Desertec – is the political will sufficiently strong?

On the face of it, scientists, researchers and engineers seem a friendly bunch, who collaborate with each other in the spirit of genuine, frank and honest discussions about the work they are doing, the solutions they are attempting to find and the technologies they hope may be used for the betterment of the human race.

That's what we're led to believe and, of course, it's actually a load of poppycock.

Scientists, engineers and technologists are deeply competitive, highly secretive and sometimes incredibly selfish too. They want to find solutions – that's true – but the emphasis is a lot more on the individual achievement than on the collaborative solution.

Compare them with politicians and you'll possibly discover there's just a hair's breadth between the two groups.

So, when a plan such as Desertec is proudly unveiled to the world by representatives from 12 countries, with leading scientists and engineers adding credence to the organisation you can rightly be awestruck.

The concept is relatively simple: provide all the electricity for Europe, the Middle East and North Africa from solar concentrating thermal systems in the centre of the Sahara. Projections show that properly functioning equipment could provide enough energy for each of these regions in something under six hours.

Completely clean, renewable energy – using technologies that are readily available from suppliers throughout the world.

Then start to put together the nuts and bolts of such a project and the picture is less than rosy. Politicians must be trusted (how one asks?) to stick by all the international agreements. Countries must stand together and agree on how the renewable energy will be paid for, when payment is due, whose responsibility it is to maintain power stations, the network, the distribution grid, the transmission lines and so forth.

As soon as this kind of co-operation is needed, plans start to falter and different interest groups, with fundamentally different agendas, emerge from the halls of Parliaments in all three of the regions.

And some of the fears might be well founded.

What happens, for instance, if Britain supports Israeli against the Palestinian forces against the will of the Middle Eastern countries? Egypt and some other Arabian countries switch off Britain's power as retribution.

Britain swishes around various North African states pleading for electricity from anywhere. It gets none. So it must either back down or revert to coal-fired power stations on its own lands.

It is these hidden, secretive and often unspoken agendas that so often thwart major co-operative projects such as Desertec. And in my simplistic view this is just so dumb. Surely it must be possible for mature, established, civilised countries to co-operate for the betterment of the entire human race? It's not the first multi-national project to be mooted – and it certainly won't be the last.

But given the politics, the ideologies and the social mores of the three regions in question, one wonders?

Many of you will recall how the Organisation of Petroleum Exporting Countries held the world to ransom in the early 1970s, forcing up the price of petroleum and limiting the actual volumes exported to different country. Well, does the Desertec project create much the same risk for Europe today?

Electricity supplies are fundamental within the developed world and while the Sahara Desert is a perfect place to harvest energy, it is the security of supply that is so much more important.

Maybe Desertec's successes might represent more than technology. We'll have to see.

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WATT'S

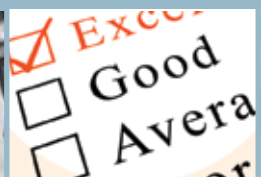
WATT'S HAPPENING




4> WATT'S GOING ON?

Sahara turns into an energy farm to harvest the sun; 70 000 school kids given new shoes; Africa's high mobile penetration sets the stage for Internet revolution; 2010 World Cup provides sustainable infrastructure development.





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Sahara turns into an energy

Engineers, scientists and researchers are working on plans to effectively harvest the sun to provide electrical energy for Africa, the Middle East and Europe. Solar thermal power plants will be erected in the Sahara, North Africa, while wind farms along the European and African coasts will provide additional energy for the whole region.

Plans to go ahead with the Desertec Industrial Initiative were announced in Munich in July. An outline of the project was presented to a group of South African and foreign journalists in Johannesburg, ahead of the Munich announcement.

Siemens, alongside many other industrial companies involved in the initiative, estimates that it will cost about €400-billion, equivalent to four times the amount of money spent by the United States to get one man onto the Moon.

The world's desert regions are fertile sources of energy and harbour enough solar heat to generate more energy in just six hours than mankind can consume in a year. Moreover, countries like Morocco and Egypt have many sites that are suitable for wind farm installations as well, so both the coastal and desert regions of North Africa are breeding grounds for vast renewable energy projects.

In terms of the Desertec project, between 15 and 25 percent of Europe's electricity requirements will be from renewable energy resources by 2050. The necessary technology is, according to Siemens, already available because solar thermal power plants have been proven over the past 20 years, while the low-loss transmission of electricity over long distances has also been perfected.

Siemens is one of the world's leading companies in the development of wind farms and steam turbines that use solar thermal power to generate electricity. Through its investments in Archimedes Solar Energy, Siemens has developed the innovative technology for solar receivers, a key component for the construction of solar power plants.

Research undertaken over the past few years shows that each square kilometre of desert produces as much solar energy as 1,5-million barrels of oil and when the desert areas of the world are combined, the available energy in these deserts is several hundred times more than the total energy consumption of all nations in all regions.

The essence of this technology lies in using mirrors to concentrate, or focus, sunlight to create heat and then using the heat to raise steam to drive turbines and generators in a conventional way. Concentrating solar thermal power is not to be confused with the solar photovoltaic power from solar panels.

Studies by researchers, engineers and scientists show that an area of just 114 090 square kilometres, if covered by concentrating solar power plants, could provide as much electricity as the world is using right now.

An advisory body, the Desertec Foundation, has been created and comprises members from Africa, the Middle East and Europe. Countries involved in the initiative include Algeria, Bahrain, Dubai, Egypt, Iran, Jordan, Libya, Morocco, Palestine, Tunisia and Yemen. The European members include the Czech Republic, France, Germany, Italy, the Netherlands, Spain, Sweden, Turkey and Britain. Australia and Pakistan are also members of the Foundation.

Electricity generated through concentrating solar thermal power can be stored in melted salts, such as nitrates of sodium or potassium, so that electricity generation can continue at night, on cloudy days or in the middle of a desert dust storm.

The existing high-voltage alternating-current (HVAC) transmission grid would allow countries throughout Europe, the

farm to harvest the Sun

Middle East and northern Africa to benefit from the desert's electricity generation.

There are plans to upgrade the existing grid to use high-voltage direct-current (HVDC) transmission lines using 'smart electronics' so that the HVDC grid can integrate with the HVAC grid. Technologies such as the Flexible Alternating Current Transmission System (FACTS) are composed of static equipment used for alternating current transmission of electrical energy.

The system is defined by the Institution of Electrical and Electronics Engineers as a "power electronic based system and other static equipment that provides control of one or more AC transmission system parameters to enhance controllability and increase power transfer capability.

Extensive use of the HVDC lines has established that the transmission losses are about three percent per thousand kilometres with further small losses arising from the conversion of current from DC to AC.

This means that, in practical terms, the amount of electricity generated in North Africa and transmitted to the United Kingdom would drop by about ten percent. However, it is both feasible and economic to transmit solar electricity for distances of 3 000 kms and more.

The German Aerospace Centre has calculated that solar electricity imported from concentrating solar power plants in North Africa and the Middle East would provide some of the cheapest electricity available to people in Europe and this includes the cost of transmitting the electricity over thousands of kilometres.

According to information from the Desertec Foundation, concentrating solar thermal power plants are running in several parts of the world and many new projects are under construction or at a feasibility study stage.

In Spain, the energy from PS10 and PS20 plants near Seville are feeding electricity into the European electricity grid. (Any readers who want to view CSP plants can open Google Earth and search for CSP Plants to view the sites – Editor).

As part of the research undertaken by the Desertec Foundation, several startling facts have emerged.

For instance, 90 percent of the world's population currently lives within 2 700 km of a desert, implying that there is no region in the world that could not readily draw electricity from solar thermal plants built in the desert dunes.

The EUMENA (Europe, the Middle East, and North Africa) region is likely to be one of the first to benefit from the Desertec concepts because, on favourable sites along the southern and eastern shores of the Mediterranean Sea, including the Arabian Peninsula, countries could meet most of the power needs using CSP plants.

Moreover, they would have a stable source of electricity and enough power to drive major desalination plants to remove salts from the sea, transforming it into clean potable water for human and animal consumption, and to irrigate crops for domestic use.

Desertec says that just one CSP project would create thousands of jobs in the generally poor regions of North Africa and its figures indicated that at least a thousand workers and engineers will be needed over a three year period to build just one 250 MW parabolic trough power plant.

At the same time, Europe is under increasing pressure to seriously reduce its carbon emissions and this could be achieved if the European countries were to close down some of the fossil-fuel-burning power stations and, instead, draw clean power from solar thermal power plants in the Sahara.

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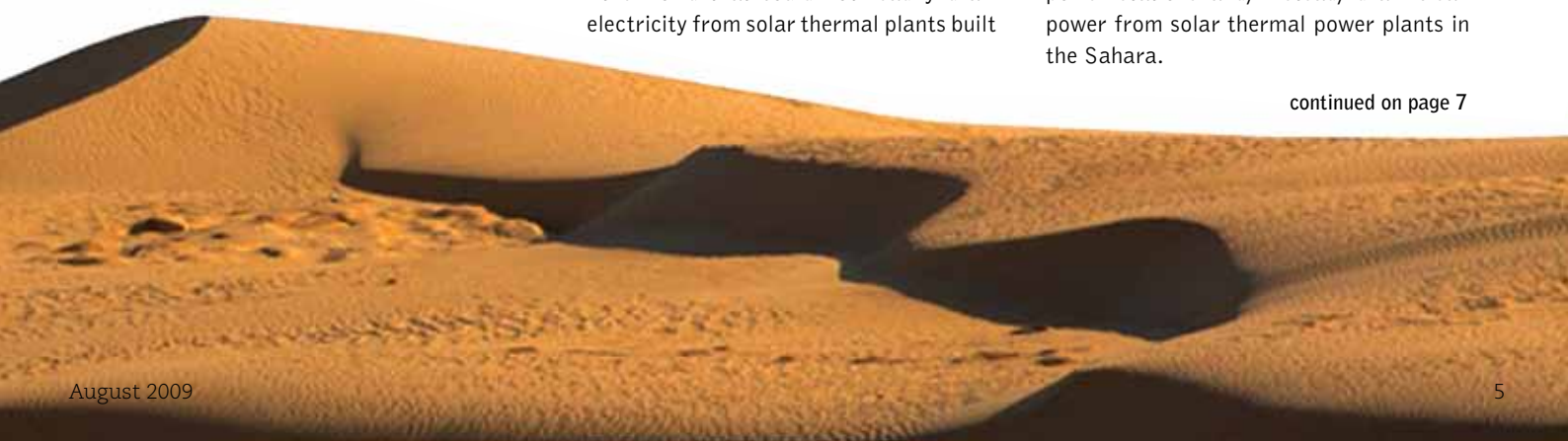

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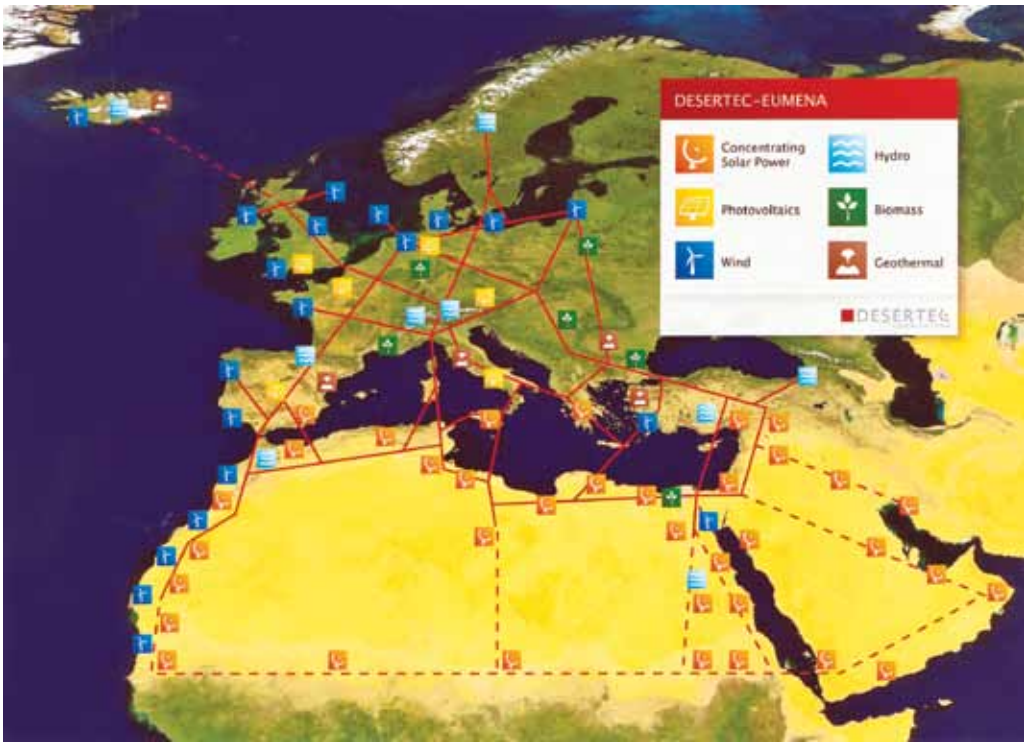

Sites for the renewable energy plants that could be set up in the Sahara and the hot and dry lands of the Middle East. Wind farms could be used to generate electrical power from the strong winds that burst through parts of the North Atlantic region

continued from page 5

It is the notion that if Europe starts drawing power from foreign suppliers in the Middle East and Africa, the countries could find themselves depending on foreign sources of power.

The concern is that this sort of vulnerability could mean that Europe could be held to ransom over electricity supplies in much the same way as Organisation of Petroleum Exporting Countries (OPEC) did when it cut oil supplies to countries throughout the world in the early 1970s.

Desertec's view is that this concern is not a serious threat because European countries could augment supplies from solar thermal sources.

It says that an orchestrated suspension of power from one of the producing countries would be unlikely because the electricity cannot be stored and sold later at a higher price as is the case with fossil fuels.

Furthermore, customers would lose confidence in the power producer and cancel supply contracts, resulting in significant revenue loss for the generating companies.

Desertec says its concept offers tangible benefits including:

- Extensive use of abundant solar energy that is currently not being exploited in any of the desert regions around the world.
- It provides an integrated solution for climate change, improved food production, increased fresh water supplies and the establishment of clean, renewable energy resources.

What are the next steps if this major project is to get off the ground?

Desertec says that politically, the emergence of the Union of the Mediterranean comprising representatives from the European Union and ten of the states on the southern and eastern borders of the Mediterranean will help to create the political framework for the project.

Added to this is the need to embark on the immediate preparation of feasibility studies to look into the political, organisational, financial, technical and ecological aspects that may influence implementation of the Desertec project.

Then the pilot project to build and commission a 1 GW CSP plant to demonstrate the practical feasibility of CSP developments in Middle East and North African countries must immediately be undertaken.

In fact, Desertec has identified a suitable site in Egypt for this project, which, once complete will supply drinking water and electricity to the Gaza Strip.

Desertec also wants to implement a programme to support industrial and human capacity building for the construction of solar thermal power plants and solar collectors. It claims that this will contribute to the industrial development of the participating countries and ensure the necessary expertise is available to build and maintain additional power plants in the Sahara Desert itself.

It seems there are just too many benefits and too few disadvantages for the Desertec projects to be abandoned.

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SCHOLAR DESIGNS ENERGY EFFICIENT HOTEL

Jana Jordaan, a grade 11 learner at Parys High School, gets an adrenaline rush from being in a room full of young people with gadgets and contraptions made out into science projects.

Being an inventor herself, her last innovation won her a cool R30 000 in mulah and the honour of being chosen the 2008 winner of the ***eta*** Awards: Young Designers Category.

Energy efficiency is part of Eskom's drive to ensure sustainable electricity supply into the future and is the core focus for the ***eta*** Awards. The ***eta*** Awards is an annual event sponsored by Eskom and supported by the Department of Minerals and Energy and it has been running for the past 19 years.

In her winning project, Jana sought to prove that bigger buildings, in her case a hotel, can be self-sufficient, generating 100% of their own electricity - using mainly biogas plants; solar panels and solar collectors.

