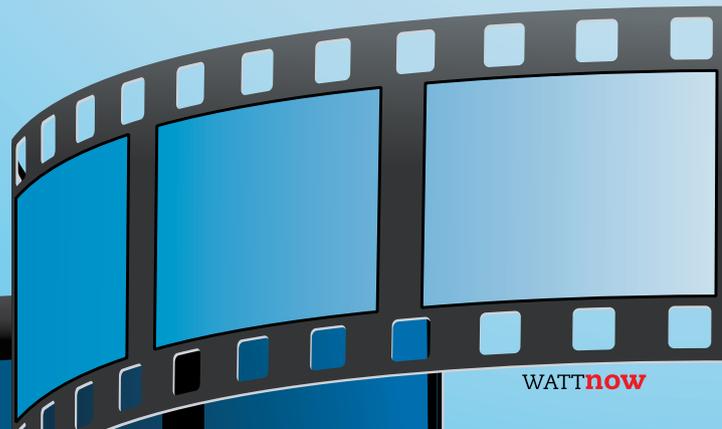
## The Kinetoscope

The Kinetograph was the camera used to create film, which was shown using a Kinetoscope, a wooden device incorporating the camera and a peep-hole (with magnifying lenses in the top), through which the viewer would look to see the moving images. Developments in

celluloid film enabled a strip of film about 50 feet long, to be exposed in a horizontal-feed mechanism inside the cabinet. The film ran between two spools, at a continuous speed, while a rapidly moving shutter gave intermittent exposures when the apparatus was used as a camera and intermittent glimpses of the positive print when it was used as a viewer. The spectator looked through the same aperture that housed the camera lens and the rapid series of apparently still frames appeared, thanks to the phenomenon of persistence of vision, as a moving image.

## Commercial operation

On April 14, 1894, the Kinetoscope began commercial operation at the Kinetoscope Parlor at 1155 Broadway in New York, where patrons paid 25 cents to view films in five Kinetoscope machines placed in rows! These peep-show arcades later became known as nickelodeons. 'Films' ranged from staged cock fights and boxing matches and scantily clad women, to those with titles such as 'Barber Shop' and 'Trapeze'. Other cities soon followed suit, opening their own Kinetoscope parlours. Spectators were apparently amazed by even the most mundane moving images in the very short (30-60 seconds) films; approaching trains or parades, dancing women and twisting



contortionists, sometimes hand-coloured on the film. Most of the 'movies' were actuality-types, but by 1900 'acted' or 'fictional' films made up about 40 percent of Edison's company's total output.

Popular comedies and trick films were supplied to Edison by other film-makers. In 1896, May Irwin and John C Rice re-enacted the final scene from a Broadway play musical called 'The Widow Jones' in a film called 'The Kiss' which was merely a close-up of a prolonged kiss!

## Further developments

As time passed, Dickson worked on developing a projection apparatus for motion pictures, although Edison had already stated categorically that he was not interested in projecting moving pictures in favour of the peep-hole method. Not long after, Dickson resigned from Edison's company and formed, with other inventors and investors, The American Mutoscope Company, which opened on Broadway, New York in December 1895. The company, soon a major competitor to the Edison Company, went on to develop the Mutoscope, based on the kinoscope, later adding a projector called the Biograph that allowed films to be shown in theatres to a large audience, rather than in single-user nickelodeons.

Although Edison was slow to develop a projection system (his single-user Kinetoscopes were very profitable), he later purchased the rights to another new device called the Phantoscope, developed by C Francis Jenkins and Thomas Arnat. Thus The Edison Manufacturing Company began manufacturing the machine and producing films for it, although it was advertised as a new Edison invention – the Vitascope. The first theatrical exhibition of the Vitascope took place in April 1896 at Koster and Bial's Music Hall in New York.

In Berlin, Germany, brothers Max and Emil Skladowsky, designed a Bioskop camera which recorded and projected two simultaneous images, each at eight frames-per-second, thus creating the illusion of 16 frames-per-second projection. In France, the Lumiere brothers, Louis and Auguste, used (in 1895) their Cinematographe camera/projector through which moving images could be viewed on a large cinema screen. 'Le Jardinier: L'Arroseu Arrose', a short comedy, was technically the first fictional narrative film ever.

## Beginning of the future

Although the early films had little or no cinematic technique, no editing and usually no camera movement, and compositions were flat and stagey, there is no doubt that the novelty of realistically moving photographs was the catalyst for the motion picture industry to

mushroom before the end of the 19th century, in countries around the world.

Cinema's exponential technological advancement was demonstrated in 1900 by Raoul Gromoin-Sanson when he unveiled his Cineorama system which featured an enormous panoramic screen. French stage magician, Georges Melies, sought to fully exploit the camera's potential for illusion. He used editing and trick photography to create films in which objects and people appeared, disappeared, multiplied, exploded, grew and shrank! His film screenings were accompanied by narration provided by bonimenteurs, while his masterpiece was a science-fiction tale about a group of curious Victorians exploring the lunar surface. Called *Le Voyage dans la Lune*, it was based on a story by Jules Verne. In addition, the film was more than ten times longer than any previous film.

## Quo vadis?

Who would have thought, watching the films of today with all their elaborate techniques and styles, that only a hundred years, or so, ago there was no such thing as a 'movie'? Questions that surface now are: "What will digital film-making do to narrative?" and "Now that we have non-linear ways to edit films, will we also develop a way to make non-linear films to watch?" and "Will we develop a taste for them?"

Director Mike Figgis ('Leaving Las Vegas') is of the opinion that people are still interested in linear storytelling. He commented in a recent interview: "I think the use of digital technology creates a freshness and brings in a new generation who may discover the same kind of passion for linear storytelling, [but] with new clothes." He went on to say that the history of cinema was marked by moments when innovators arrived at a new approach to linear storytelling that was quickly absorbed into the mainstream.

"We owe it to ourselves as creative people," he continued, "to rethink that mode so it has a freshness. Personally, I'm only interested in stories about people and how they relate to each other." **WN**



## With Wii's: some you win, some you lose

**N**intendo's Wii gaming console is being touted as a possible replacement for traditional gym exercises after students at Dalhousie University in Halifax, Nova Scotia put it to the test.

According to Justin White, a fourth-year kinesiology student, he used 27 students in the Applications in Exercise Physiology class to test the impact of playing Wii boxing for 30 minutes and compare it with a 30 minute walk in a local park. Each student did each activity and during the exercises their heart rates were measured.

White said that although the Wii showed promise as an exercise game, it did not provide students with a cardiovascular workout. He said that while it might help people to get a bit more exercise than simply sitting on the couch, it would not improve overall fitness.

Conversely, researcher Kanav Kohel of the Banner Good Samaritan Medical Centre team has shown that playing a computer game on the Nintendo Wii can significantly improve a surgeon's performance in the operating theatre.

He found that games requiring really delicate movement, such as Marble Mania, were particularly effective.

Eight trainee surgeons were tasked with spending an hour playing a game on the console before performing virtual reality surgery on a computer simulator. Game players scored almost 50 percent higher on tool control and overall operating skills than those surgeons who had not played the game.

The success of the experiment has led the team of researchers to set about designing software for the Wii that will accurately simulate surgical procedures.

## Taking a Tank to design school

**A** local web creation program known as *Tank* has been developed by Alan Alston and Le Roux Bodenstein of Cape Town and is available as a free download from the *Tank* site.

It's simple and easy to use once the registration process, which takes several minutes, comes to an end. There are a variety of templates – for business or personal websites – available to assist in creating a site, which takes about five minutes.

From there, users can add skins, images, video clips and text, using their browser to upload content. No coding is necessary on simple sites but users can elect to inject their own CSS code if they want to.

Alston says that he and Bodenstein have been building websites for more than ten years and have taken their experience and melded it into an application that makes website creation simple and easy.

*Tank* is hosted on a centralised local server and provides automatic updates to its software. Users can create their websites for nothing, and are allocated 10 MB of storage space and 100 MB of bandwidth.