"Initially, I was planning to build a house. But I decided to be different and chose to do a project on a hotel," Jana said.

"I had to go deeper and research further than I would have if I had built a house. The project took me about six weeks to complete. A few friends had joined me at the beginning, but they dropped off, saying it was too demanding.

"It was a lot of work but I stayed with it. Not that I didn't enjoy it. I have been fascinated with biogas technology for a while. My interest started with a project I did in Grade 8. Another factor that made me see the project through to the end was my stubbornness. When I start something, I have to see its conclusion," she added.

Jana is entering the competition again this year and this time she is expanding the scale in a project to determine if a shopping centre can generate 100% of its own power.

Her win has inspired a lot of young people in her community to explore energy efficiency projects.

"I have had 48 enquiries from learners who want to do projects similar to mine. A man also approached me with a proposal to supply him with the air-conditioner I designed for the hotel project. But that is for later.

"I plan to study towards a degree in architecture or civil engineering. On completion of my studies, I want to open a franchise to build energy efficient houses or convert existing houses to be energy efficient," she expounded.

The eldest of three siblings, Jana gets a lot of support from her parents, both teachers. She might love science but she is not square. Part of her winnings for the ***eta*** Awards went towards paying for the cost to enter the dance section of the South African Championships of the Performing Arts. She also loves music and plays the piano.

There are eight categories which one can enter: Industry; Commercial; Residential; Women in Industry; Woman in Community; Power Fitness, Innovation and a prize for Young Designers. Each category winner receives R30 000. The two runners-up get R5 000 each.

Eskom encourages those who have exciting and innovative ideas or projects to enter them for the 2009 ***eta*** Awards.

For more information on the ***eta*** Awards and how you or your company can enter, please visit www.eta-awards.co.za or email Anna-Marie Roux on amroux@mweb.co.za.

Dr. Steve Lennon, MD of Eskom's Corporate Services Division, Ms. Jana Jordaan, winner of the Young Designers category and Ms. Thandeka Zungu, Deputy Director General for Corporate Services, Department of Minerals and Energy.

70 000 kids given school shoes

Over 70 000 school children have received new school shoes across Gauteng through a community initiative to provide youngsters with some of the most basic needs. uJima Bakoena Shoe Cooperative has distributed more than 70 000 pairs of shoes this year.

"We are pleased to be doing great things for those children in need and aim to offer our services countrywide," says Fikile Zikhala, spokesperson for the Cooperative. Offering children the opportunity to walk into their schools with dignity is one of many goals that we hope to achieve" he says.

The Cooperative, specialising in the manufacturing and distribution of school shoes to poor communities, was founded in July 2008 by a group of 19 members from the shoe manufacturing industry. These members, other than possessing shoe making skills, were able to marketing the shoes and manage the business too.

Says Zikhali: "The Co-operative understands that Government cannot create jobs for all the people, which is why they are looking at ways to expand our community work so that we can do more for the youngsters who are at school."

The Cooperative has received R890 000 in funding from the National Development Agency (NDA), which has been put in place by government to strengthen the institutional capacity of grassroots organisations to deliver quality service and programmes to alleviate poverty.

Nokwazi Mazibuko, NDA Gauteng provincial manager says that the agency is proud of what the project has achieved because it encourages other skilled people to join the example set by members of uJima and provide some more relief for students from disadvantaged communities.

UJima's long term vision is to develop into a medium-sized enterprise and diversify its product offering into school uniforms and other apparrel. The Cooperative is a member of the National Industrial Chamber, an affiliate of the National African Federated Chamber of Commerce (Nafcoc) whose benefits include training and advice to emerging small businesses.

Africa's high mobile penetration sets the stage for Internet revolution

Rapid penetration of cellular phones into South Africa and the rest of the Africa will set the stage for mass adoption of the Internet across the country and continent according to Deon Liebenberg, regional director for sub-Saharan Africa at Research In Motion (RIM), the company behind BlackBerry®.

Commenting on the recent *Africa Connected: A telecommunications growth study* undertaken by Ernst & Young that found that market penetration of cellphones in Africa is sitting at 37 percent, Liebenberg says that the continent has largely bypassed fixed-line telecommunications solutions in favour of mobile technology. South Africa has cellular penetration of about 98 percent.

From 2002 until now, Africa has seen the number of cellphone subscribers climb by a compound annual growth rate (CAGR) of 49,3 percent compared with 27,5 percent in Brazil and Asia, according to Ernst & Young. By 2012, market penetration in Africa is likely to climb to above 60 percent.

Says Liebenberg: "It's clear from these statistics that most Africans have bypassed fixed-line telephony in favour of mobile phones, which coupled with cellular infrastructure, will do as much to bring data services to Africa as they did to bring telephony within the reach of the continent's people.

"Affordable smartphones, such as BlackBerrys, coupled with Internet services have the potential to bring Internet connectivity to many small businesses and consumers in Africa who were unable to have any access to the Internet in the past," says Liebenberg.

The full BlackBerry solution offers South African end-users unlimited on-device Web browsing and e-mail access from as little as R59.00 a month.

Vodacom offers a prepaid BlackBerry® Internet Service for just R59.00 per 30 day cycle (month).

"Smartphones are becoming more accessible and affordable to a broader range of subscribers. Coupled with the the Internet services, these devices are opening up a whole new segment of users who now have access to other forms of communications, multimedia, navigation and personal productivity tools that allow them to stay in touch with everything that matters at work and at home."

In Africa, where communication costs have been prohibitively high and notoriously unreliable. This is now coming to an end, if Ernst & Young's report can be believed.

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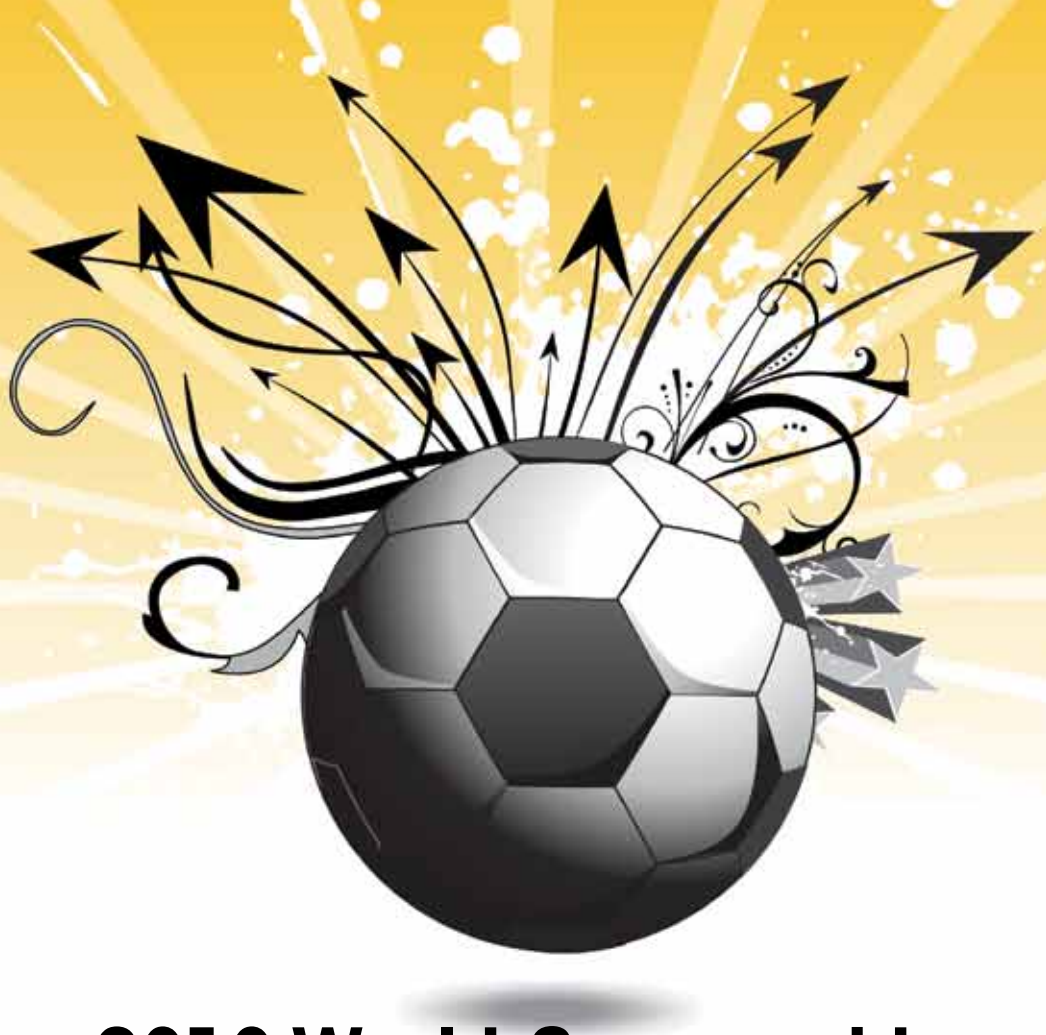

2010 World Cup provides sustainable infrastructure development

Siemens has orders worth almost €1-billion for energy infrastructure expansion projects in South Africa ahead of the 2010 World Cup event that will be staged at different venues around the country.

Siegfried Russwurm, responsible for Africa as a member of the international company's managing board, says that long after the World Cup has come to an end in Johannesburg; the effects of Siemens' investment will be felt.

Siemens has provided products and solutions for power generation and transmission, traffic management and mass transit systems and improvements to healthcare services. Eight of the stadia will use Osram's lighting products. Osram is a subsidiary of Siemens.

According to Russwurm, projects in Siemens' Energy Sector account for about 80 percent of the company's order and, among other things, it has built new power plants in Cape Town and Mossel Bay to help manage peak loads in the national power grid.

Russwurm claims that Siemens is the only company in the world that can offer complete technological solutions within every aspect of the energy sector from fuel extraction to electrical power coming through a socket in a home.

Improvements in power generation and distribution are, in Russwurm's view, critical for development in Africa because the entire continent needs sustainable development projects and electricity is a key factor for that development.

The figures are immense, with the United Nations estimating that 530-million people living on the African continent have no access to electricity and, in the next 20 years, this figure is expected to reach 600-million even though there are extensive electrification programmes underway.

Moreover, power failures or interruptions of service are frequent because the power grids have been poorly maintained, resulting in extensive expenditure on resurrecting distribution networks.

He says one direct advantage for South Africa is that by winning the right to host the 2010 World Cup event, rapid changes to the electrical infrastructure had to be made, along with changes to the road and railways networks. Russwurm says that about 3,5-million people are likely to visit the country during the month-long event and all of the 50 venues (or more), including hotels, airports and the stadia, must be properly linked to accommodate the visitors.

Referring to Germany's hosting of the 1972 Munich Olympic Games, Russwurm said that at the time this event was held it

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was a catalyst for development in Germany. "It led to a huge number of civic improvements: sports venues were built, new houses erected, downtown pedestrian zones created and 27,5 km2 of new roads were built. In just seven years, Munich created a new subway system too." He points out that today, almost 30 years since the Munich Olympic Games, the positive effects of the 1,35-billion Deutsche Marks spent then (€2-billion in today's terms) are still being felt.

"I believe the same will happen in South Africa and the people of the country will benefit from the rapid development and infrastructure investment that has taken place over the last four or five years," he said.

Siemens has completed (or is still working) many other sporting developments around the world and Russwurm claims that the company is successful in winning tenders to do the work because it has the technical expertise and experience to undertake major projects and complete them on time and within budget.

Some of these projects include:

- The Reliant Park Stadium in Houston built for the 2003 Super Bowl.
- The stadium for the 2004 European football championships in Portugal.
- In Germany, it completed a host of projects for the 2006 World Cup.
- In Austria and Switzerland, the company was involved in another stadium for the European football championships.
- In Singapore, Siemens is preparing the exhibition centre for the Expo 2010 and in Delhi, it's involved in projects for the 2010 Commonwealth Games.
- In Vancouver, it's working on projects for the 2010 Winter Olympics while in New Zealand it's helping to prepare for the 2011 Rugby World Cup.
- It is also busy in Mexico with preparations for the 2011 Pan-American Games and, in London, it's working with authorities there to prepare for the 2012 Olympic Games to be held in that city.

"We have a proven track record in helping cities and countries prepare for and host major international events and the 2010 World Cup in South Africa is no exception.

Apart from its involvement with various events around the world, Russwurm points out that Siemens is currently supplying a healthcare information system to 37 hospitals and 300 clinics around the country and this will mean that healthcare administrative systems at public sector facilities will improve dramatically.

"In Africa, solutions must be sustainable and investments must contribute to a cleaner future using renewable energy technologies to create more efficient cities and provide a high quality of life to residents in this under-development continent," he said.

"There is tremendous public and political support for sustainability and the commitments made by leaders at the G20 Summit are a clear statement of intent for the future," Russwurm added.

According to Siemens, about 90 percent of the investments made in preparation for the 2010 World Cup in South Africa will have a sustainable impact on the country in terms of infrastructure development. He says that projects in the healthcare sector, telecommunications, airports, security, energy supplies, accommodation and transportation are all sustainable and involve about 65 percent of the investments made so far.

"Only about ten percent of the total budget for the World Cup here was earmarked for stadium development," he added.

In a separate development Russwurm confirmed that Stuart Clarkson has been appointed Siemens South Africa's new chief executive, replacing Siegmar Proebstl who returns to Siemens in Germany.

Protect your car
– use a microdot with in-built technology

Microdot vehicle identification technology is now being used to protect all new Nissan and BMW motorcars coming into South Africa and off local production lines. On 3 June 2009, at an event at Nissan in Rosslyn, an SABS standard was launched and the process of marking cars was demonstrated. Peter Middleton reports.

Microdot technology – the permanent marker for cars

My first treat on arrival at Nissan's Bill Wilson Building in Rosslyn was to be shown a video of a Nissan Almera being blown up in Kroonstadt. Fouche Burgers from Business Against Crime South Africa (BACSA) showed it to me in slow motion, complete with the bonnet and one of the doors being tracked, frame-by-frame, as they flew into the air and out of sight, and then reappeared several frames later on the way down again. Apart from the mangled remains of an engine, there was little left of the car. It was described as a 'controlled test' but to me, it looked a touch too ferocious for that.

Who was responsible? The South African Police Service (SAPS), the Department of Transport (DoT), the South African Bureau of Standards (SABS), the Vehicle Security Association (VESA), Nissan South Africa (Nissan SA), and four Microdot suppliers in South Africa – DataDot, Holomatrix, Impimpi and Recoveri.

Why? To prove, beyond all doubt, that it was impossible to remove the micro-dotted identification numbers sprayed onto vehicles. The exploded Nissan had been marked with microdot 'DNA' from all four of South Africa's microdot companies – and all information from each supplier could be located and read on the remaining debris of the bonnet and doors immediately after the explosion. Legible microdots were also found on the remains of the engine. Exciting stuff.

The launch event began with a tour of the Nissan's microdotting facility, a process subcontracted by Nissan to DataDot. We were bussed to a three-pit workshop and taken through the process of microdotting a new Nissan bakkie. "At this facility, we can currently microdot 250 cars a day using a single shift manual process," says Derek Menday, director of DataDot and our guide. "The facility has also been designed to eventually take on a robotic arm, which will enable a car to be dotted in one minute and 11 seconds – or 700 to 1 000 cars a day on a double shift basis," he adds.

Every car manufactured by Nissan at the Rosslyn plant passes through this facility before being dispatched, and every car manufactured by Nissan since October 2006 has been microdotted.

The process involves the application of approximately 10 000 tiny polyester or metal dots, each less than one mm in diameter and each containing the vehicle's identification number (VIN) or a unique vehicle PIN etched onto it by a laser-etching process, as repeated lines of text. "The 17 digit VIN number can fit no less than four times on each dot," Menday tells us, "which is a lot of information."