Users can upgrade to a basic package of 100 MB of storage and 1 GB of bandwidth for R85 a month or a premium option, which is double the cost and double the storage and bandwidth.

All domain names must be registered.



# Yahoo! we're not merging – at least not yet

Considering that they have decided to spurn Microsoft's offer of more than \$44-billion for the company, Yahoo!'s shareholders must be pretty certain that they haven't misjudged the market for messaging, mobile communications, advertising and social networking.

Yahoo!'s chief executive, Jerry Yang, told company employees that the board had decided that Microsoft's offer was "not in the best interests of the company or the shareholders". Yahoo! says that Microsoft has not properly assessed the company as it has 500-million users worldwide and significant investments in its online advertising platform.

Some analysts believe that Microsoft's offer was too low, claiming that a realistic figure was more like \$46-billion (what's \$2-billion among friends anyway) and that shareholders are now expecting Microsoft to come up with a revised offer.

The original offer by Microsoft of \$31 per share was a 62 percent premium on Yahoo!'s closing stock price the day before the offer was made. Negotiations between the two companies are continuing even though many of Yahoo!'s own institutional investors are trying to stop Microsoft from paying too much for the company.

Many analysts believe that if Microsoft increases its offer the companies would certainly merge and pose a significant competitor for Google.

In a separate development, Yahoo! recently laid off about 1 000 of its staff at offices throughout the US. According to an engineer responsible for laying-off a number of staff in his office, the cuts were "performance based" rather than closing down of specific operations.

The company currently employs 14 300 people.



# iPhone run over by a truck

A man in Kansas inadvertently left his brand new iPhone on the boot of his car after stopping at a petrol station. As he pulled onto the highway he realized his phone was missing and remembered where he'd left it. He drove for about 25 kilometres to the next exit, turned back onto the other side of the highway and sped back to the garage.

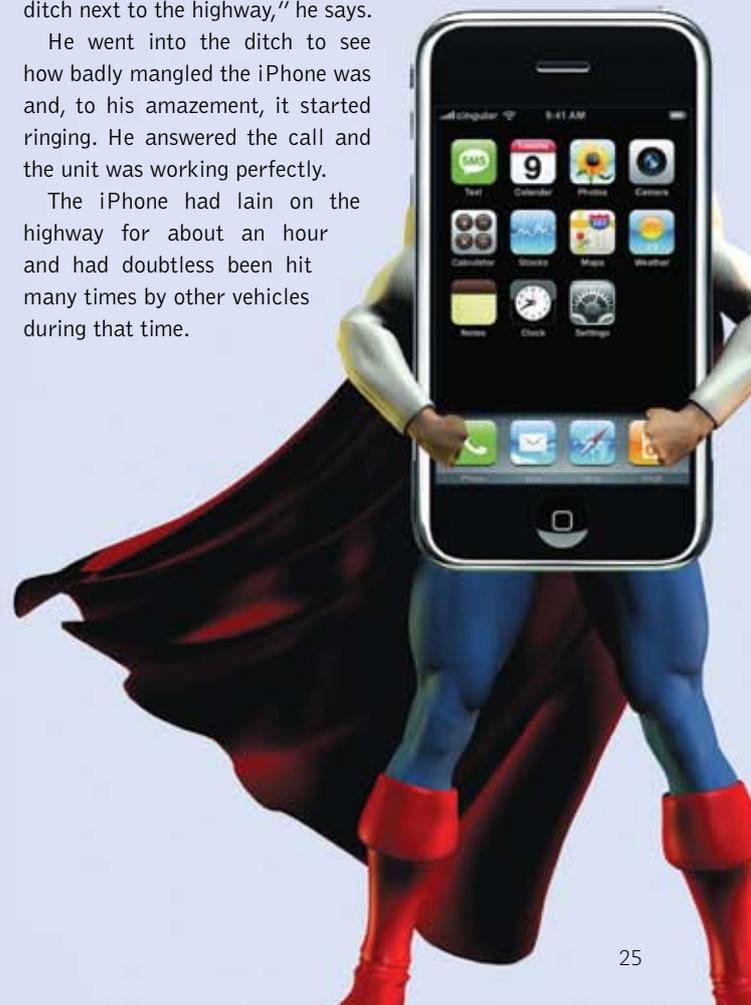
Unsurprisingly, the phone was not there and man dejectedly drove away. He stopped at the on-ramp just in case his phone was there but no such luck. As he merged with traffic on the highway he saw something glinting in the right hand lane.

He says that as he sped past the shining object he felt certain it was his phone. He slammed on brakes and pulled over before foolishly running across two lanes of highway with vehicles travelling at more than 140 kilometres an hour.

"I saw a pair of headlights beaming down on me and watched helplessly as an 18-wheeled truck pulled into the outside lane and drove right over the iPhone at full speed. The phone bounced around before being flung into a ditch next to the highway," he says.

He went into the ditch to see how badly mangled the iPhone was and, to his amazement, it started ringing. He answered the call and the unit was working perfectly.

The iPhone had lain on the highway for about an hour and had doubtless been hit many times by other vehicles during that time.



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## Moving mouse gives game away

**A**vigilant and alert employee at Sweden's Swedbank foiled an attempt by seven thieves to steal millions of Swedish Krona from one of the bank's own accounts. A remotely controlled device designed to manipulate the bank's computer system was placed in one of the offices and then used to provide remote access to accounts on the system.

According to Christer Nordstrom a superintendent in the Uppsala police, the unit was hidden in the bank during a break-in in August last year. The equipment was extremely advanced and hidden under an unused desk. The alert employee who thwarted the theft saw the mouse pointer move on its own and found the box, which was immediately unplugged.

Police began intensive investigations and after five months were able to arrest the seven men. At the time of their arrest they were apparently building similar units for at least two more attacks.

The police have refused to reveal details of exactly how the units work but did confirm the components were readily available through the average computer store.

Experts believe that a wireless system is used to intercept the signal from the computer to the keyboard and mouse, and attackers can sit within a few hundred metres of the bank and be in direct contact with the box thus circumventing the security systems that might be in place.

## Netscape, Rest in Peace

**T**he world's first web browser, *Netscape Navigator*, has been laid to rest 13 years after it helped spark the dotcom Internet frenzy. AOL, which owns Netscape, says that it will no longer provide support for Netscape or release new versions of the software which is, at least for the time being, still downloadable from the Netscape site.

Netscape is seen by many web enthusiasts as the 'evangelist' that the Internet needed in its early days. It effectively turned everyday computers into portals and made the World Wide Web readily accessible and easily understood.

Within the first nine months of its launch, Netscape had sales of \$20-million and a market value of \$2-billion. In 1995 Microsoft effectively bought Netscape's dominance to a halt when it released Internet Explorer that was bundled with every copy of Windows and was extremely difficult to remove in early releases.

In just four years Internet Explorer rose from nothing to a market share of 60 percent.

In 1998 Netscape released its source code and created the Mozilla project before being bought by AOL in 1999. Blake Ross, one of the developers of Netscape recognised that it had got "some things right and some things wrong" and Mozilla created the leaner, faster, and more adaptable Firefox.

While *Internet Explorer* still dominates the browser world, *Firefox* is gaining acceptability, particularly as it is extremely fast and provides a host of extensions and add-ons that allow users to customise it as they see fit.



## Want to Google your health records?

Google has launched a test site for 1 500 detailed medical records of individual patients on a special database that is password protected and enables individuals to access their medical records from anywhere in the world. The company hopes to increase the test site to 10 000 patients in the next few months.

Google's move has prompted an outcry from the medical profession in the United States who claim that it is only doctors and hospitals that should be entitled to hold those records.

Privacy watchdogs claim that already Google "knows too much" about the interests and habits of its users as each user's search requests are logged and Google stores their e-mail discussions as well. Last year Google introduced a system that purges-in individuals' search requests after 18 months. Moreover, Google won a court battle against the Department of Justice two years ago when it demanded access to millions of users' search requests.

In terms of the new service, each health profile will include all relevant information about prescriptions and allergies, the patient's full medical history, all diagnoses and treatments as well as any operations, procedures or chronic conditions. Google says that its venture into storing individual medical histories of patients is a logical extension to its business as its search engines already process millions of request from people trying to find more information on a specific condition or medication.

The Cleveland Clinic has joined forces with Google and, once the test phase is over, will make available the medical histories of 120 000 of its patients so that patients will have access to an efficient and effective national healthcare system. Each medical record will be encrypted and password protected.

Last year Microsoft introduced a similar service called HealthVault, and AOL has joined forces with Revolution Health, which offers online tools for managing personal health records.

## Attackers attack gaming computers

The ever-sensitive, over-protective American government set up a test of its computer security systems, using its own *Cyber Storm* war game to test how the country's computers would hold up against a major hacking attack.

What they failed to realise is that gamers generally are an ingenious bunch and instead of attacking the government's computers, they attacked the gaming machines, which meant that the mock attack supposedly to test the security of the computers was a complete waste of time.

The \$3-million invitation-only war game simulated what American officials believed would be a plausible attack against government computers that control transportation lines, energy utilities and the information technology industry. The attacks were to last five days.

Among the various disasters that *Cyber Storm* was to simulate included shutting down Washington's Metro and disabling the seaport computers in New York harbour, as mock rumours spread by fictitious bloggers announced where hazardous materials were stored.

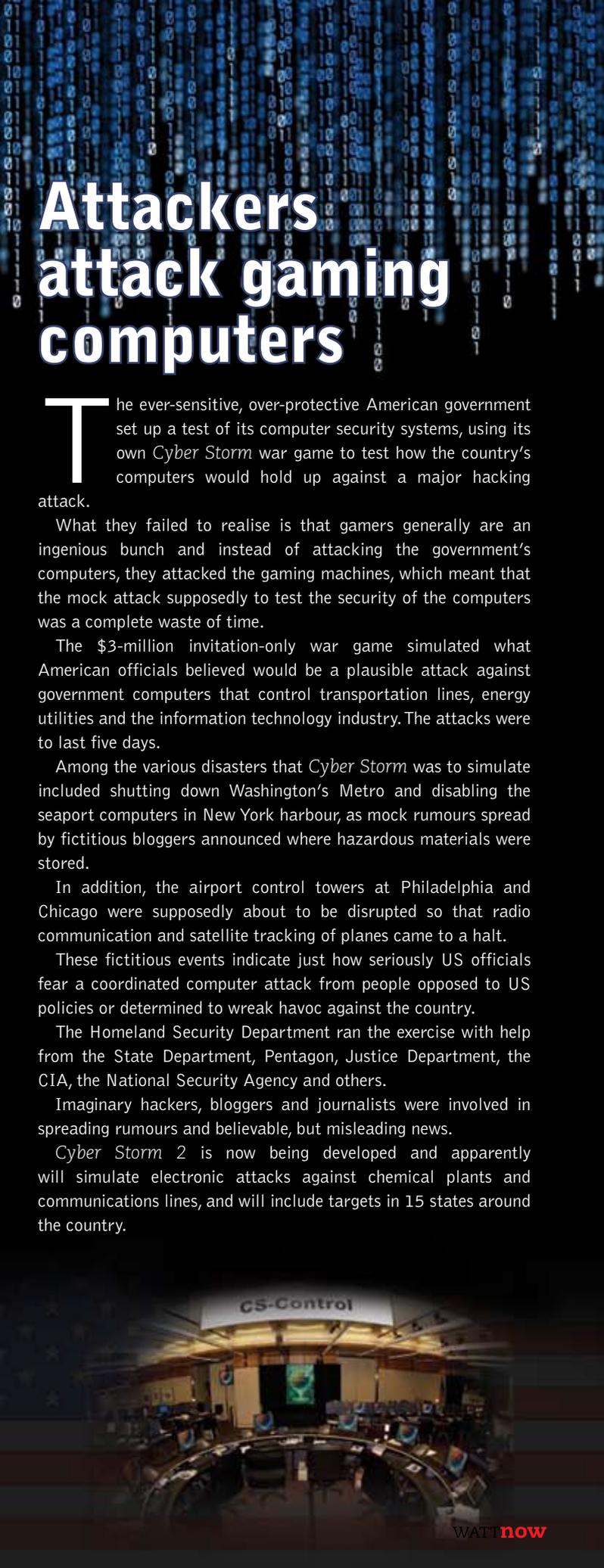
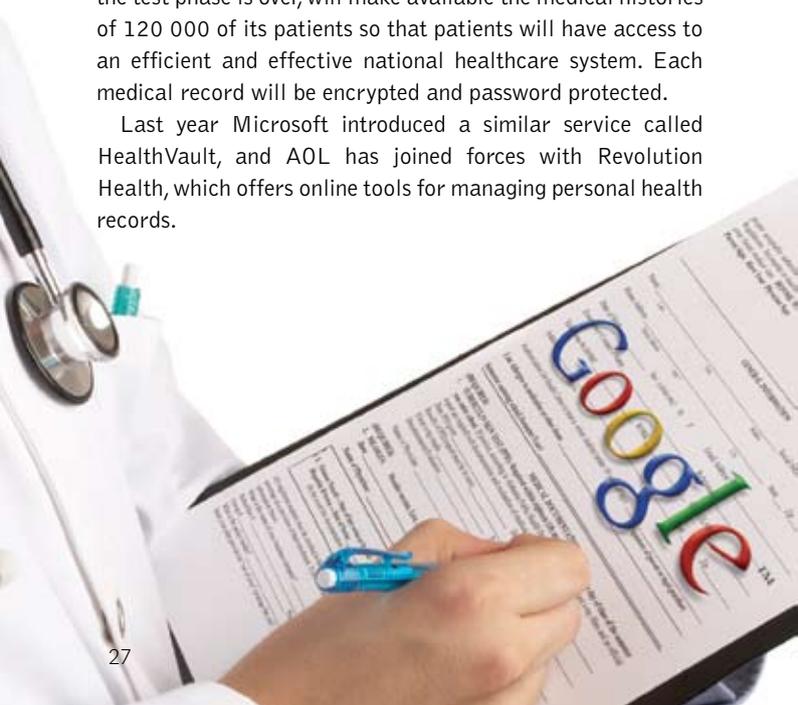
In addition, the airport control towers at Philadelphia and Chicago were supposedly about to be disrupted so that radio communication and satellite tracking of planes came to a halt.

These fictitious events indicate just how seriously US officials fear a coordinated computer attack from people opposed to US policies or determined to wreak havoc against the country.

The Homeland Security Department ran the exercise with help from the State Department, Pentagon, Justice Department, the CIA, the National Security Agency and others.

Imaginary hackers, bloggers and journalists were involved in spreading rumours and believable, but misleading news.

*Cyber Storm 2* is now being developed and apparently will simulate electronic attacks against chemical plants and communications lines, and will include targets in 15 states around the country.



# Microsoft warning on Vista service pack

Microsoft has warned Vista users that a number of third-party products might no longer work properly after Service Pack One – the first major update for Vista, due to be released at the end of March – has been installed. The programs that will be affected include:

- BitDefender AV
- Fujitsu Shock Sensor
- Jiangmin KV Antivirus 10 and the 2008 versions
- Trend Micro Internet Security
- Zone Alarm Security Suite
- Iron Speed Designer
- Xheo Licensing
- Free Allegiance
- NYT Reader
- Rising Personal Firewall
- Novell ZCM Agent

Microsoft says that this list is not comprehensive and users who have other programs that do not function correctly once SP1 has been installed should contact the manufacturers of the software to fix the problems. Some programs will be 'blocked' by the update, some will simply not run and others will lose some functionality.