The DataDot process currently uses a PIN-based system, although the technology is already available to etch the vehicle's own VIN number onto the dots. The laser-etched dots are manufactured in George – mixed with a water-based inflammable adhesive and packaged in a disposable canister, which is bar-coded with the unique PIN number – then sent to Rosslyn in batches. As the vehicle is driven into the facility, its VIN number is scanned and blue toothed into a computer system at the back of the workshop. A canister of dots is then taken out and its unique PIN number is scanned and allocated to the vehicle's VIN number. This enables a live database to link the two vehicle identifiers and immediately register the addition on a nationally accessible database. "The muscle of the dot comes down to the availability of the information at the right level, not just at police level but at dealer, bank and insurance levels. This system is in place. This Nissan being dotted today can be traced back to a VIN number and a current owner within minutes of leaving this facility," says Menday.

The information on each dot – invisible to the naked eye – functions as the vehicle's DNA. A criminal wanting to tamper with the identity

The canister of dots is attached onto a compressed air line and a sample is sprayed onto the fitment sheet.

James Ralekwa applies microdots to the engine compartment of a Nissan bakkie.

of a vehicle and its parts must literally find all 10 000 dots. The fact that this is a virtual impossibility makes the use and application of microdot technology an important deterrent against vehicle crime and theft. In particular, it ensures that the vehicle's identity can never be removed, and thus it fights crime at its financial roots, ie, the point at which 'anonymous' stolen vehicles are sold.

James Ralekwa of DataDot is issued with a 'pot of dots' along with a fitment sheet. He then does a manual verification, twice. He checks that the PIN number on the canister is the same as that allocated to the vehicle, that the vehicle VIN plate is the same as that on the fitment sheet and that the VIN stamp on the vehicle ties up.

Having signed off the fitment sheet, Ralekwa takes out a nozzle and, after shaking the canister, attaches the canister of dots onto a compressed air line. He then applies a sample dot onto the fitment sheet. We see a smudge of adhesive on the paper with 20-odd tiny black dots embedded into it – the DNA of this Nissan. Ralekwa begins spraying in short bursts into the cavities of the Nissan's bonnet and the internal spaces of the engine compartment's framework. He then proceeds to spray individual components on the engine. "All of the major panels and all tradable parts of this vehicle are being 'contaminated' with these dots," says Menday.

Each vehicle has a quality specification stipulating where the dots will be sprayed and this information is made available to the police services. The 10 000 dots are sprayed in 88 different places on the vehicle.

The adhesive cures completely in 24 hours and takes on the background it is applied to – making the dots invisible on the components of the car but "the trick is, the adhesive has a UV property that fluoresces under UV light." We get the opportunity to shine a simple UV-torch onto the newly applied patches of dots. They are very easy to find.

Once the engine compartment is complete, Ralekwa moves around the vehicle, marking the tailgate and other components as he goes. He moves into the pit underneath the car and continues marking components from the underside. Once finished, he places the Nissan DataDot sticker onto the car's window, "which makes the vehicle too hot to handle and much less desirable to criminals." He scans this vehicle one last time, and the car is registered on the Nissan SAP system as 'dotted'.

Menday tells us that vehicles worth R1,2-billion are crushed annually by the police services because the legitimate owners cannot be traced. "No Nissan vehicle made or imported after 2006 will be among these," he adds.

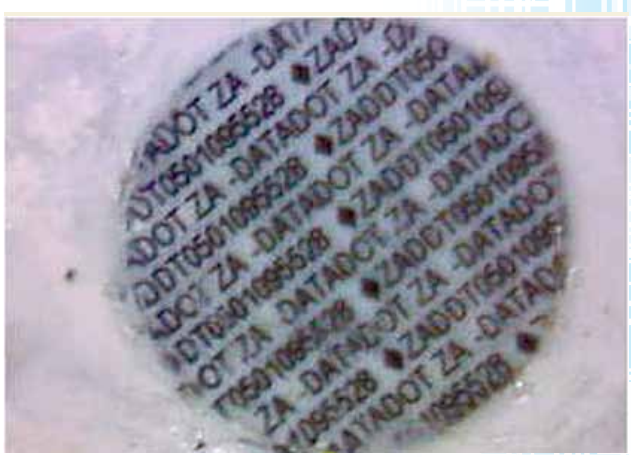
Police conducting forensic investigations on stolen vehicles or parts need a low-tech UV-torch to find embedded microdots and a simple microdot viewer/reader to determine the vehicle's microdot PIN number. They then link into their databases to determine the identity of the vehicle. They need only find one dot to identify a vehicle, unlike the criminal, who needs to find 10 000 dots to remove its identity.

At a later presentation by Burgers, he summarises some successes. All makes of recovered vehicles that have been 100% microdotted have been identified by SAPS – all Nissans, BMWs, Toyota Quantums, AVIS and SAPS vehicles. More than 3 000 vehicles with microdots have been recovered and in more than 400 cases, the microdots were the only identifiers left on the vehicle. Recently, microdotted parts from 28 different vehicles were identified in one chop-shop.

"With a fuller take-up of the technology and fitment, which complies with the Standard launched today, BACSA, in conjunction with the partners, hopes to see similar and even better results going forward," says Burgers.

The cost increment off production lines is just R400 – of the order of a single month's insurance premium. Surely all South African vehicle manufacturers and fleet operators should adopt this process and the associated new standard.

UV light is used to quickly find patches of microdots embedded in fluorescent adhesive.



This clearly readable DataDot microdot was taken off the exploded Nissan Almera in a test to prove the permanence of the microdot marking process.

Angola – breadbasket of wealth and hope or land of continued misery?

How do you effectively rebuild a nation that has been destroyed by more than 25 years of civil war, and do so in a way that allows all its citizens to participate in the rebuilding process while benefitting from the windfall wealth that has been unearthed?

These are questions that Angolan politicians and human rights groups have been battling to come to grips with since the end of the civil war in 2002. Angola is, potentially anyway, one of Africa's richest countries. It is the largest oil producer on the continent, ahead of Nigeria, pumping more than two-million barrels of oil a day (b/d).

The Angola Oil & Gas Report compiled by Business Monitor International (BMI) estimates that the country will account for 3,83 percent of Africa's regional oil demand by 2013 while providing 19,53 percent of supply.

Angola is currently the largest producer although Nigeria's exports could also rise substantially if that country can resolve the conflict in the Niger Delta area. Both countries also have extensive gas reserves and the region used about 107-billion cubic metres (bcm) of gas last year and its consumption is set to rise to about 177 bcm by 2013.

One of the problems facing Africa's oil producing regions is the variation in prices achieved for crude. For instance, the oil price last year was well above $100 a barrel and it has now fallen back to about $50 a barrel, suggesting that African countries will be as well-off this year as they were last year.

For 2009, BMI estimates that the average price of oil will be around $57 a barrel rising to about $65 by December this year. This will not dent growth prospects for the country, which grew by 15,2 percent in 2008 and is expected to grow by about 11 percent this year.

This means that unlike many African countries, Angola is still in the fortunate position of achieving positive growth for at least the next five years.

Spectacular oil demand growth – admittedly from a low base – has helped Angola to expand local oil consumption from 81 000 b/d in 2008 to 156 000 b/d by 2013 as conditions in the local economy improve.

The BMI report estimates that oil consumption in Angola will rise by 342,8 percent between now and 2018 and will then slow to about 15 percent a year thereafter. Gas production will increase by 362,4 percent during the same period.

Given the fact that Angola has a population estimated at between 12- and 14-million and has proven oil reserves means that it will continue to remain extremely wealthy as a nation in the years ahead.

But that does not mean that the outlook is necessarily rosy for Angola and its people. The country is ranked at 147 out of 179 countries in terms of corruption, and its human rights record is being challenged by many international organisations.

From a social development perspective little money is being invested in rural people. When visiting the capital city of Luanda – originally designed by the Portuguese to house 800 000 people and currently harbouring more than 5-million — evidence of poverty is everywhere, as is the evidence of excessive wealth.

In Luanda itself luxury Bentleys, Mercedes MLs and Hummers speed up and down the city streets where a hotel room – if you can find one – will cost at least $300 a night. Despite this evidence of wealth, the Council on Foreign Relations' report, entitled Angola's Political and Economic Development, says that most Angolans still live in poverty earning less than a dollar a day.

So the windfalls of excessive earnings from oil and gas have yet to translate into meaningful changes for the average Angolan citizen. Of course, the sustained civil war also caused widespread and catastrophic damage to the country's roads, railways, bridges, ports and airfields. It decimated the agricultural infrastructure. According to the report, Angola lacks a pool of skilled labour, with almost half its population under the age of 15, has a poorly functioning health-care system (with an infant mortality rate among the highest in the world) and an inadequate education system. According to the Council on Foreign Relations, more than 45 percent of school-age children are not in the formal education system at all. The country is ranked at 162 out of 177 countries on the United Nation's Human Development Index.

The combination of enormous wealth and widespread poverty has created some of

the greatest development challenges faced by any country in the world. Simply put, Angola must rebuild its social and economic infrastructure from the ground up.

Political power is concentrated around President Jose Eduardo dos Santos who has been in office for 30 years and political analysts point out that he heads a patronage system that actually operates outside state channels.

He is all-powerful – this results in people being removed from posts and reassigned to others – which undermines the efficacy of government. The country is, nominally anyway, a multi-party political system and yet it has not held multi-party elections since 1992.

The main opposition party, Unita, is considered to be almost irrelevant now and a June 2007 survey published by Semanario Angolense newspaper in Luanda showed that only 16,8 percent of people would vote for an opposition party.

Despite this, there are some efforts by government to promote democracy. Working with the World Bank, government expenditure is now being monitored and the Ministry of Finance is publishing information about budgets, oil revenues and financing programmes from Chinese organisations on its website. A 2008 report from Britain's Department of International Development warns that many donors and policy-makers in foreign countries view Angola as being a 'sea of chaotic corruption', a perception that the Angolan government has done little or nothing to change.

The Angolan government has balked at reducing the overwhelming power that President dos Santos wields in the country and in July last year it closed down the independent Radio Despertar, which was one of the few Angolan media organisations prepared to create a broadcast platform for the political views of opposition parties.

Angola is ranked at 42 (out of 48 countries) in the Ibrahim Index of African Governance, with low marks for human rights, democratic participation and rule of law. Nigeria, itself dependent on oil for its economic well-being, also fares poorly on this index, being ranked at number 37.

As the Council on Foreign Relations points out, a significant barrier to a more robust and transparent political system in Angola is the state-owned oil company Sonangol. It was created in 1976 and has a 51 percent interest in all production from the oil-rich province of Cabinda and from the offshore concessions where huge oil fields have been found.

Sonangol oversees all the licensing for exploration and oil production and determines the profit that is due to government and the payments that must be made to the Finance Ministry.

Surprisingly, though, Sonangol is regarded by international oil industry peers as being an extremely well run and efficient organisation. The company – even during the civil war – managed to repay its oil-backed loans and stuck to the terms of the supply contracts it had negotiated.

Some industry analysts claim that Solangol has some of the most talented professionals in the oil industry. For years now, Western organisations have suggested that Sonangol move away from its quasi-fiscal role and focus, instead, on its core competency of producing oil or exploiting oil reserves.

The World Bank has called on Sonangol to contribute to the country's economic development by training more Angolan citizens and then expanding fuel storage capacity, investing in social projects and improving fuel distribution outlets to create jobs for local people.

The International Monetary Fund has praised Angola's macro-economic policies that allowed triple-digit inflation to be reduced sharply and then pay back all its creditors.

The Angolan government has not targeted its poverty problems directly– particularly in rural areas – but has invested in large infrastructure and public works programmes instead. The programmes are being administered through the Gabinete de Reconstrucao Nacional (GRN), which was created in 2004.

The infrastructure and public works programmes that have been planned for Angola are phenomenal and extensive because the entire country needs to be rehabilitated. However, the programmes are being severely hampered by the technical capacity of government officials and figures

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SANEA

The South African National Energy Association

Energy People Working Together

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

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

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

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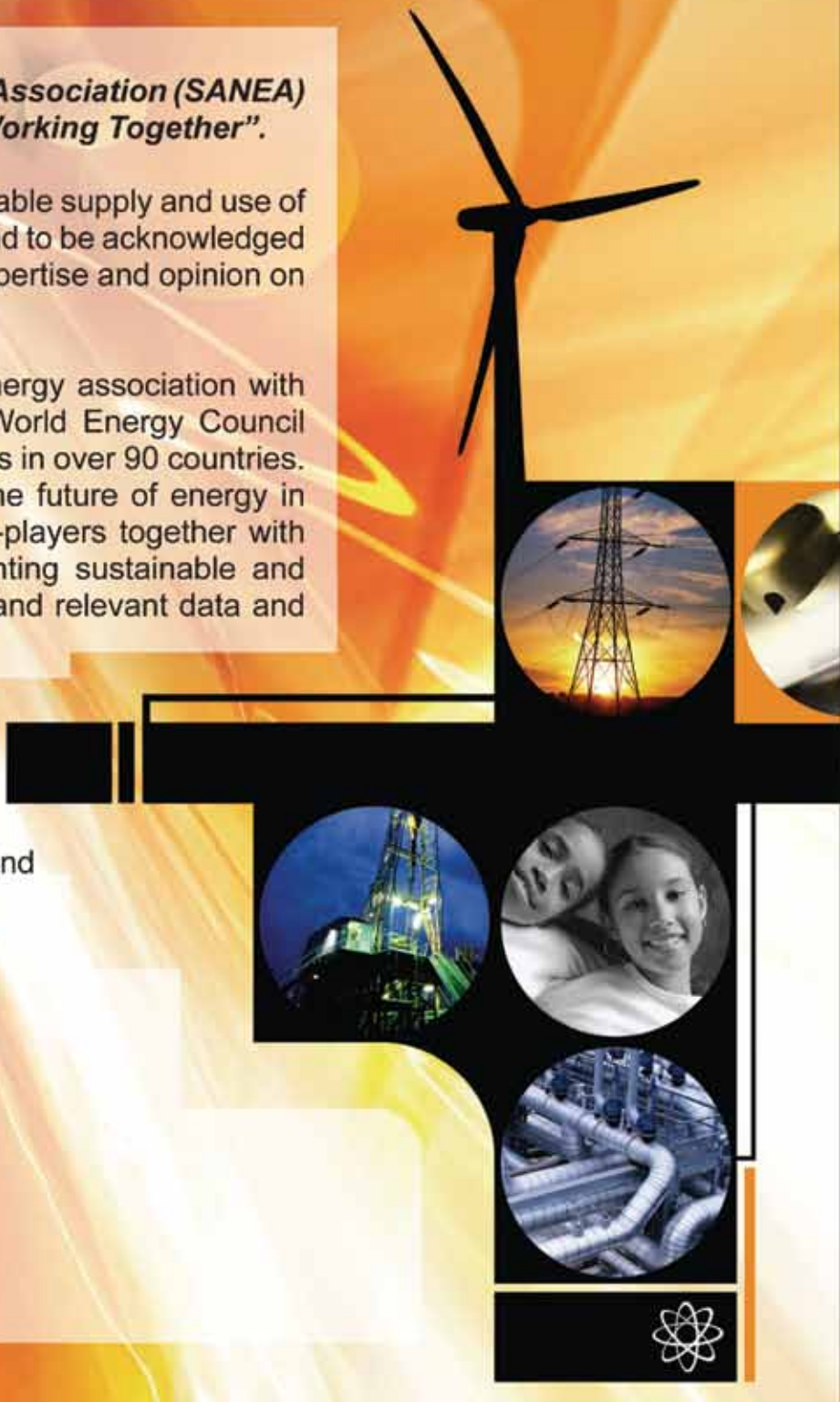

continued from page 17

compiled by the United States-Angola Chamber of Commerce show that up to 40 percent of departmental budgets were being returned to the Treasury because projects could simply not be implemented.

This is not surprising considering that only 16 percent of government employees have completed high school. This lack of capacity is one of the most relevant reasons for the public infrastructure and development programmes failing to get off the ground or to make any contribution to the upliftment of rural Angolans.