## Seed Bank in Svalbard – deposits welcome

A Global Seed Vault has been established on the Norwegian island of Spitsbergen near the town of Longyearbyen in the remote arctic Svalbard archipelago. The island is about 1 120 km from the North Pole and its population of 1 900 is less than that of the 3 000 bears that inhabit the same space. The vault, which consists of three enormous caverns blasted 130 metres into the permafrost, will be a permanent seed bank housing more than 2-million species of edible plants. With the capacity to store up to 4.5 million seed samples, the vault will eventually house seeds of all important food plants in the world.

The ultra-high-security, ultra-low-temperature bank will protect the seeds for about 20 000 years, even if global warming progresses rapidly and threatens other parts of the world. The Norwegian government established the vault after extensive consultation and negotiation with American farmer, Cary Fowler, who is the chairman of the Global Diversity Trust.

Fowler claims that the bank is "a library of life" housing a diversity of plants and a heritage of thousands of years of agriculture. He says that it is the "ultimate insurance" against calamitous catastrophe that could, at some point in the future, face the Earth.

Fowler says that in the past 100 years 75 percent of the world's plant diversity has disappeared and the establishment of the seed bank is aimed at ensuring that species are protected and preserved as a back-up should any earth-shattering event occur. He says that if, for some reason, plant species in a particular region are threatened the seeds from the vault will be "withdrawn" and used to re-establish that species in its natural habitat.

There have been cases in the past where countries have established their own seed banks only to see them destroyed. The Taliban demolished Afghanistan's seed bank in 2002 and in 2003 looters raided Iraq's seed bank and made off with the specimens that were kept there.





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Charles F. Kettering (American engineer, inventor of the electric starter, 1876-1958)

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# FaceBook for professionals – it's LinkedIn

While FaceBook and MySpace have toted up record numbers of new members and reached popularity levels that are virtually unsurpassed, a new social networking site has been set up for older, professional people. The new site, LinkedIn, has a more functional, serious approach.

The site works in much the same way as FaceBook: Members can build up a list of links – work colleagues, professional acquaintances, associates or members of the same professional bodies – and through these lists contact secondary acquaintances.

It also offers a number of useful business tools and networking opportunities. Job opportunities can be posted, along with CVs, and members can look through business opportunities or gain useful information about potential future employees or companies offering a variety of services.

The profile of the average LinkedIn user is that they are in their 40s and earn upwards of R750 000 a year. LinkedIn hopes to attract some serious, 'heavyweight' advertising on the site, which is now expanding to Europe from the United States. The company is expected to generate profits this year of between R500-million and R750-million from advertising and this figure should grow once LinkedIn moves into the European market.



# Computers diagnose the human brain

According to research conducted by the University College of London, computers can diagnose cases of Alzheimer's disease more rapidly and more accurately than medical specialists.

Sadly, a definitive diagnosis is usually only possible after the patient has died. Alzheimer's disease is caused by a build up of amyloid plaques and tangled bundles of fibres known as neurofibrillary tangles that cause the brain to waste away.

Physicians use a combination of brain scans, blood tests and patient interviews to diagnose the disease, which is difficult to distinguish from dementia. Currently the accuracy of the diagnosis by doctors is just 85 percent while, according to the research, computers identify brain damage caused by Alzheimer's with an accuracy of 96 percent.

Professor Richard Frackowiak points out that the computer diagnosis is not only more accurate, but is also cheaper and faster. The system works by 'teaching' a computer the differences between brain scans from patients who do not have the disease and those who do. Magnetic Resonance Imaging (MRI) scans are used to distinguish the conditions.

Frackowiak claims that the computers are able to make an objective diagnosis without human intervention.

Symptoms of Alzheimer's only emerge after a considerable amount of brain damage has occurred and in order to effectively prevent further deterioration of the brain it is important for doctors to make the diagnosis early.



## London for breakfast, Sydney for lunch

**B**ritish engineers have developed a new hypersonic jet which they claim can carry about 300 passengers at a top speed of 6 400 kilometres an hour, or five times the speed of sound. They say that this would allow passengers to leave Brussels on schedule and touch down in Sydney four hours and 40 minutes later.

The hypersonic A2 jet has been designed by Reaction Engines in Oxfordshire as part of the Long-term Advanced Propulsion Concepts and Technologies (LAPCAT) project, which is backed by the European Space Agency. If commissioned, the plane could be operating within the next 25 years.

According to Alan Bond, head of Reaction Engines, the plane is designed to take off in Europe, fly quietly into the north Atlantic, at

sub-sonic speeds of mach 0,9, until it reaches the Arctic when it would accelerate to Mach 5 and blast across the North Pole, crossing the Pacific to Australia.

The plane is designed to run on liquid hydrogen, which gives off water and nitrous oxide rather than carbon gases. It is 143 metres long (about twice the length of the world's biggest operating planes) and will have a range of about 20 000 kilometres.

There are no windows on the plane as heat produced at high speeds could damage them, so the designers plan to install flat-screen television sets where windows would normally be so that passengers can be fooled into thinking they are looking out.

Fares are estimated at about £3 500 – the current price of a first class ticket.



## 'Suicide' mission for Jules Verne

**T**he European Space Agency's Automated Transfer Vehicle (ATV), named after fantasy writer Jules Verne, has been lofted into space and will attach itself to the International Space Station (ISS) in April. The 20-ton vehicle is the largest and most sophisticated spacecraft built by the ESA so far.

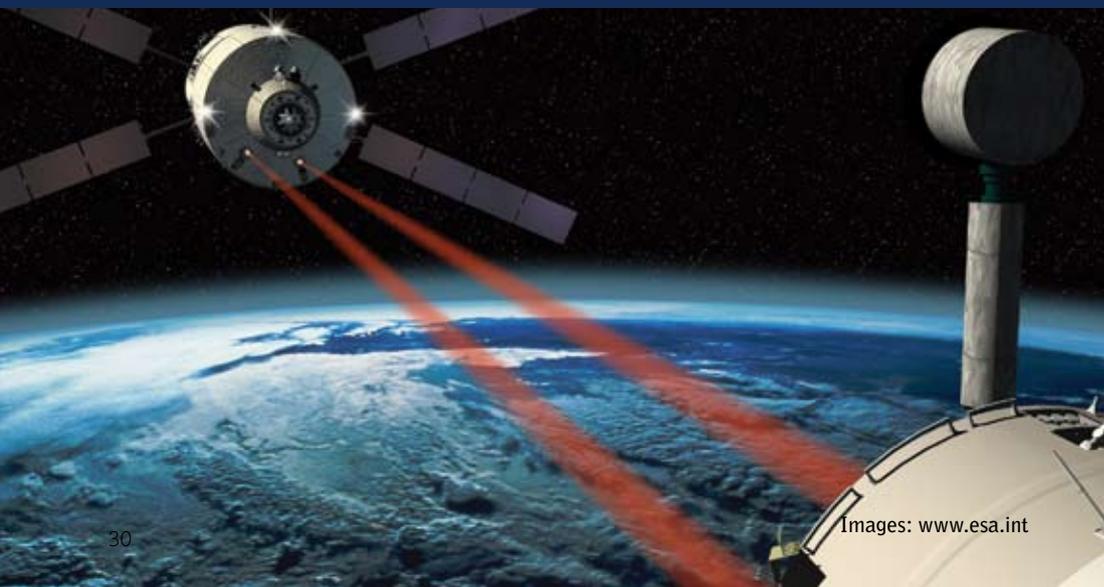
The Ariane 5 launcher will be used to propel Jules Verne out of the Earth's atmosphere.

The ATV is capable of carrying a payload of 7,5 tons to the ISS. This

is more than three times the carrying capacity of Russia's Progress craft. Jules Verne will lug scientific equipment, food and clothing to the ISS or will carry large tanks of air, water or fuel supplies.

The ESA is planning to build at least three more of these craft. The Jules Verne ATV cost the agency about 1,3-billion Euros. The ATV will stay docked onto the space station until August this year when it will be commanded to undock and ditch itself somewhere in the Pacific.

The second ATV is expected to make its flight in 2010.



## Rubber, heal thy self...

**A** team of French researchers has invented a material that can repair itself, even if it has been sliced into two pieces. The material, which has not yet been named, is a form of artificial rubber made from a combination of vegetable oil and a component in urine.

The material apparently produces surfaces that retain a strong chemical attraction to each other causing the material to join together without the use of glues or any other bonding agents.

The French research team says that this remarkable property was created by carefully engineering the molecules in the materials. Dr Ludwik Leibler, head of the research team says the secret of the substance lies in the way the molecules are held together.

A piece of rubber actually comprises a single molecule with billions of smaller units that are chemically welded to form a tangle network. The elasticity of rubber comes from the strands in the network which buckle like a concertina or straighten and elongate.

However, if the rubber is broken the covalent bonds – or chemical welds – are also broken. The new material uses hydrogen bonds, which are weaker but act like hands that clasp together rather than let go when broken.

He says that this means the new material could be recycled or remoulded many times and, if separated by a cut or a break, the chemical 'hands' at the edge of each surface would be waving about, ready to bind again.

In proving the principle, Dr Leibler cut a strand of the yellow materials and separated the edges for a while. Then he pressed them together and almost immediately the material could be gripped at only one end. Within an hour the bonds had rebuilt and allowed the material to be stretched to more than twice its normal length.

Liebler says that this material will be extremely useful for making seals that, if punctured, would automatically repair themselves. French company Arkema, which paid for the research, is investigating the commercial prospects for the material.

## Cygnus to augment Jules Verne service

**W**hile the European Space Agency is working on its Jules Verne Automated Transfer Vehicle cargo, the United States space agency is investing \$170-million in Orbital Sciences Corporation to help it develop a commercial re-supply craft for the International Space Station.

Dubbed the Cygnus spacecraft, it will be used to ferry food, water, air, fuel and equipment to the orbiting platform. The unmanned demonstration flight is due to take place in 2010.

The National Aeronautics and Space Administration (NASA) says that it needs logistics support for the space station and plans to hand the routine low-Earth operation to companies in the private sector, so that it can concentrate on sending humans back to the Moon.

Cygnus will launch on a Taurus II rocket and will have a payload of about two tons.

Artist's rendering of the Cygnus spacecraft. Image: Orbital Sciences Corporation: Creative Commons Attribution 3.0

# Huge 'Lost City' on top of Atlantis



Scientists have discovered a lost city – some 800 metres below the surface of the Atlantic – which they say contains chemical traces that indicate it may have been the cradle of life on Earth. The findings seem to support Charles Darwin's assertion that life on Earth emerged from a 'warm little pond'.

The 'Lost City' has creamy white and grey spires, pinnacles and chimneys that are about 18 storeys high and it is these chimneys that teem with microscopic marine life.

Underwater hot springs, heated by the slow cooling of the underlying rocks, create a hydrothermal vent field, similar to those predicted to have occurred in the early years of life on Earth. Scientists report that hydrocarbons containing molecules critical for the formation of life are routinely being generated by the chemical interaction of seawater with the rocks and chimneys.

According to research scientist Dr Giora Proskurowski, this site is able to produce the "building blocks of life" and this makes them "strong contenders for the places where life first originated". There are many similar sites found in oceans around the world.

Hydrocarbons, a combination of hydrogen and carbon atoms are key elements for cellular life. For instance, amino acids are short hydrocarbon chains hooked up with nitrogen, oxygen and sulphur atoms.

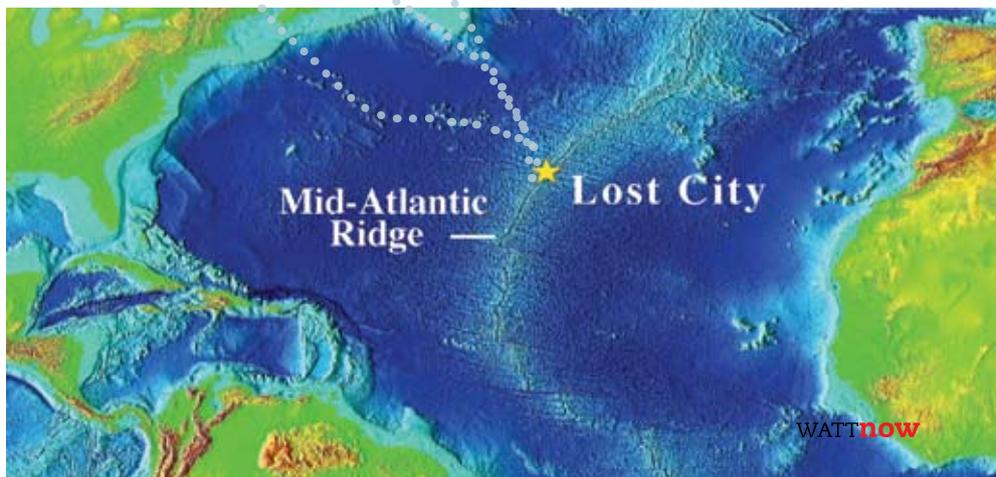
Dr Proskurowski says that Earth would have remained lifeless were it not for the emergence of hydrocarbons. No living origin for hydrocarbons has been established and in the case of the Lost City, the detection of building blocks from non-biological sources may contribute to science's understanding of how life originated on this planet.

The Lost City hydrothermal vent is suited about 4 000 kilometres east of Florida on the Mid-Atlantic Ridge. Micro-organisms found there thrive in the alkaline vent fluids, which are almost as caustic as drain cleaners. The microbes feed on methane and hydrogen instead of carbon dioxide.

Structures at the Lost City are almost pure carbonate and the same material as limestone in caves. The towers range in size from tiny toadstools to the 18-storey column named *Poseidon*.

The hydrothermal vent is different from the black-smoker vents found in oceans around the world and microbes feed on carbon dioxide bubbling through these vents. Black-smoker vents are about 100 times smaller than the tallest vents at Lost City.

The Lost City, formed on top of a submerged mountain named Atlantis, and was discovered accidentally by researchers working on a research vessel, coincidentally named Atlantis as well.



A ledge or flange made of carbonate juts out from the side of a 160-foot chimney in the Lost City hydrothermal vent field. The chimney and flange are made of carbonate minerals and silica dissolved in 160°F fluids that flow out of the seafloor and then precipitate when the fluids hit the icy cold seawater.



 GALACTIC

IMAGE DESIGN &amp; GALACTIC BIRL BY SKY26

# SpaceShipTwo on White Knight too

Virgin's Galactic has released pictures and an animation of its final design for a launch system that will take passengers into space. SpaceShipTwo is slung underneath its carrier White Knight Two, which carries the spacecraft into the sky before it separates and allows it to blast into space.

Virgin Galactic contracted an innovative aerospace designer, Burt Rutan, to build both craft. White Knight Two is virtually complete and is expected to be flight tested later this year. SpaceShipTwo is about 60 percent complete. Both craft are being built at Rutan's Scaled Composites factory in California.

Virgin's boss, Richard Branson, says that SpaceShipTwo is designed to carry two pilot astronauts and six paying passengers. The voyage will carry passengers to an altitude of 110 kilometres where the curvature of the Earth and the darkness of space are clearly visible.

Passengers will experience weightlessness for a few minutes before descending back into the Earth's atmosphere. The entire trip is expected to last for about two-and-a-half hours.

Seats for the sub-orbital trip are priced initially at \$200 000, considerably less than a seat on the Russian Soyuz launcher which

costs \$20-million. Virgin Galactic says that already more than 200 individuals have booked for the flight and a further 85 000 have registered an interest in making the flight. The company has taken tens of millions of dollars in deposits from people wealthy enough to indulge in any fantasy.