High unemployment in Angola is another huge problem and an opinion poll administered by the International Republic Institute showed that 75 percent of respondents regarded unemployment as the most pressing problem facing the country.

Some analysts say that by rejuvenating the agricultural sector, jobs will be created but World Bank figures show that roughly two-thirds of the population already earn a living from small-scale farming. Yet, the Angolan government allocates less than one percent of its total budget to this sector of the economy.

Because of its colonial past, Angola has maintained its ties with Portugal and annual trade with the Portuguese is expected to reach about 2,5-billion Euros this year, making it the largest European trading partner.

However, China and Angola have forged extremely strong ties and today Angola is China's largest trading partner in Africa and also China's single largest source of oil.

Oil exports to China have increased sevenfold since 2002 (twice the growth rate of Angolan oil exports to the United States) while China has extended three multi-billion dollar lines of credit to Angola. Two loans of $2-billion were made by the China Exim Bank in 2004 and 2007, while the China International Fund provided a loan of $2,9-billion.

The loans from China Exim Bank will be used to finance projects for energy, water, health, education, fisheries and communications while the $2,9-billion credit line – managed by GRN – will be used for railway rehabilitation, highway construction and new airports.

However, a Chatham House report notes that it remains unclear how much money is managed by GRN, how the funds are allocated to projects or how much money has actually been spent so far. Some analysts are skeptical about the growing relationship with China, but the Angolan government is quick to point out that it has established strong ties with many other countries – from France to India – as well.

China is involved in many projects and in an article published in the New York Times Magazine reporter James Traub recounts his visit to a Chinese worksite where the project manager told him that he had to teach Angolan workers how to mix cement even though concrete is the only building material used in Angola.

There is some concern too about Angola's ability to maintain projects that have been built by the Chinese contractors. A report by Campos and Vines says that the government will have to focus much more attention on planning and organisation to ensure the sustainability of projects and the transfer of know-how, otherwise it may have to rely on foreign contractors and engineers to maintain or rebuild projects originally undertaken by the Chinese.

Angola's government likes Chinese financing mechanisms because they offer better conditions than commercial loans and provide the country with lower interest rates and longer repayment periods. But there are signs of a strain in the relationship amid rumours that construction on the railway to Lobito has been halted and that negotiations with a Chinese petrochemical company to build a refinery in that port city have collapsed.

Some experts warn that Chinese workers are flooding the Angolan job market at the expense of locals. As the report by the US-Angola Chamber of Commerce points out, the greatest deficiency in the country is the deficiency in institutional and human capital.

Angola's political and economic development will require patience. Angola has eight provinces, 164 municipalities and 557 administrative units, known as communes or comunas, which are divided in sectores, bairros and blocos. Each province has its own government, with governors appointed by central government and vice-governors selected from a different political party than the governor.

The provincial government appoints the municipal administrator, who in turn appoints the comuna administrators. There are no formal state institutions or structures below that level. The country's traditional leaders,

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known as sobas, are the local governing authorities in rural and peri-urban areas.

It is this structure that compounds the administrative problems faced by the Angolan government and may be a contributing factor when it comes to implementing social and economic reforms in rural areas.

In Angola, land ownership is regarded as being owned by a universal deity and ancestors of living occupants. So land is held by a community and administered for the benefit of that community by the soba. This ownership process has been sustained through Portuguese colonial rule, the nationalisation of land after independence, the displacement of about 4-million residents and the adoption of two formal land laws.

Land management is traditionally controlled by the soba on behalf of a community. All members of the community are entitled to use a portion of the land, or arrangements are made within the community to lease or borrow the land. The soba is entitled to allocate land to households and individuals.

In urban and peri-urban areas individuals are able to buy land and in these areas the soba have little or no authority over land allocation. Women do not have land access equal to men because under traditional succession, land passes to sons on the male line. If a woman is widowed, abandoned or divorced, the former husband or his relatives may force her off the husband's land. The transferability of land under customary law prohibits permanent transfer of land because it is deemed to be held in trust for ancestors and unborn generations and cannot be permanently transferred.

Angola does not have a written, comprehensive statement of its land policy with the result that there is no guide to land-related legislation to prioritise economic growth and development, land access, tenure security, land use or land administration.

In the colonial period, the Portuguese established large farms and plantations to grow cash crops for export and some farmers might have received title to that land. After independence, Angola's government nationalised all the land, and subsequent efforts to collectivise farming have failed. By the mid-1980s most farms were abandoned and production had ceased.

In 2004 Angola introduced its first Land Act, which allows the government to exercise ultimate authority over all land and natural resources. It has an irreversible right to expropriate land. The Angolan government can confer transferable rights on rural and urban land.

The transfer of land is based on surface rights and these can be mortgaged or purchased. The surface rights are granted for a period of 70 years, subject to renewal.

These issues may complicate social investments – particularly by foreign companies – in Angola and may inhibit the development of large commercial farms run by individuals or companies who are interested in investing in Angola.

However, the government claims that its programme to develop farming activities in rural provinces have created 570 000 new jobs in just three years and that the farming outlook in Angola is improving every year.

The problem is that Angola still relies heavily on imports and while the rural farms may have created additional jobs there is still no real indication that Angola will return to being a net exporter of food and agricultural products as it was prior to independence.

Compounding the agricultural problems is the lack of a road and railway network to link the rural areas with the major centres where food can be sold in an urban market.

So despite having access to vast potential wealth from its oil and mineral reserves, its agricultural potential and its small population, the future for Angola is beset with problems because it lacks vital infrastructure at every level.

Of course, this probably means that there are more and more opportunities for South African companies and organisations to invest in this country and to assist it in meeting its own goals but the stark reality is that Angola currently has to rely heavily on external markets and contractors to supply products, services, materials, machinery and, most importantly, expertise.

For it is the expertise that, most sadly, is lacking in that country.

Angola's mining sector worth $94,8-billion

Angola, blessed as it is with incredible oil wealth also happens to have minerals and metals worth billions too and prior to independence, Angola was one of the world's major producers of diamonds, iron ore, gold and copper but war disrupted much of this.

Today Angola is the fifth largest producer of diamonds by value with mines principally in the provinces of Lunda Norte and Lunda Sul. Most of the production until now has come from alluvial deposits but Angolan state-owned company Endiama is hoping to exploit large kimberlite pipes that have been found in the country but are not yet being mined.

However, the downturn in the global commodity market is likely to have a negative impact on the country over the next few years and international research group BMI says that because banks are cutting back on loans used by diamond traders to purchase stones, the diamond mining market has receded sharply.

The world's biggest diamond producer, De Beers has cut production by 30 percent because of the slump among diamond traders and a consequent fall in retail sales.

As a result, BMI forecasts that Angolan mineral exports – more specifically diamonds – will drop this year to about $94,8-billion – still a significant amount of revenue for a country with a population of just 12-million people that's already pumping more than 2-million barrels of oil a day.

Watt Says

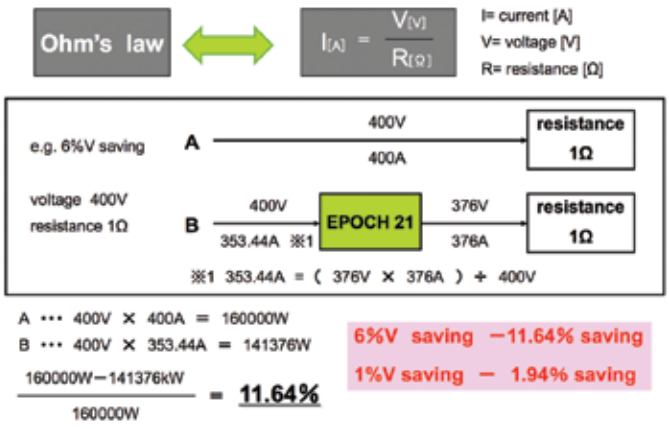
Sirs,

With the 34% increase from Eskom and the 33% from Jo'burg (your article June WATTnow pg 49), what is industry/commerce proposing?

As we all know, energy management starts from the cheapest solutions, for example, good housekeeping' 'Switch-off' campaigns; arranging shift patterns to maximise daylight hours; reduction in lux levels; cleaning of lighting fittings; optimisation of inverter drive settings; ensuring pf is good; etc, etc.

However, with increases of the percentages proposed maybe one should be looking at some capital expenditure with a good ROI.

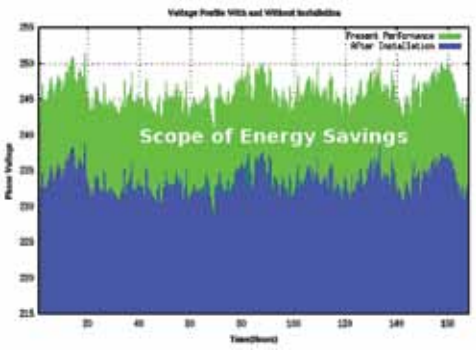
Let us go back to basics and Ohm's Law:-



The problem

Electrical power is distributed to users through high voltage distribution techniques, the principle reason being to increase the efficiency of delivery of power. This approach is also true with respect to low voltage systems and it is commonly found that power is delivered to the user at the higher end of the allowable voltage range in order to maximise distribution efficiency, for example, 247 V instead of 240 V.

Since electrical loads can be classified as resistive, inductive and non linear, this means that the end user will consume more power than if the voltage is lower. In many cases, if the voltage is lowered to the correct level, then energy will be saved with no detriment to the performance of the loads on the system, this represents Scope of Energy Savings.



If we reduce the tap settings on our 415 V distribution transformer we will increase our distribution losses and reduce the lifetime of the distribution network (the above figure illustrates the scope of energy savings for an installation). This is compounded by the fact that the standard in the country (not SA) is now 230 V and many of the loads are designed to operate efficiently at 220 V; this ensures that all users on a power grid can operate all loads correctly, but it does not mean that equipment will operate in the most energy efficient manner, this further adds to scope of energy savings.

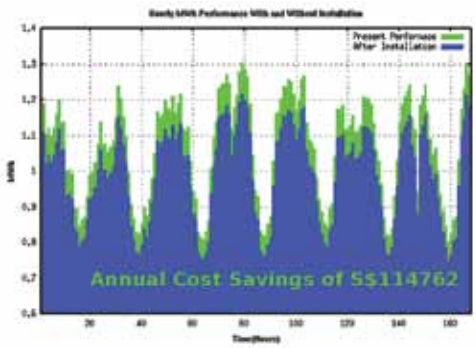
The solution

The solution is to fit a worldwide-patented power optimisation technology, which has the ability to optimise power flows by regulating the voltage level. This enables both the distribution and load losses to be regulated to the correct level for optimised power consumption. The technique not only reduces total power consumption it also consequently increases system real power capacity and system reliability while potentially reducing operational maintenance.

The technology approach will deliver:

- A reduction in energy consumption and carbon emissions
- An increase in system capacity and reliability

On an installation in Singapore the savings were as indicated below (currency Singapore dollars):



Further and more detailed information can be obtained from the writer.

Yours faithfully,
James S Galloway, I.Eng., FIET.

. . .and a second contribution from James:

Sir,

I noticed the interesting article in the Watt's Science section of the June issue, regarding the burning of whiskey in order to prove its authenticity.

When I saw the word whiskey I assumed it was of Irish or American origin. However, I noted that the sample under test was an 1856 Macallan. This was certainly not whiskey; it was Whisky.

There is an important distinction between the two. You see, whisky (plural whiskies) shows that the product was made in Scotland, Wales, Canada or Japan, whereas whiskey (plural whiskeys) shows that it was made in either Ireland or America.

As a bonus, here's another whisky spelling trivia gem for you: Despite what I told you above, the official spelling in America is actually whisky. The Bureau of Alcohol, Tobacco and Firearms decreed it so in 1968. Some distilleries obeyed. Others clung to tradition. And in the whisky world, tradition is important, much more important than the Bureau of Alcohol, Tobacco and Firearms. Which is why they had to give in and allow American distilleries to choose the spelling they wanted to use, and why you'll see examples of both spellings on American labels.

It is also sad that one has to go to such extremes as burning the golden nectar to prove its age.

Yours faithfully,
James S Galloway, I.Eng., FIET.

Dear Sir,

The Editor's page refers to columnist David Bullard's comments on engineers getting it wrong. If the article entitled Power to the People – but not from a plug is the article Paddy Hartdegen is referring to, then Bullard was correct in blaming the ANC hierarchy (which, in fact they do accept) for not building power stations in time.

The comment on Page 25 referring to the SAIEE "examining and realigning its demographics ... opening its doors to all races prior to the 1994 elections," is untrue. I do not think that the SAIEE constitution ever had racial exclusions. As President in 1994, I do not recall any such action nor in the years prior to 1994.

Regards,
Bill Calder
Past President SAIEE

Paddy Replies:

Two things: the article I was referring to by David Bullard was the one where he said that Africa would have remained in the Dark Ages and not given a damn about it either. He was wrong – so wrong he was fired from that job anyway.

The second point is the SAIEE did not have a racially-based exclusionary clause for its membership. However, Job Reservation precluded blacks from becoming engineers or technicians for many, many years resulting in a dearth of available candidates of another colour to join the SAIEE.

Certainly, any engineer of colour who applied to join the SAIEE would have been welcomed with open arms in the Sixties, Seventies or Eighties.

The problem was that South Africa's laws (more specifically Job Reservation among others) and not the SAIEE precluded any blacks from becoming electrical engineers or certified electricians.

Wadley – a genius worth remembering and applauding

By Paddy Hartdegen based on research done by Dirk Vermeulen and Professor GR Bozzoli

That Trevor Wadley was an engineering genius has never been disputed, but judging from some of the research material I have read, it's clear that he was certainly eccentric. Moreover, his ideas were backed by an unwavering determination that he was always right.

History seems to prove that he was.

Born in Durban in 1920 to a relatively influential family – his father was Mayor of the city for a period – Trevor was one of 12 children. He was a loner who had few close friends; he had an aversion to getting up early and hated living under strict rules and regulations.

To compensate for these curiosities, he was blessed with a brilliant mind and like many brilliant students was soon to excel in mathematics and science. But he paid little attention to the subjects that did not interest him – just as he couldn't really be bothered learning to play any of the school sports that young men were supposed to enjoy.

There was an exception though: Wadley, much to the surprise of his school mates and teachers, decided one year to enter the annual cross country athletics event and predicted, quite arrogantly it seemed, that he would win the event in a record time and that his record would stand for 15 years.

He began training and, apart from regularly running, he kept to himself. Sure enough, when race-day came, Wadley was kitted out in his running shorts and as the starter's gun fired, he sped off into the distance.

No one could keep up with him and, as he had predicted, he did win the event – the first sporting event in which he'd competed. What's more his record did stand for 15 years before it was eventually broken.

Of course, what the teachers and his chums did not know was that Wadley had calculated exactly how long it would take him to cover the first hundred yards, then how long it would take to run the second, then the third and so forth. He had marked off each hundred-yard distance on Burman Drive and trained himself to run each stretch in the time he'd allowed.

His school career at Durban Boys' High was sufficiently impressive for him to gain entry into Howard College (later the University of Natal and today the University of KwaZulu Natal) where he studied electrical engineering. Lecturer, Professor Eric Phillips and his fellow students would today attest to the fact that he seldom, if ever, took any notes during classes.

He just remembered them.

In his book entitled Forging Ahead – South Africa's Pioneering Engineers, Professor GR Bozzoli refers to Phillips' recollections of Wadley. "He would very occasionally take out a small pocket notebook and write a word or two in it using a blunt, stubby pencil. His remarkable mind understood and remembered every item of a lecture."

Naturally enough Wadley could excel in any of the examinations and his lecturer recalls that he would never confine his answers to the minimum number required. Instead he would answer all the questions, then repeat them all as a check and would still finish the examination before the allotted three hours were up.

In that way it was possible for him to regularly achieve more than 100 percent for an examination.

But examinations didn't fascinate Wadley much either. He would do just enough work to get through the degree and would devote the rest of his time to hobbies and other interests, for he seemed much more fascinated by the practical application of his knowledge and ability.