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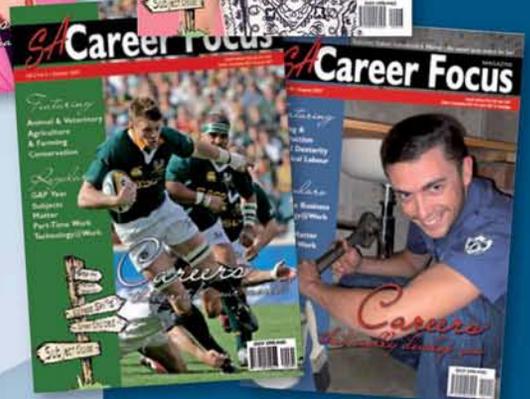
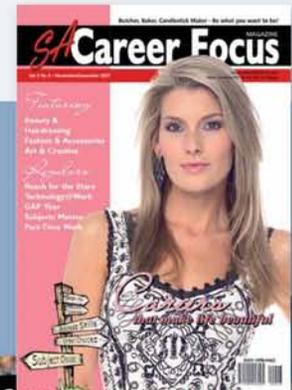
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**Just a little sneak preview of what we are up to in the next couple of months...**

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# Dutch ‘courage’ for new wind farms

**F**ramework agreements for the supply of up to 1 900 MW of power generated by wind turbines in the Netherlands have been signed between REpower Systems and RWE Innogy. The agreement involves 250 offshore wind turbines and a further 200 turbines on land. It will take between four and six years for REpower to deliver the two, 5 and 6 MW wind turbines to RWE.

In addition, RWE Innogy and RWE Energy Nederland have submitted proposals to the Dutch authorities to build at least two major offshore wind farms which will have a combined capacity of 2 GW.

The first wind farm called Tromp will be erected 64 kilometres off the coast of Ijmuiden in a water depth of 26 metres and will have a capacity of 1 150 MW. It will not be visible from the shore. A site for the second project, which will have a capacity of 900 MW, has not been decided. According to RWE’s chief executive, Kevin McCullough, the company will spend about E1-billion a year on renewable energy projects.

# Battery powered houses on the cards

**J**apanese company Sharp has joined forces with Daiwa House Industry and Dai Nippon Printing Company to develop large lithium-ion batteries that will store enough energy to run an average sized house. Solar energy will be used to charge these batteries.

Sharp is the world’s largest producer of solar cells and this deal will give it the opportunity to expand its solar power business. Dai Nippon Printing Company provides the electrode materials used in lithium-ion batteries and Daiwa House is a major Japanese home-builder that will install the solar power batteries in the new homes it builds.

The three companies will each invest about ¥660-million in battery development company Eliiy Powe, which plans to build a new factory to produce the batteries.

Lithium-ion batteries store up to 40 times the power of smaller batteries such as those used in laptop computers. Although many households around the world use solar power, they cannot store it for later use; with the advent of large lithium-ion batteries this will now be possible.



## Billions in new electricity contracts

**A**lstom has been awarded a R29-billion contract to supply 12 turbine islands for Eskom's new Medupi and Bravo power stations over the next eight years. More than half the contract value will be sourced from South African companies.

Products that are likely to be sourced locally include air coolers, pumps, structural steel, piping fabrication and auxiliary equipment. Alstom plans to expand its own manufacturing capacity and will invest about R8-billion.

Alstom will supply six turbines, six turbo-generators and six air-cooled condensers at Bravo and Medupi. In addition, the company will be pitching for contracts for the transmission and distribution of the electricity generated at these power stations.

Alstom president, Phillippe Joubert warned that demand for new generation capacity was growing at an unprecedented rate with orders from countries around the world topping more than 200 GW a year.

Eskom contracts account for 25 percent of Alstom's current order book; the company's generating equipment supplies about 80 percent of South Africa's electricity.

In a separate development, French company Areva has signed an 80-million Euro contract to build a power supply system for Rio Tinto Alcan's new smelter, which will be erected at Coega in the Eastern Cape.

Areva, which has a long-standing partnership with Rio Tinto Alcan, will supply a conversion substation to provide direct current needed for the aluminium manufacturing process. Areva and rival Toshiba Westinghouse have submitted bids to Eskom for construction of South Africa's second nuclear power station. Areva is hoping to build a fleet of European Pressurised Reactors for the power plant.



## Green buildings in US

**S**an Francisco has introduced legislation aimed at forcing new commercial and residential buildings to meet its Leadership in Energy and Environmental Design (LEED) standards. Public buildings in New Mexico and Washington have adopted these standards but San Francisco is the first region to impose standards on private buildings.

San Francisco officials have introduced the tough legislation because more than half of the city's carbon dioxide footprint comes from these buildings. Under the new legislation developers must earn credits from a checklist of building practices aimed at reducing this footprint

According to Marilyn Farmer, an LEED architect in San Luis Obispo, new environmentally more friendly products have increased tenfold over the past decade. These include recycled carpets and insulation materials that are made from discard blue denim jeans and many new recycled products are coming onto the market every year.

She says that the credits are "driving the marketplace" and forcing building materials manufacturers to look for new and innovative ways to provide environmentally friendly materials with the same

characteristics as those previously used by the building industry.

Some of the other legislation provides credits that stipulate that certain materials must originate from within 800 kilometres of the building site. The purpose of this is to prevent developers from using cement imported from China or sand and stone imported from Canada and offloaded from bulk carriers in San Francisco's docklands.

Farmer points out that moving cement, sand and stone halfway around the world creates an enormous amount of unnecessary greenhouse gases. San Francisco is probably the US's leading city in terms of LEED construction and more than 1 000 of its buildings have registered with the US Green Building Council.

Authorities in the city offer incentives to private developers who abide by the LEED practices; the most prominent of these being to fast-track the issue of permits to those developers, thus speeding up overall development and reducing construction costs.

LEED legislation covers commercial buildings larger than 460 square metres, residential buildings over 23 metres high and renovations on buildings larger than 2 350 square metres.

# Time to farm wind from 'Windy City'

Watt Energy



**P**ort Elizabeth is to develop its first wind farm that will generate an initial 20 MW of power for the city. The wind turbine is expected to be supplied in 2010. Although a site has yet to be chosen, the 'windy city' has abundant supplies of raging gales for months on end so wind farms could be set up on virtually every street corner.

The Nelson Mandela Bay municipality says that it is investigating a number of other renewable energy sources including the use of landfill gas to power turbines and generate electricity.

According to experts who investigated the Koedoeskloof and Arlington sites, it is possible to generate about 5 MW of renewable energy from the landfill methane gas produced by organic waste decomposing under anaerobic conditions. About 5 MW of power could be produced from each of the sites.

In keeping with other municipalities around South Africa the local authority is installing solar water heating systems in houses in the region.

# Brazil gives loggers the chop

**B**razil is to use its federal police force to help fight deforestation of the Amazon and about 300 federal police agents have been stationed at Tailandia where fierce fighting between towns-people and the local police force has been going on for some weeks.

Brazil sent in its police agents along with troopers from the paramilitary national defence force to help stop continued deforestation. Within the next two months Brazil expects to have a permanent force of about 1 000 police and troopers continuously operating in the Para province where deforestation is at its worst.

Tailandia is about 170 kilometres south of Belem. Police recently confiscated about 15 000 cubic metres of timber from illegal sawmills that had been taken from the Amazon forest. Logging is the mainstay of Tailandia's local economy and there are more than 140 sawmills operating in the region.

More than 4 300 square kilometres of forest was stripped from the Amazon's rain forest between August and December last year, prompting the tough action from police and paramilitary forces.



# Millions without power in USA

**T**here might be some consolation in the fact that South Africa is not the only country that battles with sudden power outages – although it is one of few that has to cope for the next eight years with consistent power cuts. Recently about four million people in Florida, USA were victims of a sudden power cut that left cities grid-locked and people trapped in elevators.

The power was returned to most of the regions affected within a couple of hours and was caused by what authorities called a 'disturbance' in the power grid, which forced the nuclear power station at Turkey Point to go into an emergency shut-down.

The power failure spread from Miami northwards to Tampa on the Gulf of Mexico with a domino effect that created a chain of blackouts throughout the state. According to Linda Campbell of the Florida Reliability Co-Ordinating Council, the problem started at a substation in Miami-Dade County and led to the loss of a transmission line that shut down several plants owned and operated by Florida Power and Light.

Power was restored to most areas within about two hours – much the same duration as the power outages in South Africa – but, unlike South Africa, it was caused by a genuine failure rather than a 'planned failure' otherwise known as 'load shedding'.

## Nuclear power plants offer sustainable solutions

Countries throughout the world are suffering from energy shortages and new power stations are being built at a rapid rate to meet increased demand from power-hungry consumers. Addressing delegates at the South African Institute of Electrical Engineers' Power Generation conference, recently held in Midrand, Gert Claassen of PMBR (Pty) Ltd also pointed out that a stable electricity supply is essential for economic growth and social upliftment.

He said that political, economic, environmental and developmental considerations influenced electricity generation and that a rapidly developing country such as South Africa needed to secure an affordable, safe and clean supply of energy if it was to meet its growth targets.

On the international front currently, there are 441 nuclear reactors operating in 30 countries and 30 new nuclear plants are being built in 12 countries. In all likelihood, even more nuclear plants will be commissioned in future as they offer highly efficient electricity generation without consuming fossil fuels.

Claassen says that in China alone, 27 reactors with a generating capacity of 1 000 MW will be built over the next 15 years. In France, 58 reactors will be replaced at a rate of 1 600 MW per year.

India is planning to increase its nuclear generating capacity tenfold. South Africa has one new conventional nuclear power plant planned

and is working on a smaller Pebble Bed Modular Reactor, which is to be built next door to Koeberg.

Claassen claims that opportunities in the new global energy market will be driven by a consistent growth in energy demand and a diversification of energy supply to ensure continued energy security for countries that rely on electricity.

Furthermore, the real threat of global warming caused by carbon dioxide and other emissions is forcing countries to look for cleaner energy solutions and nuclear energy provides such a solution.

In fact, environmentalist Patrick Moore and the co-founder of Greenpeace, James Lovelock, have both called for a massive expansion of nuclear power to combat what they believe is the very real threat of global warming.

According to Claassen, in future new electricity power generating plants will be based on nuclear, renewable or clean carbon fuel technologies.

## Environmentally friendly cool

MAN Ferrostaal has bought a 20,1 percent stake in solar cooling systems manufacturer, Solitem, and will jointly market solar cooling systems in hot, tropical countries of Africa and the Middle East.

About 80 percent of electricity generated in the Middle East is used to power air conditioners and according to Solitem, the market potential for solar cooling systems worldwide is estimated at about \$600-billion. Solitem systems will compete directly with conventional air conditioning systems.

So far, the company has installed four solar cooling systems in hotels and public buildings in Turkey and indications are that the costs of these systems will be amortised in just seven years.

Apart from lower running costs, the solar cooling systems are more environmentally friendly with virtually no carbon emissions. MAN Ferrostaal is one of the world's largest suppliers of solar thermal systems; in addition to Solitem, it has recently also bought shareholdings in Solar Millennium and the Solar Power Group.



# The South African Institute of Electrical Engineers

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## 30 MINUTES WITH...

### Max Clarke

SAIEE Historical Section Chairman 2008

BSc ElecEng (Heavy Current) (Wits), GCC (Electrical Works), MSAIEE, MIEE



You had a long and successful career, starting in 1953, until you retired in 1991. Of all the positions you held, which do you remember as the most interesting and which the most challenging, and why?

Each position had its challenges. On the one extreme, Somerset East had a small coal-fired power station and quite an extensive rural distribution system which was both taxing and exciting. At

the other extreme, Randburg required negotiating with Eskom to take over their network, and establishing an operational department within the municipal structures, starting from scratch. That meant appointing staff at every level, developing administrative systems, getting a handle on the technical operation of a fairly old network and then planning and executing its expansion to meet the rapid urban growth that started in the late '80s and early '90s.

You are the Chairman of the Institute's Historical Section. Give us some examples of how the role of recently qualified electrical engineers differs from engineers who qualified in the '40s and '50s.

The most striking thing for me has been the effects of automation, computerization and miniaturization. If I think of protection relays, for example, I remember how we worked with electro-mechanical devices that needed a fair amount of tender-loving-care during handling, installing and commissioning. Not only are the modern solid-state devices generally much smaller in size, their versatility and range of operations make them a bit like a modern car compared to a wagon. But virtually all aspects of the engineer's work has been turned upside down by the advances in what is essentially changing from analogue to digital technology.

What do you remember best about the years you spent as the Town Electrical Engineer of Randburg, from 1979 to 1991?

After the initial setting-up process, and getting staff in place, it was probably the installation of a load management system for the management of peak loads by controlling electric hot water systems. This was an exciting project as it was one of the largest radio-based systems that had been installed at that time. The fact that its operation met all the targets for savings that were set was extremely gratifying.

Tell us something about your involvement with the Association of Municipal Electricity Undertakings from 1983 until 1991, and with its newsletter, which you still edit.

The Association of Municipal Electricity Undertakings (AMEU) was established in 1915 as a forum for Municipal Electrical Engineers to get together on a regular basis for the exchange of ideas and views on all matters of interest or concern in the municipal field. My membership started in 1954 after I joined the Somerset East municipal service. I have remained active since then not only by participation in regional and national activities, but also, from 1983, as a member of the Executive Council. By 1987 Exco had decided that we – the AMEU – needed a regular form of communication with its members and other stakeholders and interested persons. I was given the job of developing a three-times-a-year, 'glossy' newsletter and – as the saying goes – the rest is history. Issue number 64 will be published in March 2008.

How do you see South Africa resolving the present energy crisis? Are you in favour of nuclear power generally?

I personally believe that with currently available technologies nuclear is the only real way we can meet the world's voracious demand for power in a clean and sustainable way. In South Africa in particular, while the other technologies all have a part to play, I don't believe alternative 'green' processes such as wind, wave or solar, can make significant contributions to the current energy crisis. When you realize that one needs 100 or more of the largest wind turbines to provide an output even remotely approaching the capacity of modern steam turbines, you get some idea of the scale of things. Then there are the problems of siting, aesthetics and noise pollution. The current crisis will be with us for a long time; that much is abundantly clear. We will have to use every practical way, including consumer load management systems, to keep peak loads in check and to minimise the adverse effects that will arise from load-shedding from time-to-time over the next few years. There is no magic formula or easy way out.

Tell us a bit about your leisure interests and how you fill your time as a retired person.

Travel is one of my keen interests. I have toured extensively in South Africa and enjoy the game reserves and the scenery. I also have Australian connections and love nothing better than to fly across the Indian Ocean to catch up with family, friends, the countryside and the animals and birds. I do quite a lot of casual photography and enjoy reading magazines, mainly technical and travel. I enjoy live theatrical performances, be they ballet, musicals, Pieter Dirk Uys productions, the Lion King, or others!

# From the President's Pen



Victor Wilson  
President SAIEE

**A**t the AGM in March I was inaugurated as President and Ian McKechnie took up the Immediate Past President role. The two Vice Presidents, Deputy, current, and Past President positions plus the Honorary Treasurer constitute the Office Bearers of the Institute.

The three years as Vice or Deputy President are a good preparation for the functions the

President is expected to perform. I want to thank those who have led the Institute in the past few years for their example and I am glad that Ian remains involved. His energy and dedication have been amazing.

The new Office Bearer is elected each year from among the Fellows on Council who have not already been President. The Council is elected by members and has about 40 seats in various categories. See the Constitution on the website (<http://www.saiee.org.za/>) for all the details. Council meets monthly (on the first Friday of the month)

and each Council member is also on two committees of Council which meet on the same day. In future issues I will discuss the various committees.

My theme for the year is Participatory Governance. Members of the Institute are affected in their work and careers by legislation, regulations, and standards. These governing documents are regularly updated and amended.

Who do you want contributing the technical content of documents that govern your life and business? Possibly your fellow SAIEE members – or you yourself. Who do you want informing you of proposals, drafts, developments, approvals, and implementation of new rules? Possibly the SAIEE, or the members who are participating in the committees.