When the World War 11 broke out, Trevor Wadley was one of six people (five plus the leader) who formed the nucleus of a highly secret unit, based in Johannesburg, which was dedicated to developing radar.

One of the early advertisements for the Tellurometer that was being assembled in Cape Town according to Wadley's patent and being sold throughout the world.

The six of them were seconded to Britain for special training and he was expected to memorise, probably parrot-fashion, the instruction manual being read to students by a sergeant instructor. Wadley was too quick for that as his mind was capable of understanding abstruse and complicated ideas almost immediately. He had to suffer through the training but had grasped the essence of radar and its application.

After this 'training', Wadley was posted, as the officer in charge, to a radar station operating in the Middle East and he set to work improving the equipment used there, something he did successfully.

At the end of the war, the President of the CSIR, Dr Basil Schonland decided to put the skills of the five talented young men to good use and established the Telecommunications Research Laboratory, initially in the Electrical Engineering Department at the University of the Witwatersrand.

It was later renamed the National Institute for Telecommunications Research, with Dr Frank Hewitt as the director and Trevor Wadley and Jules Fejer as two of the first staff members.

Whether he was a gambling man by nature or not is unknown, but almost every day, Wadley would challenge staff members, colleagues and students with one of his seemingly preposterous suggestions that appeared, at least on the surface, to be outrageously wrong.

Vigorous arguments would soon follow and Wadley would bet anyone willing to accept the wager, that he could prove, beyond doubt, that he was right.

He always was.

Bozzoli writes that his colleagues and students were eventually so exasperated by this that they decided to get their own back. They bet Wadley, who was reasonably portly that he would not be able to crawl through a five-metre length of mutton cloth.

Wadley knew the mutton cloth would stretch – he was so quick he'd probably calculated by how much it could expand – so he took up the challenge believing he couldn't lose.

He climbed into the mutton cloth tube and gradually crawled through it until he'd reached the halfway mark. Then, his challengers tied a knot at either end of the mutton cloth, trapping him. They left him stranded, unable to cut his way out, as he didn't have a pocketknife or sharp instrument until he was forced to admit, shame-facedly that he'd lost.

That's the only bet he ever lost.

One of Wadley's earliest contributions to the world of electrical engineering was the development of an ionosphere sounder or ionosonde, as it became known. This apparatus is used for measuring the height of the ionised layers of air above the Earth's surface at distances of between 50 and 600 kilometres.

Ionospheric layers were used as sound to reflect radio waves within the band of frequencies between 100 kHz and 20 MHz. He designed

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Professor G Bozzoli described Trevor as 'the only genius he knew' and the director of overseas surveys in the United Kingdom referred to him as 'The man who changed my life'.

Wadley's fertile mind produced the famous Wadley radio receiver and the revolutionary Tellurometer. In the 1960s the receiver was standard equipment for the Royal Navy and was used professionally throughout the world.

The Tellurometer shook the foundations of land surveying and over 20 000 of these remarkable instruments were sold throughout the world. It was manufactured in Cape Town and had an important influence on the whole South African electronics industry.

This remarkable member of the SAIEE grew up in Durban as the seventh child in a family of ten. His younger sister, Mary von Hirschberg, has compiled this fascinating biography of her brother entitled: Biography of Trevor Lloyd Wadley – Genius of the Tellurometer

Trevor was undoubtedly one of South Africa's most significant electrical engineers and this biography will interest anyone wanting to know more about what makes brilliant folk tick. The SAIEE will be publishing a history of electrical engineering in South Africa next year which will include a whole chapter on the technical aspects of Wadley's work.

The book is available from Innes House with 112 pages in A5 format at a price of R140 excluding post and packaging.

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and built an instrument that made a complete scan of the frequencies in less than a minute and, using a 16 mm movie camera, recorded the resulting contours, which were then compressed to display as a single frame photograph.

The longer sequences could be viewed using a projector to better understand what happened during an ionospheric storm or some other disturbance.

His equipment was used to provide a frequency prediction service to the South African Broadcasting Corporation, the Post Office's radio section, to the military authorities and other short-wave radio users too.

All existing ionosondes used complex switching mechanisms to switch from band to band, but Wadley believed he could avoid switching by using a novel heterodyne method of covering the radio spectrum in a single sweep for both the transmitter and receiver. He achieved this and was soon able to do a complete scan in just seven seconds.

The next invention was an all-wave radio receiver, which maintained virtually perfect frequency stability using a single crystal oscillator. The principle was patented by the CSIR and, after fruitless negotiations with various companies, a large British firm agreed to produce the first versions of the now famous Wadley Receiver. It was produced in revised forms for many, many years.

Col HA Bauman, director of the South African Trigonometrical Survey Organisation, suggested the need for an improved distance measurement instrument and Wadley was given the job of devising this equipment. Until then, all survey work was done using tapes to establish base lines and then theodolites to measure angles to high precision for extending the survey beyond the baseline.

Bauman framed, for Wadley, the operational requirements for any new apparatus. He said it had to be man portable and able to measure distance of between five and 50 kilometres to an accuracy of better than one part in 100 000.

Wadley produced a transmitter/receiver device within a few months and positioned it at one measuring station focused on a transponder at a distant point. A signal from the transmitter triggered a response from the transponder and the receiver measured the time it took to cover double the journey (there and back). Wadley used that information to calculate the distance.

He knew that radar was able to provide a rudimentary distance measurement but it could not be used for precise survey measurements. So Wadley devised a method of superimposing a wave of suitable frequency on the microwave signal and used a highly precise method of phase comparison to determine time and, therefore, distance.

Stupidly, Lauf bet Wadley that he would not be able to get a sufficiently accurate measurement using this method. The test duly took place and Wadley provided his results to Lauf for comparison with the known survey data. The figures did differ by a small, insignificant amount and Lauf simply presumed that he was right and Wadley's figures were wrong.

But the ever-obstinate Wadley told him that his measurements were

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right and the original measurements were wrong. He was so determined to prove this that he kept badgering and nagging Lauf until he eventually agreed to recalculate the original measurements.

To his complete astonishment, Wadley was right.

It was Wadley's knowledge of Latin that created a name for the new device he'd invented for surveying tasks. Tellus, in Latin means earth and so the tellurometer was born.

It was an immediate success and soon became known as the device that revolutionised land surveying. The Tellurometer was made by a Cape Town company and eventually sold thousands of units, which were used to survey countries and regions throughout the world.

As an engineer it may be surprising to realise that Wadley was not particularly keen on mathematics – although he understood it extremely well – but his early friendship with Jules Fejer resolved this problem for him. The Hungarian mathematician was extremely gifted and from an early point in their friendship, Fejer set out to prove each one of Wadley's concepts mathematically.

He always did.

It was combination of skills that made Wadley and Fejer a formidable team in the scientific, engineering and mathematical realms.

Wadley was awarded his Doctorate of Science for his thesis entitled Heterodyne Techniques in Specialised Instrumentation. He was later rewarded with an honorary doctorate by the University of Cape Town, received a gold medal from the South African Institute of Electrical Engineers in 1960 and was also presented with a medal from the Franklin Institute in America.

In fact, he received so many accolades that we cannot possibly record all of them here.

However, perhaps Wadley's most satisfying memory was the prolonged applause he received from a distinguished audience of peers attending his presentation on the electronic principles of the Tellurometer that was presented at the Royal Geographic Society's meeting in 1957.

The recognition from his peers meant much to him. Perhaps as much as the commemorative stamp that was issued by the South African Post Office to honour 25 years of Wadley and his Tellurometer.

Wadley retired from the business world in 1964 aged just 44 and lived a comfortable life on the south coast of KwaZulu-Natal until he died of cancer in 1981 at the comparatively young age of just 61.

He'd made a formidable contribution to science, electronics and electrical engineering, locally and internationally, in his short life and for that Wadley will always be remembered.

And respected, and revered.

The widely-used 12RA-radio designed by Treevor Wadley.

The very popular and commercially successful Barlows Wadley XCR30 Mark Two radio that was heralded as possibly the finest model in the world.

The prototype of the Barlows Wadley radio with a handwritten frequency guide

Bye, bye, you Telkom guys...

I think that if you were to round up all the people in South Africa who dislike Telkom and its telephone service then the only people left would be those who actually work for the organisation.

So I was delighted, a couple of months ago, when I saw the Neotel workers moving methodically down the pavement installing cables to provide an alternative telephone service.

I watched the progress with interest and – believing that I'd be dealing with a bureaucracy modelled on Telkom – decided to apply immediately for a Neotel service and wait the mandatory six weeks or so for approval, then a technician and his team, and then another two or three days before, triumphantly, I could dial my first call.

How wrong could I have been?

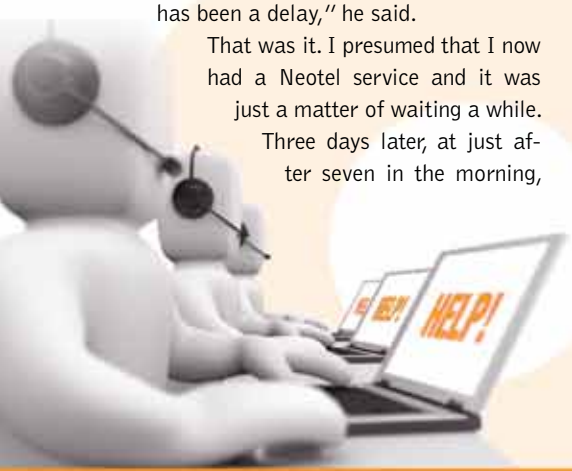
First of all, I met a pleasant-speaking, articulate call centre operator who told me what I needed (or at least what he thought he knew I needed). The account application was then done and approved on the phone and he gave me a tracking number.

I assumed the tracking number was like one of the Telkom reference numbers but again, I was completely wrong.

"Sir, your handset will be delivered to you within seven days and if you haven't received it by then, phone us and give us the tracking number and we'll let you know why there has been a delay," he said.

That was it. I presumed that I now had a Neotel service and it was just a matter of waiting a while.

Three days later, at just after seven in the morning, there was a buzz at the gate and, lo and behold, there was a delivery chap with my new Neotel instrument.



I signed for it and excitedly went inside to connect it to my Mac computer. In keeping with hundreds of thousands of other menfolk, I didn't read the instructions, just unwrapped the box, plugged in the Ethernet cable, plugged in the telephone so that it would start charging and waited to see what would happen.

Within a couple of minutes I was logged onto the Internet. No messy setup, no Telkom technicians, no wires, no drilling for phone points and, most importantly no set-up hassles.

Plug it in and get to work.

I was so excited that I phoned my daughter on her cell phone. She was upstairs, asleep in bed having had another late night of jolling with her boyfriend and, promptly the phone started to ring.

This was too good to be true.

"Dad, why are you phoning me from home, I'm at home . . ." she said sleepily.

"I'm just testing Neotel," I said sheepishly. "Go back to sleep."

She is much sharper than I am and had already programmed the new Neotel number into her phone so that it would reflect as 'Home' when a call from there rang on her phone.

Here I was, making calls, connected to the Internet and working away in front of my computers and it wasn't even 7h45.

As there are four or five computers in our house (I have a Mac and a PC, my son has a desktop machine and my daughter has a desktop and a portable) it was soon evident that we had a problem. We could only connect one computer because we had a NeoConnect Prime.

We should have got the NeoConnect Flex Data bundle instead. I didn't know that at the time but you learn from your mistakes and I'd made the mistake.

So I phoned the helpline again and told them about the predicament. "No problem," they said. "We allow you one change on your account anyway. What we'll do is order the Neoflex Data Bundle and you should receive it within seven days," he said. "What about making outgoing calls?" I asked. "Ah," he said. "Then you'll need to add the basic phone service as well and that's R99 a month," he told me, and explained that there were a whole bundle of free minutes and things that I got for this as well.

I couldn't remember what he said altogether but I did know that my original price of R699 and 15 GB of data was now R799 for four computers and 10 GB of data and then a further R99 a month for a phone service to make calls.

Still cheap at the price, I thought.

True to his word, within a week or so the telephone handset and the router arrived. Again there wasn't a hassle to set it up: plugged in the router, and logged onto the Internet.

I tried to log on with the PC (which has a wireless connection) and discovered after a few irritating minutes, that I had to switch on the wireless component in the router's setup software. That took longer to find in the manual than to switch on in the settings panel. I was cooking on gas – and so was my son, with his wireless card fired-up in his desktop and so was my daughter from her wireless card in her portable.

But blow me down, was it slow or was it slow.

It was mid-April (and mid-holidays) too but I got onto the Neotel phone and called the help line. "We're connected and everything's working at the moment but the connection is so slow. I've got an orange light on my router, which says my signal is bad and man I'm struggling," I told the operator.

He suggested I try setting the router up in

different rooms in the house (I hadn't told him that I was stuck in my office, surrounded by walls on all four sides and thick concrete slab for a ceiling) but no matter.

For the next two weeks or so we struggled on manfully. The help line operator had told me that the cables were still being installed and that the service was likely to improve sometime in May.

I was slightly cynical – having dealt with Telkom for so long – and thought, "Well, at these speeds, there's no chance I'd ever use up 10 GB because even if the modem ran all day and night I still couldn't download enough to eat up my cap."

I should have listened to the Neotel technician. Because, one Sunday in May, shortly before my birthday, I got up early, went downstairs to download mails and read the newspapers and blow me away it took seconds and everything was done.

There was no waiting for screen refreshes and no thought of making tea while you wait for a file to download. Boom the file was there.

I looked at the modem and there was a bright green light next to 'Signal' and another bright green light next to something dubbed 1x/EV-DO.

"Test time," I thought to myself and fired up my PC so that I could download the monstrous Service Pack 2 file for Vista. It started downloading and I saw the figures: it was running at 184 kilobits per second and 200 kbs, sometimes higher, for a short duration.

I couldn't believe my eyes. Within half an hour I had the file.

Since then it has been a constant and absolute pleasure: I spent an hour talking to SAFM on a morning programme without my phone plugged in and I didn't have a single interruption.

I've taken the phone with me, in my car, to a friend's house in Waterkloof Park about six kilometres away and it's worked perfectly all the time.

I've downloaded enough files to sink a battleship (including the latest Tom Tom upgrade, a 46 MB file that took about six minutes to arrive) and I love the service.

In fact there is absolutely no way that I would ever go back to the dreaded Telkom service, with its wires, its inconsistencies, its 3 GB cap and its excessive charges.

But – and there's always a but, I suppose – there are still one or two niggling issues that I haven't resolved.

First of all, the E-Mail programme on my Mac that I prefer to use is Microsoft's Entourage (the equivalent of Outlook) and for some inexplicable reason I can receive mails in Entourage but I cannot send them. I've tried resetting every possible button and connection to no avail. Worse still, the Neotel people can't tell me what's wrong. The same applies to the Mac Mail program. I can receive but I can't send.

However, when I use Mozilla's Thunderbird I don't have any problems – I can send and receive to my heart's content.

Oddly enough, with Windows XP and Vista, both Mail and Outook work perfectly.

Right now, my default e-mail program is Thunderbird and the more I use it the more impressed I am with it because there are a range of add-ins that provide extensive functionality from within the mail program which, unless Neotel had forced me to use it, I might not have discovered.

A second irritation was that I had to restart the modem once a day because it would drop the connection after about 24 hours. I initially thought this was a security issue, forcing you to take on a new IP address so I wasn't too bothered by it. However, in the past few weeks, this has stopped so perhaps there was a problem on Neotel's side, which has since been rectified.

The last issue is that if you intend to use the Neotel Flex as a gaming station then you'll probably find that the router tends to jam up from time to time and reduce the response times you normally could expect.

If it's running as a standalone machine then slower speeds are unlikely to affect you but if there are four computers involved in one Internet game against multiple challengers or teams then it might get jammed.

My own view, if you want this sort of application, is to talk to Neotel and get them to advise you on the right line to put into your house. Neotel is making bandwidth affordable and will continue to do so, so you might be better off choosing a dedicated one-gigabit line for serious gaming.

The costs, compared with Telkom anyway, are fractional and the service is unsurpassed.

Neotel might not have many converts yet but I can certainly say that once you've tasted this service you're not going to go back to a Jellytot service, driven by a belligerent call-centre staff that Telkom prides itself on.

And you will never have to put up with impolite people from Telkom insisting that you unplug your telephone when you report a fault – as happened to a good buddy of mine recently – and then refused to report the fault because she, the call centre staff member, couldn't find a fault on the line.

So the fault remained until the next day when, finally a fault was reported (from my Neotel line) and logged by Telkom.

With Neotel, that sort of service is unheard of.

The Eskom tariff increase:
An alternative viewpoint

Comment from electrical engineer Mohamed Fayaz Khan

It is significantly easier to join the chorus of frustration regarding the recent tariff increase awarded to Eskom by NERSA or remain silent for fear of being ridiculed than to have a viewpoint that differs from the overwhelming majority of citizens in our country.

It is in the spirit of fostering much needed debate that I therefore chose to present these alternative viewpoints because I believe that a healthy informed debate on the future of energy is needed to help us chart a better course to a sustainable future.

The 31.3% tariff increase awarded to Eskom equates to approximately 8c/kWhr. An analysis of the media statement released by NERSA clearly states that included in the increase awarded is the 2c/kWh levy on the sale of electricity generated from non-renewable sources.

Eskom, in its application to NERSA, stipulated that the increase was an interim application and did not take into account the 'environmental levy'. This therefore means that Eskom was only awarded a 23.4% tariff increase.

When mentioned in his budget speech, the honourable Minister Trevor Manual was lauded on his visionary thinking for finally taking a firm step to ensure that we slow down the rate of carbon emissions that is rapidly killing our planet. I am therefore surprised at the silence of those 'environmentalists' now, when the government stands to gain approximately R4-billion from a carbon tax (this was calculated by using total electricity sales achieved last year and multiplying it by the environmental levy).

No clarity has been given as to how this is intended to be spent or will it merely form part of the treasury allocation for the next fiscal year?

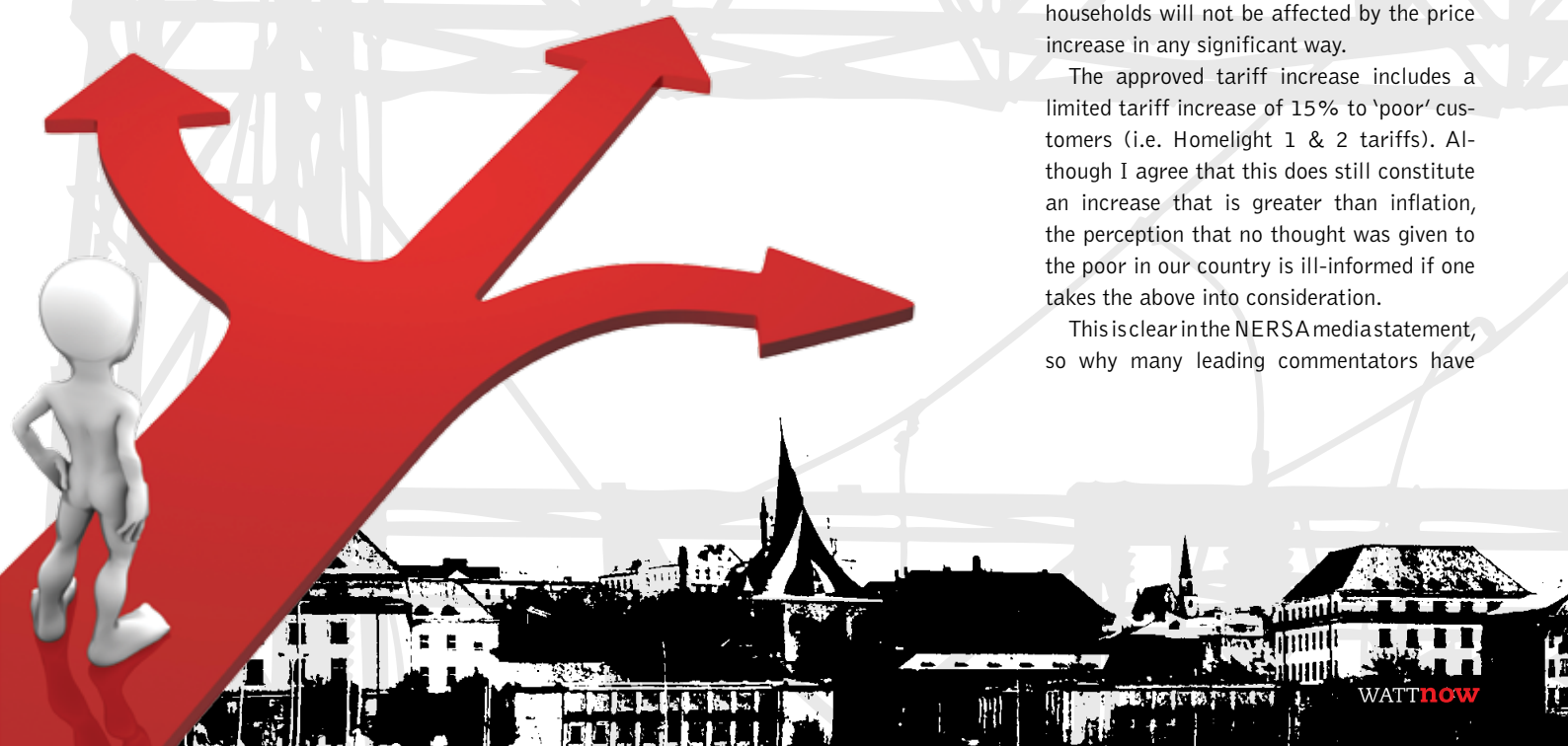
I am of the opinion that the money generated from the 'carbon tax' should be ring fenced and given back to the citizens of this country as incentives to reduce our electricity consumption. Perhaps this could be in the form of more attractive subsidies for solar water geysers for domestic households or high efficiency motors for industry. If this money is not used to reduce the carbon footprint of the average citizen it will represent a significant opportunity lost.

Another popular comment by the media and politicians is that there is no protection for the poor with this price increase.

Eskom and the large municipalities are mandated by Government to provide free basic electricity to the poorest of the poor in our country. This is allotted in kilowatt hours, not in a monetary value, so these households will not be affected by the price increase in any significant way.

The approved tariff increase includes a limited tariff increase of 15% to 'poor' customers (i.e. Homelight 1 & 2 tariffs). Although I agree that this does still constitute an increase that is greater than inflation, the perception that no thought was given to the poor in our country is ill-informed if one takes the above into consideration.

This is clear in the NERSA media statement, so why many leading commentators have



chosen to ignore it suggests either that their opinion is based on the media representation of the tariff increase or that they realised it would be unpopular not to appear to have the interests of the poor at heart.

Most commentators are asking for competition in the energy sector and for us to consider renewable energy. On the first point, there remains limited commercial interest in the generation of electricity because the price of electricity is so low. An obvious parallel would be the telecommunications industry in South Africa.

There is significant commercial interest in our telecommunication sector because our telecommunications costs rank amongst the highest in the world. Even the recently completed infrastructure projects, meant to free us from the shackles of the Telkom monopoly, are yet to materialise.

It is a sad truth that corporations invest in projects to make maximum profit and not to generate more competition in the market. On the concept of renewable energy, everybody, from the COSATU secretary general to the newly appointed Minister of Energy—the honourable Dipuo Peters—claim to support the propagation of renewable energy while simultaneously lamenting the high cost of electricity and its effect on the poor.

The minister in a recent public statement asked that measures be put in place to shield the poor from the electricity price increase. She then went on to say that, "We (must) invest a lot of time and resources in expanding renewable energy as a source".

The reason renewable energy is not gaining momentum in this country is because it is considerably more expensive than conventional coal-fired power stations. As an indication of how much more expensive renewable energy is, one should recall that after the recent tariff increase the cost of electricity is 33.14 c/ kWh. NERSA has recently released the framework for the renewable-energy-feed-in-tariff (Refit) for potential wind, mini-hydro, landfill gas and concentrating solar power investments in the country. The tariffs sanctioned were wind (R1,25/kWh), mini-hydro (94c/kWh), landfill gas (90c/kWh) and concentrating solar with a storage capacity of more than six hours, (R2,10/kWh).

These represent the prices Eskom would be required to pay for energy they would then sell at 33.14c/kWh. For clarification, I am in complete support of the Refit framework and welcome its implementation. My discussion above merely highlights the huge costs associated with renewable energy.

I believe that we need to start diversifying the energy mix in our country as, per capita, we are currently the worst polluting country in the world – something to consider next time we accuse the Americans of being responsible for killing the planet or the Chinese for growing their economy with utter disregard for the effect that they are having on the environment. I believe, however, that NERSA's proposal to review Refit annually would cause concern with potential foreign investors as there would be uncertainty about whether the favourable tariffs would be sustained.

Lastly, the misconception that tariff increases would be considerably lower if senior management in Eskom took pay-cuts or were not awarded bonuses is laughable. Senior management in Eskom constitutes less than 1% of the Eskom staff and a reduction of their salaries would have a negligible effect on the bottom line.

Likewise, their bonuses depend on whether they meet the shareholder (government) targets set at the beginning of each year. If they meet these targets, then they, like any other employee in any other organisation, are entitled to their performance bonuses.

These managers/professionals are not appointed by government so why should they agree to work for a lower salary when they could potentially earn more in industry, with considerably less stress?

Furthermore, the security of supply in South Africa is under severe strain and Eskom staff have worked to minimise the effects of the crisis in the past two years. They represent trained professionals, engineers and artisans who have chosen not to leave Eskom, or South Africa for that matter, but to stay and face the challenge head on. I would like to congratulate those staff on a job well done.

Even after taking into account the recent increase in the electricity price, Eskom continues to be amongst the cheapest suppliers of electricity in the world. I believe that it is time that we stopped focusing on the failures of the past (Government's and Eskom's) and ensure that the correct policies are in place to ensure security of supply, diversification of the energy mix and the universal access of electricity to all the citizens of our country.

My advice would be to conserve as much power as you can, choose energy efficient devices, and consider alternative energy options if you can afford to. I believe that this would be the most effective way for us to face the challenges and minimise the effects of rising energy costs on our monthly budgets.

Incidentally, I am an electrical engineer who is employed in the electricity distribution industry. I am a strong believer in renewable energy and enjoy participating in informed debates because, as long as you keep an open mind, either you are corrected or you educate someone. I wrote this article because I believe that not all issues are considered when people comment about electricity price hikes and that certain misconceptions need to be clarified.

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Grow damn you, grow, grow, grow

Talking to your favourite plants is bound to make them grow faster and bear more voluptuous fruits, but the Royal Horticultural Society has now found that women's voices are even more effective at making plants flourish.

The Society doesn't say whether the women who chatted to their plants were using the same nagging tone applied to sports-watching men who need to mow the lawn.

The experiment, conducted by the Royal Horticultural Society (RHS) over a month, measured a tomato plant's growth when spoken to.

The most effective at promoting growth in the plants was Sara Darwin, whose great-great-grandfather Charles had been one of the founding fathers of this society many years earlier.

Her plants grew nearly 50 millimetres more than other plants and this was attributed to her reading the plants passages from Charles Darwin's Origin of the Species for the entire month-long experiment.

Colin Crosbie, garden superintendent of the RHS, says that the gardeners had predicted that a woman's voice would encourage plants to grow more rapidly and he admits that although none of the gardeners can explain why the dulcet tones encourage more rapid growth, it has now been proven.

(Perhaps the woman was saying, softly and gently, "Grow, damn you. Grow. Get those lazy cells out of bed. Stop wasting time. . . get to work. There's so much to do today. You can't just lie around lazing days away. Get up. . .and get up now, not later dammit." Even a lazy oke would do something with this voice constantly yakking into his right ear).

More seriously, the experiment began in April at the RHS's Garden Wisley in Surrey with open auditions for the public to record excerpts from John Wyndam's T*he Day of the Triffids*, Shakespeare's *A Midsummer Night's Dream* and Darwin's *Origin of the Species*.

A variety of voices were picked to play to ten tomato plants over a month. Every plant was played a voice through headphones connected to the plant's pot. Conditions for the plants remained constant throughout the experiment. Two control plants were left to suffer in silence.

The results showed that plants 'listening' to a woman's voice responded more rapidly than those hearing a man read. In fact some plants apparently disliked the male voices so much that they grew less than the control plants living in silent contemplation.

The RHS should have got members of the Welsh Male Voice Choir to do the reading for them – or perhaps should have used Richard Burton's rendition of Under Milk Wood in their experiment. That way the RHS may have produced tomatoes the size of watermelons.

Bacteria may hold the key to plastic production

Plastics are everywhere in our modern world – from the containers that convey our food to the canisters that carry oil for our motorcar engines. Even organically grown, fresh, raw meat is served to you in plastic containers wrapped with a thin, self-adhesive film.

Yet plastic originates from fossil fuels and without fossil fuels, plastics are wiped off the planet.

Perhaps this is one of the reasons that Mark van Loosdrecht of the Delft University of Technology in the Netherlands started trying to find alternative sources of plastic and revise production methods at the same time.

He started using bacteria to transform agricultural, industrial and household organic waste into plastics. He says that certain bacteria naturally turn sugars and fats in organic wastes into a kind of biodegradable polyester.

However, the high costs of production have made it difficult to harness the bacteria's plastic-producing ability. Not so for Kevin O'Conner of the University College of Dublin who tackled the same problem.

He takes ordinary plastic waste and heats it, in the absence of air, to a temperature that will break the molecular bonds so that plastics revert to oil. Then he feeds the oil to natural soil bacteria, which produce organic polyester.

Richard Gross of the Polytechnic University in Brooklyn, New York, uses a similar principle to produce biofuels. He feeds a vegetable oil to bacteria, which makes a substance that's similar to polyethylene – like the plastic used to make water bottles – and the right enzymes turn this bioplastic into biofuel.

While these processes have been proven in the laboratory, none of them is apparently ready for commercialisation as there is still much work to be done on producing sufficient quantities of the bacterially produced plastics to make commercial products.

A cup of water and the washing's done

Researchers at the University of Leeds have developed a washing machine that uses just one cup of water to complete a full load of washing and this could mean that, once commercialised, trillions of litres of water could be saved in countries around the world.

The machine uses less than ten percent of the water and 30 percent of the energy used by conventional appliances. Thousands of tiny plastic beads, that attract and absorb dirt under humid conditions, provide the detergent power needed to get dirty clothes clean.

Xeros, the company behind the development of this technology, plans to sell the machine to commercial customers such as hotels, laundries and dry-cleaners before making the machines available to home users.

A small amount of water and detergent are used to dampen the clothes and loosen stains. Then the machine creates a water vapour that allows the plastic beads to get to work and clean the fabrics.

Once the washing cycle is complete, the beads fall through a mesh in the machine's drum so they can be collected and re-used for up to a hundred washes.

Xeros has signed an agreement with GreenEarth Cleaning, an environmentally friendly dry-cleaning company to sell the technology in America.

Chief executive of Xeros, Bill Westwater, says that the company has its eye on the consumer market but that it will take time to develop a machine that is suitable. As a result, Xeros intends proving the technology in a commercial environment before investing in products suitable for the consumer market.

The technology was developed by Professor Stephen Burkinshaw of the University of Leeds and was funded by an unnamed intellectual property commercialisation group.

Bend me, shake me, anyway display me

Over the years, screens have got sharper, wider and thinner and now researchers working at the Arizona State University's Flexible Display Centre have come up with a new screen that could be rolled up and carried around in a pocket like paper.

The screen could be used to display words, images, newspaper or magazine pages or even television images. The technology uses a novel lithographic process and an electronic ink to make flexible displays.

The lithographic process was invented at Hewlett Packard's laboratories, the electronic ink was developed by E-Inks – a company that was spun out of the Massachusetts Institute of Technology – and the plastic film was developed by Du Pont.