Electronic technology allows us to exchange ideas, consult members, and share documents wherever and whenever our members have the time and the means to connect. Let us establish two-way communication between governance bodies and our members. The key is the discussion forum on our website. I encourage you to read what has been posted publicly and register a username to be able to make your own postings. Members of the Institute and members of committees get access to additional forums.

Keep an eye on the website for upcoming events.

## Generation Technology Conference

**The SAIEE hosted a conference on Generation Technology on 19 February 2008, in collaboration with Eskom.**

**W**hilst the timing of the conference was fortuitous in terms of the current focused attention on the issue of electricity generation in South Africa, this was coincidental as the conference had been planned since June 2007. The conference was not in reaction to the generation and reliability of supply problems being experienced in early 2008, but was rather focused on a proactive consideration of the generation requirements moving forward, and in particular on the mix of technologies that can, could and should be part of the generation capacity programme to 2025 (and beyond).

The keynote address was presented by Braam Conradie (GM of the PPD Enterprise Division at Eskom), who reviewed the planned Eskom generation capacity build programme to 2025. Particularly interesting was the acknowledgment of the probable need for another coal-fired power station, in addition to the Medupi and Project Bravo power stations, before the planned nuclear capacity is brought on line.

A range of generation technologies was included in the conference topics, and papers were presented by a number of technology experts from Eskom, as well from Siemens who brought in a speaker from Germany on gas turbine technology.



Braam Conradie, GM  
PPD Enterprise Division  
– “Keynote Address”



**Louis van Heerden,**  
Corporate Specialist  
– “Concentrating Solar Power”



**Dave Wynne,** Senior Manager  
Program Support  
– “The Nuclear Power Project”



**Tony Britten,** Corporate Consultant,  
HV Engineering  
– “Electricity Generation without Dynamos”



**Gert Claassens,** Industrial  
Marketing & Localisation  
– “Pebble Bed Modular Reactor”



**Ian Smit,**  
Chief Engineer Solar & Wind  
– “Wind Generators”



**Hendri Geldenhuys,**  
Corporate Specialist  
– “Solar Power”



**Barry Lipchin,**  
Senior Consultant, EON Consulting  
– “Demand Side Management”



**Sivakumar Pasupathi,**  
Chief Engineer  
– “Emerging Technologies”



**Mark van de Riet,**  
Corporate Consultant  
– “Underground Coal Gasification”



**Gerhard Bohrenkamper,**  
Expert Engineer, Siemens Germany  
– “Gas Turbines”



**Frans Louwinger,**  
Corporate Specialist Hydro  
– “Pump Storage Station”



**Nandu Bhula,**  
Power Station Manager  
– “Hydro Power”



**Ian McKechnie,**  
President SAIEE  
– Chairman of Panel Discussions

Interesting presentations were made on the nuclear generation options, which were particularly relevant given Eskom’s ambition of 20GW of nuclear power generation capacity by 2025 and the submission in the previous week of bids by Westinghouse and Areva to build new nuclear plants in South Africa (Eskom’s intention being to commence with these project implementations in the next few years). Both Pressurized Water Reactor and Pebble Bed Modular Reactor (PBMR) technologies and project intentions were discussed.

Renewables were not left out, with interesting presentations on Solar Concentrator technology and Eskom’s plans for an initial system in the Northern Cape, as well as a report on a photovoltaic solar project which had been implemented in a rural area. Hydro generating schemes were discussed, as well as the current pump storage project at Ingula and the planned project Lima in Mpumalanga. Wind generation was also on the agenda including discussion of the planned generation facility in the Western Cape.

Emerging technologies featured in the programme, as did coal gasification, which is particularly relevant given coal mining difficulties at certain power stations. Demand side management was included due to the need to encourage energy efficiency and to reduce load demands in the short to medium terms whilst new capacity is developed.

The conference closed with an interesting panel discussion, followed by a cocktail party and networking opportunity. Generous sponsorship was received from Eskom, Siemens and Alstom, and their contributions are gratefully acknowledged. The event was oversubscribed with 350 delegates and a full auditorium.

This conference served to provide a platform of experts on the various technologies available, but more importantly, it allowed for discussion and comment by a broad spectrum of interested persons in the audience. The SAIEE thus achieved its objective of facilitating an event that served to keep all South Africans informed, coincidentally at a time most needed.

# Energy Crisis Coping Forum

In January 2008 widespread and sustained electricity load shedding was experienced in the country as a result of generation capacity shortfalls at Eskom. Similar but less sustained problems were previously experienced (for example, at various times during 2007).

The generation capacity shortfalls were attributed in the first instance to the reduced reserve margin due to a delayed investment in new generation capacity and resultant and progressive reduction of margin between generation capacity and levels of demand. These shortfalls were exacerbated by various factors, including planned maintenance during summer, numerous failures at generating plant, load losses due to coal quality issues and problems with coal logistics.

The effects on the business and industrial community, as well as residential consumers, was significant, and culminated in the shutting down of mines in late January. Traffic light failure caused chaos on the urban road systems with associated time and fuel wastage.

These events caused much anger, uncertainty, anxiety and frustration amongst the residential, business and industrial community, not to mention the real costs and losses associated with the power outages and ultimate effects on the country's economy. A lack of information about the situation and scenarios now and going forward, and about the available coping mechanisms, tools and technologies, worsened this situation. This results in a reduced ability to effectively develop coping strategies.

The Institute decided to make a constructive contribution by facilitating a forum for information-sharing and discussion, to empower the attendees to develop strategies, for their particular situations, to cope with the power crisis over the next five years and beyond. A three-pronged approach was adopted for the forum, to establish the scenarios from both the Eskom and local authority perspectives, and then to provide information regarding tools, techniques and technologies to cope with the defined scenarios and 'environment'.

This resulted in an Energy Crisis Coping Forum being presented at the Eskom Convention Centre on 11th February 2008 with three formal presentations, followed by a panel discussion and Q&A session. The event was attended by approximately 250 people from a variety of businesses and industries, including a number of SAIEE members.

The first presentation was by Dr Steve Lennon from Eskom who summarized the prevailing situation and its causes. He then reviewed Eskom's short and long term strategy to ensure the best possible reliability of power supply under the prevailing conditions. The second presentation describing the scenario was by Mr Silas Zimu from City Power as a representative local authority, who described their situation and strategy going forward. The third leg of the event was presented by Prof Willie Cronje from Wits University's School of Electrical and information Engineering. He used a case study approach to discuss how to conduct a power audit and the characteristics of various loads, as well as discussing demand-side measures and increased efficiency issues. He also discussed, for example, various alternative electricity sources as well as alternative energy sources.

The forum closed with a panel discussion to answer questions from the floor which resulted in useful discussion and additional insights. Very positive feedback was received from attendees and the SAIEE is planning to offer this forum, with a similar approach (and also involving the relevant local authorities), in other centres.



Dr Steve Lennon, MD Corporate Services Division, Eskom



Silas Zimu, Managing Director, City Power Johannesburg



Prof Willie Cronje, University of the Witwatersrand

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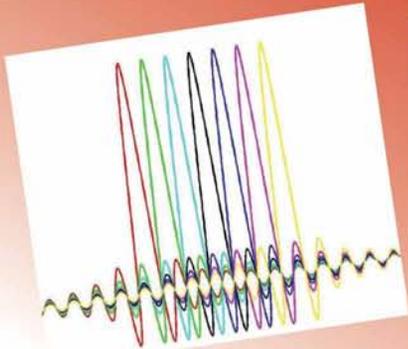




# POWER LINE COMMUNICATIONS: University of Johannesburg

## Our Research Interests

Powerline Communications  
Digital Communications  
Coding Techniques  
Information Theory  
Video Communications  
Networks



## Our Research Partners

University of Duisburg-Essen, Germany  
Technical University - Delft  
University of California (Davis)  
Walter Sisulu University  
North-West University  
University of Witwatersrand  
Chinese University of Hong Kong  
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Protoclea Advanced Image Engineering  
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