The film with display properties is produced in long rolls and then sliced into sections to make individual 'electrophoretic' screens that consume a fraction of the power used by liquid crystal displays.

As the American Defence Force helped to pay for the production of this film, the first applications are likely to be in the military arena, providing soldiers with electronic maps that can receive appropriate geographic information and display it. Once proven on the battlefield, it could move into commercialisation.

However, extensive development work is still needed. At the moment the film can only display black-and-white images and it cannot refresh rapidly enough to display moving pictures – as required by television sets.

If the research teams can overcome thesome of these problems then the flexible film has a lot in its favour because LCD screens are expensive to make and and have a wastage factor of 20 percent or more.

LCDs consume a lot of power being lit from behind. The liquid crystals become transparent if light is not shone onto them. Thus, the backlighting is in constant use, consuming electricity to display the image.

E-ink is different: It uses tiny capsules filled with a clear fluid containing positively charged white particles and negatively charged black ones. The capsules are arranged as pixels and electrical charges are applied to each pixel. The charge pulls either the black or the white particles towards the top of the capsule and the opposite colour to the bottom.

Unlike LCDs, the image does not need backlighting but uses reflected light to create the image – much like reading on a sheet of paper. An electrical charge is required only when the image changes.

Millions paid for just 24 songs

A woman who illegally downloaded and shared 24 songs from the Kazaa file-sharing Internet site has been fined a record $1,92-million after being found guilty of infringing the copyright of these songs by a federal jury.

Jammie Thomas-Rasset was brought to trial soon after the illicit file-sharing was exposed and fined $222 000 per song by a different jury. However, the judge in that case declared a mistrial.

Instead of opting to pay the $30 000 fine the Recording Industry Association of America imposed on her, she chose to undergo a new trial and has now been fined $1,92-million for her trouble – equivalent to $80 000 per song. When testifying to the Minneapolis court, Thomas-Rasset claimed that her children might have been using her computer to download shared music files from Kazaa.

In terms of the United States Copyright Act, courts can award damages of up to $150 000 per track. The average fine – in the thousands of cases that the RIAA has already settled out of court – is about $3 500 imposed on people who illegally download music files.

Thomas-Rasset has vowed not to pay the fine. The 24 songs that have cost $1,92-million to download are:

- Guns 'n Roses – Welcome to the Jungle and November Rain
- Vanessa Williams – Save the Best for Last
- Janet Jackson – Let's Wait Awhile
- Gloria Estefan – Here we Are; Coming Out of the Heart; Rhythm is Gonna Get You
- Goo Goo Dolls – Iris
- Journey – Faithfully; Don't Stop Believing
- Sara McLachlan – Possession; Building a Mystery
- Aerosmith – Cryin'
- Linkin Park – One Step Closer;
- Def Leppard – Pour Some Sugar On Me
- Reba McEntire – One Honest Heart
- Bryan Adams – Somebody
- No Doubt – Bathwater; Hella Good; Different People
- Sheryl Crow – Run Baby Run
- Richard Marx – Now and Forever
- Destiny's Child – Bills, Bills, Bills
- Green Day – Basket Case.

Editor's Note:
For a bit of fun, why don't readers submit a brief sentence or paragraph using words from this playlist? The submission that uses the most words in the most inspiring fashion will win a free gift subscription from WATTnow for their trouble. This game closes on 31 October.

Kodachrome – The world loses its finest film

Production of Kodachrome, probably the finest transparency film ever made in the world, has ceased. Kodak has announced that it will no longer be manufacturing the film and will close down its specialised processing facilities as well.

Kodachrome was the first still film commercially available to everyone and professional photographers from all over the world have relied on this spectacular film for the vivid, bright and clear images that have graced the pages of thousands of coffee-table books, of National Geographic's explorations around the world, and of explicitly enchanting images on the pages of every magazine from Playboy to Life.

For almost 75 years, Kodachrome has been the film of choice for serious photographers and amateurs alike. Now, sadly, it's gone.

Kodachrome film was sold with the processing price included and when a film had been exposed, it had to be packed into the provided yellow bag and shipped to one of the specialised Kodachrome laboratories around the world. A few weeks later the film would be returned to you, each frame carefully mounted in cardboard frames, having been processed in a special Kodak soup that created spectacularly vivid reds, blues, yellows – in fact every colour of the spectrum.

It was a precision film and was not as forgiving as some of the other transparency films that were commercially available, but if you got the exposure correct the colours would come to life and last for decades without losing any of their original colour.

Anyone who has used Kodachrome and seen the wonderful colours it captures will be as sad as I am, to know that this film has passed into history and will not be used again. Ever.

Rest in Peace, Kodachrome.

PneuDrive Challenge 2009

We are very excited about the number of quality entries received to date,
and look forward to exploring your projects in detail.
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Keep a look out for the winners announcement, your team could be the lucky winner!

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Now this is a weapon women will love...

Millions of women around the world are likely to confirm what scientists at the University of Leicester have recently discovered: that a molecule which controls blood pressure and male erections may also have a profound impact on the brain.

The scientists have found that nitric oxide may change the way that men think and hear, and they hope that these molecules could lead to new treatments for migraine, epilepsy, Alzheimer's disease and chronic pain.

The role of nitric oxide in influencing male erections was made famous by the discovery of Viagra, which used the chemical to reduce male impotence. It is believed that nitric oxide is a signalling molecule that helps the body's cells to communicate with one another. The enzymes that aid the synthesis of nitric oxide are active in brain cells.

The Leicester team plans to focus on the junctions (or synapses) between the cells and enable them to talk to each other. High levels of nitric oxide may trigger serious brain diseases such as Alzheimer's.

Rebecca Wood, who is the chief executive of the Alzheimer's Research Trust, says that it will be interesting for researchers to discover exactly what the role of nitric oxide is in the brain as it will help researchers understand how the brain works.

She says that understanding thought processes and the brain is crucial to understanding and defeating diseases that affect it. Does this lead to the conclusion that people with less nitric oxide are able to think with less precision, I wonder?

Nickel-tungsten alternative to chrome

For decades, chrome plating has been used to show off everything from beading on Elvis Presley's Cadillac to the chopper motorcycles used in Easy Rider. There are, however, practical reasons for using chrome; it is harder than steel and extremely resistant to corrosion.

The electroplating process entails passing an electric current through a liquid bath of chemicals that contain chromium ions and these get deposited on the surface of the metal in a thin layer. The chemicals used for electroplating are hazardous and the waste materials can contaminate groundwater resources if not disposed of in the correct manner.

In a bid to find an alternative to chrome plating, Christopher Schuh and his colleagues at the Massachusetts Institute of Technology set about experimenting with different metals.

They identified the reason that chrome was so strong: it has crystals with atoms that are lined up in a neat row and the crystalline structure is so small that atoms cannot slip past each other. It is this that gives chrome its strength.

The first experiment they undertook was to plate several objects with nanocrystalline nickel. They found that while nanocrystalline nickel is very tough, it loses its hardness over a matter of months when left at room temperature.

They then tried mixing different metals with the nanocrystalline nickel and discovered that when tungsten was added to the nickel it produced a suitable structure and, as a bonus, that the mixture was capable of being plated in a way that was more environmentally friendly than other plating methods.

The initial tests showed that when materials were coated with nickel-tungsten – using a modified electroplating method – the crystalline structure remained stable indefinitely. It wouldn't degrade when exposed to heat either.

The tests that they've completed show that nickel-tungsten is extremely bright and shiny, is harder than chrome and the absence of environmental hazards make it the most appealing replacement for chrome.

The proof, though, lies in its acceptability in the market. It is being used on a fleet of trucks in the United States to prove its durability and Schuh's team hopes that it will soon be used as a replacement for chrome on kitchen and bathroom taps, and an assortment of other applications.

The most critical test, perhaps, is when it's used on a Harley Davidson motorcycle. If it is, then its future is almost certainly assured!

WATTnow

– a magazine to keep you enlightened, informed and intrigued

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

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

In addition, WATTnow gives its readers in-depth, topical coverage of many different issues that have a direct bearing on the engineering industries on which so much of the country's future development depends.
It is the official magazine of the South African Institute of Electrical Engineers and is distributed to members throughout the country.
It has also developed a Continuing Professional Development programme for all engineers and is the only publication able to provide Category One credits who are part of the WATTnow CPD Programme.

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

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

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DNA evolution slows down in cold weather

DNA likes to be warm and researchers have found that among pairs of mammals of the same species, the DNA of those living in warmer climates actually changes more rapidly than those in colder climates.

These mutations, where one element of the DNA code is substituted for another, are considered to be the first steps in the evolutionary process. Len Gillman, a researcher at the Auckland University of Technology, led the study that showed that this might be one reason that the tropics are particularly rich in species.

The DNA mutations are often so small that changes are virtually imperceptible but occur every time a cell divides itself. Sometimes the changes are valuable to the species – by making it resistant to disease, for instance – and are then passed down to succeeding generations.

The idea that micro-evolution happens at a more rapid pace in warmer climates is not new—similar results have been documented in studies of plants and marine animals—but this is the first time that the effect has been shown in mammals, which regulate their own body temperature.

Scientists think that the link between temperature and metabolic rate means that, in warmer climates, the germ cells that eventually develop into sperm or eggs divide more frequently.

Gillman and his team compared the DNA of 130 pairs of mammals, looking at genetically similar 'sister' species where each pair lived at a different latitude or elevation. They tracked the changes in one gene, cytochrome B, and compared the gene in each of the pairs of mammals to create a 'reference point' for the gene in a common ancestor.

By monitoring mutations in the DNA code for this gene, researchers were able to see which of the two mammals micro-evolved more rapidly. Animals living in warmer climates had about 1,5 times more of these substitutions than animals in colder climates.

These findings seem to support the notion that high tropical biodiversity is caused by faster rates of evolution in warmer climates.

Water may be lurking beneath the surface of Enceladus

Water is an essential building block for all forms of life as we know it and, as a result, scientists at NASA are excited by the strong body of evidence they have accumulated that indicates there is water on Enceladus, one of the small moons around Saturn.

The Cassini spacecraft's probe detected sodium salts in the vicinity of the spacecraft that seem to come from the South Pole, indicating that liquid water, in contact with rock for a prolonged period, will leach out sodium in the same way that the oceans on the Earth have done over the years.

Scientists suspect that the water is locked inside caverns just below the surface of the moon. The findings confirm that the Saturnian satellite might be one of the most promising places in the solar system to search for signs of extraterrestrial life.

The combination of water, energy and basic chemical building blocks are the elements that can start life. According to John Spencer, a Cassini scientist from the Southwest Research Institute in Boulder, Colorado, all three of these have been found on Enceladus where there are even some fairly complex organic molecules.

Scientists have been looking for some proof of sodium since they discovered that this tiny moon, just 500 km wide, was hurling water vapour and ice particles into space, which emerge as super-fast jets from a series of warm cracks on the surface.

Spencer says that if water is beneath the surface of the moon for a long period it will acquire a range of dissolved salts and these salts should be detected in the jets of water exploding from the satellite.

Sodium is easy to detect in telescopic images and yet the Keck Observatory on Mauna Kea in Hawaii has not seen any evidence of it. However, the Cassini data may resolve this conundrum.

Using the Cosmic Dust Analyser on board the craft, Cassini has analysed thousands of grains and even 'tasted' the salt, comprised of sodium chloride and sodium bicarbonate.

The problem is the amounts are tiny – just two percent of the mass of the sampled grains. Sodium is bound into the water and ice molecules and this effectively hides its light signature from the observatory's instruments.

Scientists suspect that a deep mass of water is pressed up against the moon's rocky core and is dissolving the salts until water from the sub-surface sea travels through a network of faults in Enceladus' ice mantle before erupting on the surface and exploding into space.

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Wales to spend millions on fighting climate change

Wales, once home to some of the largest coal mines in Britain, is to spend £300-million on cutting carbon emissions as part of its own commitment to tackling climate change.

Environment Minister, Jane Davidson has set out her plan to cut emissions by three percent by 2011. This plan includes providing financial and technological assistance for green energy and micro-generation schemes.

The weather office in Wales has predicted that the mean temperature in Wales could rise by 2,3 °C in the next 40 years. The British Climate Projections 2009 Report claims that hotter, drier summers and milder, wetter winters will emerge and sea levels around Wales will rise by about 200 mm by 2050.

It also says that daily summer temperatures could rise by 3,4 °C while winter temperatures are expected to increase by 2,5 °C. Rainfall is projected to increase by 14 percent in winter and decrease in summer by 16 percent. This is probably not enough to turn Barry Island into the St Tropez of Britain but it's still a significant change.

Davidson plans to appoint special Welsh climate change development officers for the different Welsh communities, who will advise and support businesses that wish to 'go green'. There will also be a Climate Change Charter that individual businesses can sign.

She admits that some climate change is probably inevitable because of the impact of past emissions but claims that changing the way people live and work will help to cut down carbon emissions, which have apparently created the global warming phenomenon that prevails today.

Magnetic fields change colour of microspheres

Magnetochromatic microspheres might provide clues to the new technologies that may be used to make products as diverse as lipstick or advertising billboards. This has resulted after Yadong Yin and his colleagues at the University of California, Riverside, began experimenting with tiny beads that change colour when exposed to a magnetic field.

What Yin and his colleagues have managed to do is to take these tiny blobs of polymer that contain iron oxide and, using interference from a magnetic field, get them to create an extensive range of iridescent colours.

The way this works is that the tiny blobs of polymer, containing the iron oxide, change the structure of particles in a magnetic field so that the fine details on an object's surface cause light waves to cancel each other out in some places and to reinforce each other in others. It is this that creates the iridescent colours displayed on a bird's feathers or a butterfly wing.

Combining iron oxide particles with a liquid polymer resin, which is then dispersed in oil, makes the magnetochromatic microspheres. The oil and the resin will not mix so droplets of resin end up floating around in the oil. A magnetic field is applied to the droplets to produce the right colour and then the colour is fixed by curing the polymer into a solid structure.

The colour of a droplet can be changed by rotating it – in much the same way as the colour on an iridescent feather changes when looked at from a different angle. Since iron oxide is used to make the microspheres, it should be possible to rotate groups of the beads to create images, including moving ones.

The spheres must be dispersed in some kind of liquid so they can rotate freely but Yin says the liquid does not have to be liquid at all times. It could be in the form of a wax that, when heated, allows the spheres to change their orientation before being held in place until the wax cools and solidifies.

The researchers believe that these microspheres could be used to make pigments in paint while, in theory anyway, the same microspheres could be used in computer and television screens to form pixel-like elements that could display images.

Yin is now working with a team from the Seoul National University in South Korea to produce a control system to switch the colour of the microspheres in real time to form moving images.

He says this might be achieved by using a grid of wires behind the particles that induce a magnetic field where the wires cross. The spheres at the intersections could then rotate. If this can be done in real time then the magnetochromatic microspheres may form the basis of a new, environmentally friendly television set or computer monitor.

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Chicago's Sears (Willis) Tower to go green

America's tallest building, the Sears Tower in Chicago is to undergo a $350-million green renovation that will see wind turbines being fitted to the top of the building along with a new roof garden and a stable of solar panels to generate electricity consumed by tenants in the building.

The five-year project is aimed at reducing the building's energy consumption by about 80 percent and projections show that it will also be able to save more than 100-million litres of water too.

American Landmark Properties, which represents the building's owners, plans to modernise and transform the Sears Tower and, within five years, erect a 50-storey, 500-room luxury hotel adjacent to the property. The new hotel will run its own, purpose-built green technologies.

The green project will see the installation of solar panels on the building's 90th floor roof. The panels will be used to heat water in the building. Different types of wind turbines will be positioned on the tower's tiered roofs and tested for efficiency.

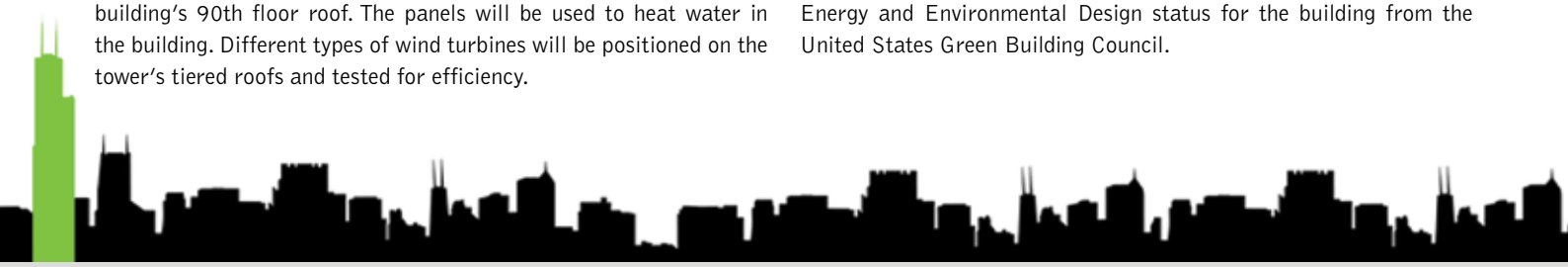
The renovation will see more than 16 000 replacement windows being fitted on the outside of the building to save heating energy. The mechanical systems will be upgraded to improve energy usage while the 104 elevators will be modified to become more energy efficient.

Finally, an advanced motion control lighting system to switch lights on or off as required will be installed throughout the building.

The project is expected to create about 3 600 jobs.

Sears Tower first opened in 1973 and was designed by the architectural firm of Skidmore, Owings and Merrill. Sears Roebuck was the original tenant but it moved its headquarters to Hoffman Estates in Chicago in 1992. Sears Tower is due to be renamed the Willis Tower after London-based Willis Group Holdings moved 500 of their employees into it.

American Landmark Properties hopes to achieve a Leadership in Energy and Environmental Design status for the building from the United States Green Building Council.



Tesla is ready to hit the road

The United States government has agreed to lend Tesla $465-million to continue producing its electric sedan and sports car models. The money is part of a $25-billion programme to assist beleaguered vehicle manufacturing operations in America.

Tesla plans to use the money to complete development of its Modern S sedan and its electric power plants that are being licensed to other car manufacturers including Mercedes. Daimler, Mercedes' parent company, has already spent $50-million on buying a ten percent stake in Tesla.

Prior to the government loan, Tesla had managed to secure $200-million in development capital but now with the government loan and the purchase of a stake in the company by Mercedes, Tesla now has $700-million in capital.

Tesla says that $365-million will be used to accelerate production of the Model S and a further $100-million will be spent on completing a manufacturing plant in California to make the electric drive trains.

Newly appointed chief executive, Elon Musk, says the company is on track to start making profits from its all-electric Roadster sports car. The company has received more than a thousand pre-orders for the new sports model.

The Model S, with its tax credits, is likely to cost around $50 000 and this is less than half the price of the Roadster, which has an impressive performance pedigree on paper but has not yet been tested in day-to-day motoring.

Tesla itself is embroiled in an internal political squabble as co-founder of the company, Martin Eberhard, alleges that the current chief executive Elon Musk, who ousted him in a boardroom showdown in May, is ripping him off.

Honda ends up as a pedal-assist electric bike

An old Honda motorcycle has been stripped, cannibalised, carved into a fraction of its size and transformed into an all-electric pedal assist motorbike capable of speeds of up to 35 km/h on a flat tarmac surface.

The 50 kg, 1986 Honda bike was modified by a Santa Cruz handyman and enthusiast, Geoff Bjorgan, who was offered the old Honda if he'd just take it away. The bike's registration was apparently worth more than the bike itself and this prompted Bjorgan to start modifying it.

He began by taking everything that was heavy or ugly off the existing frame and cut it down to reduce as much weight as possible. Then he fitted metal studs to the bike to use as pedals, found the headlight from an old hearse to use on the handlebars and got the electric motors from a company called Weird Stuff Warehouse in the city.

The motors are capable of running at up to 36 000 rpm and as a result it was necessary to fit a gear reduction box to the motors.

Bjorgan took the Honda motor apart, rebuilt it and promptly fitted it to his lawn tractor to decrease the amount of time spent mowing the lawn. In fact, he now gets speeds of 16 km/h out of his lawnmower.

He uses a standard set of bicycle gears on the pedal-assist electric machine that once started out as a roaring Honda motorcycle capable of speeds in excess of 200 km/h.

Around the world in 20 days, powered by the sun

A solar-powered plane, built by Swiss adventurer Bertrand Piccard, is hoping to fly around the world. The plane has a 61 m wingspan (almost the same size as a Jumbo jet) and yet it weighs just 1 500 kg. It is currently undergoing trials to prove that it will be able to fly at night when there is no solar energy to recharge the batteries.

Piccard has already made history after he circled the globe, non-stop, in a balloon. He says the purpose of the solar powered flight is to prove that renewable energy is a viable alternative to inter-continental passenger flights.

The flight is certainly likely to be risky. The Solar Impulse team is currently trying to find a solution in their design to ensure that the plane will be able to carry on flying in the dark.

Known as the HB-SIA, the plane looks more like a glider than anything else and is built from composite materials to ensure that it's exceptionally light. It is using solar cells, batteries, motors and propellers to keep it flying through the night.

The plane is currently being tested on a shorter cycle of flying during the day and then continuing into the night and, once these tests have been successfully completed, the team will set about building a final version of the plane.

Piccard says that while the plane will probably be able to fly non-stop around the world, the problem is that pilots cannot sustain this so he will do the trip in five hops, sharing flying duty with project partner Andre Borschberg.

He expects the plane to fly at about 25 knots, which means that it will take between 20 and 25 days to make the trip. The maximum time that a single pilot can fly is for a period of five days, even if he is able to get some sleep and that's why Piccard will break the trip into five legs.

All Britain's homes to get wind power

By 2020, all the electricity consumed in British homes will be generated from wind turbines if the government has its way. Under a new government plan, at least 7 000 wind turbines will be erected around the coastline as part of a £15-billion scheme to build and connect the new turbines to the national electricity grid.

Lord Hunt, Britain's energy minister has announced plans for the project but his ideas are being challenged by experts in the country who say that the existing grid is not designed to absorb so much 'uncontrollable' electricity.

Dr John Constable, research director at the Renewable Energy Foundation, says that the amount of electricity generated by each turbine varies according to the wind speed and that this will result in uncontrolled amounts of electricity being fed into the grid depending on prevailing wind conditions.

He says that it's impossible for Britain to get the turbines built in time to have them commissioned and fully operational by 2020. Constable says that if Britain is prepared to do extensive work on upgrading the national grid it may be possible to use renewable wind energy, but this will never be achieved by the target date.

Britain already has eight gigawatts of wind-powered generation capacity that is either being built or is in the planning phases and this is enough to supply about five million homes. The government plan to increase this to 25 GW would be sufficient to power every home in Britain.

The government has already started its bidding process, inviting companies to bid for lease sites in places such as Dogger Bank, the North Sea, west of the Isle of Wight in the Channel and along the coast of the Irish Sea.

In spite of the ambitious plan, Constable warns that Britain's shores are virtually wind-free for almost 70 percent of the year and because of this it would be necessary to have back-up power being supplied from nuclear or coal-fired power stations anyway.

Lord Hunt is not deterred by his critics and says that he is confident that investors will come forward to join the government in setting up a huge wind-powered electricity resource that can be commissioned by 2020.

ExxonMobil keeps funding climate sceptics

ExxonMobil is continuing to fund research projects undertaken by climate change sceptics who doubt whether the impact of global warming is actually caused by human endeavours. ExxonMobil apparently agreed to stop funding climate change sceptics in 2006.

The Heritage Foundation (partially funded by ExxonMobil) published a note last year claiming there was "growing scientific evidence that casts doubt on whether global warming constitutes a threat even though 2008 will be remembered as a year that was cooler than 2007."

The note was published at about the same time as a group of the world's leading scientists warned that climate change was as great a threat as nuclear war to the survival of the Earth as we know it.

ExxonMobil was criticised by the Royal Society for providing money for research that apparently aimed at deliberately misleading the public about the science of climate change.

The company has cut funding to some of the more controversial groups such as Frontiers for Freedom which claimed there was "no conclusive or reliable scientific proof that the sky is falling or that Earth's climate is experiencing cataclysmic warming caused by man's activities."

The donations amount to just one two-hundredths of ExxonMobil's global profits of $45,2-billion for the year. These amounts are minute compared with its other donations, considering that $9-million was provided to environment-related groups and $225-million was donated to charity.

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CROWN PUBLICATIONS

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Plant that 'irrigates' itself and thrives

A plant that literally waters itself has been found by scientists working in Israel's Negev Desert, one of the driest regions on Earth. The metre-wide plant with giant leaves is anomalous when compared with other desert plants that have tiny leaves that stop moisture loss.

It is the plant's large leaves that help to keep it alive. These leaves are covered in microscopic channels that allow moisture to travel in microscopic streams to a storage vessel inside the plant itself.

The scientists, from the Department of Science Education-Biology at the University of Haifa-Oranim say that the leaves act like a mini irrigation system and lead researcher, Professor Gidi Ne'eman, says that no similar plant has been found in other deserts around the world.

The plant, desert rhubarb, is able to harvest around 16 times more water than other plants that survive in the desert conditions. Scientists found that the desert rhubarb was able to collect 426 mm of water a year compared with the average annual rainfall of the Negev Desert, which is just 75 mm a year.

The Negev makes up more than 50 percent of Israel's land area to the south of the country near its border with Egypt and the Sinai Peninsula.

British public urged to take happiness lessons

The British government's green 'guru', Sir Jonathan Porritt, has come up with 19 ways that will help to save planet Earth. He has included such things as happiness lessons and free bicycles for all, and has the notion that vegetables should now be grown in public flower beds in Britain's parks.

He has accused the British government of failing to meet any of the targets it set itself for green living in the country. Porritt heads the Sustainable Development Commission, an advisory body aimed to improve government's response to green living.

Porritt claims the 19 ideas for local authorities, government and individuals have been developed and tested by a range of experts and pilot schemes to implement these ideas and are already underway in different parts of the country.

The suggestions include introducing personal well-being education into the school curriculum, increasing the amount of outdoor education for students, converting flower beds into vegetable patches and handing out free bicycles to encourage people to take up cycling if they are travelling a distance of less than eight kilometres.

He has suggested that the Royal Bank of Scotland be converted to the Royal Bank of Sustainability, and that it invests in future in green technologies rather than fossil fuels. He also wants unemployed people in Britain to be retrained for 'green jobs' such as fitting solar panels to rooftops.

Apparently the government is taking all 19 of Porritt's ideas seriously. The projects have the backing of Prince Charles, Rosie Boycott, Anna Ford and Jonathan Dimbleby.

Porritt is the former head of the Green Party and spent some years as a green adviser to Tony Blair's Labour Party.

Britain is the second worst emitter of green house gases in Europe. Just two percent of Britain's energy comes from renewable resources.

The full list of 19 ideas for green living presented by Porritt is:

1. Carbon credit cards.
2. Happiness lessons.
3. More outdoor education.
4. Free bicycles.
5. Locally produced food.
6. Grow vegetables on public land.
7. Increase National Health Service spending to prevent ill health.
8. Use the Internet to help communities work together.
9. Establish a public forum on the future to look at government policy in the long term.
10. Royal Bank of Sustainability to invest money in climate change projects.
11. Government-issued green bonds to invest in renewables.
12. Low carbon zones of energy efficient housing.
13. Councils and private sector partnership to provide cheap insulation.
14. Pay-as-you-save by deducting costs from electricity bills for those households that implement energy efficiency measures.
15. Green jobs for the unemployed.
16. Cap the amount of energy from fossil fuels that companies can sell.
17. Look at new ways of controlling global emissions as part of any international agreement.
18. Use charcoal produced from burning wood chips to make biochar that can be used as fertiliser in the ground.
19. Carbon captured from burning fossil fuels can be used to grow algae, which is then converted into biofuels.

Wasn't it Noel Coward who once wrote that Mad dogs and Englishmen go out in the midday sun?

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Hydrogen fuel tanks made from chicken feathers?

Hydrogen, the most abundant substance in the universe, is being touted as the most likely successor to the fossil fuels that drive most of the world's vehicles as it can run an internal combustion engine, power a fuel cell and the gas emits only water and heat.

The problem is that hydrogen is notoriously difficult to store because it's the lightest of the elements. So, filling a 75-litre fuel tank with hydrogen at room temperature would propel a car for just one kilometre.

This means that hydrogen must be compressed to take up less space and that process is not only dangerous but also uses energy, which defeats the object.

So, scientists are now exploring alternative ways to increase the surface area of a fuel tank allowing more hydrogen to be stored in a smaller volume.

Scientists have tried using specially engineered carbon nanotubes and while these work, they are expensive to make, especially in large quantities. Chemical engineer, Richard Wool of the University of Delaware, estimates that fitting a single vehicle with carbon nanotubes in the fuel tank could cost up to $5,5-million per unit.

Using other materials, the costs remain prohibitively high at about $20 000 to modify each fuel tank. However, Dr Wool and his colleague Erman Senoz may have solved this problem by storing hydrogen in carbonised chicken feathers.

The fibres in feathers are almost entirely composed of keratin, a protein that is found in nails and hair. When heated in the absence of oxygen, keratin forms hollow, tubular structures that are just six millionths of a metre across and are riddled with microscopic pores, much like the carbon nanotubes.

To avoid melting the fibres and destroying their structural properties, the scientists heated the feathers to 215 °C and then let them cool. This process actually strengthened the properties of the feathers.

Then, they were heated to between 400 and 450 °C, allowing the material to become even more porous and, in that way, increasing both its hydrogen-storing capacity the available surface area needed to store the gas.

What the scientists found was that the treated feathers were capable of holding 1,5 percent of their weight in hydrogen. Since about 4,5 kg of gas is needed to cover a distance of 500 kms – the typical range of a motorcar – a 284-litre tank would have to be stuffed with 300 kg of carbonised chicken feathers to achieve this.

Such a large fuel tank is not only cumbersome but it falls well outside of the six percent hydrogen storage target that has been set by America's Department of Energy to encourage innovation in alternative fuels.

In terms of these guidelines, the hydrogen system should cost up to $4/kW/hr to operate and less than $700 to fit.

The researchers say that they are confident that they will be able to improve the material by making it even more porous so that it can store more hydrogen than achieved by the first prototype processes.

Wool and Senoz demonstrated their carbonised chicken feathers hydrogen storage concept at the 13th Annual Green Chemistry and Engineering Conference held in Maryland. They estimate that the cost of converting a fuel tank on an existing vehicle and filling it with carbonised chicken feathers will be just $200 per car.

Nearly 250 GW of new electricity coming to China

China, as a major industrialised nation, is ploughing billions of dollars into nuclear energy plants and by 2020 it will have a capacity of 86 GW, up nearly tenfold from the nine GW of capacity it had at the end of 2008.

China's electricity generation capacity is largely based on coal-fired power but the government has intensified its efforts to use alternative energy sources so that between now and 2020 at least 12 GW of power will be generated from these sources.

The nuclear power projects are planned for the provincial regions of Lianing, Guangdong, Zhejian, Fujian, Guangxi, Jiangsu, Shandong and Hainan. China already has 11 nuclear power reactors operating in the country and a further 23 GW under construction.

It plans to now add a further 24 nuclear reactors to improve capacity over the next 11 years and five of these are due to start being built before the end of this year.

In terms of its draft energy development stimulus plan, the government is planning to have a further 150 GW of installed wind power generation capacity by 2020 of which 30 GW will come from offshore wind farms.

China is currently the fourth largest producer of wind power in the world with 12 GW of installed capacity at the end of last year. However, with projects already underway, China will see its wind power capacity increase to about 35 GW by the end of 2011. It is to build seven huge wind farms – each with a capacity of 10 GW – in six provinces around the country at a cost of about one trillion yuan.

Total investment in the power generation industry wil reach 15,5-trillion yuan ($1,9-trillion or R15-trillion) and create about 20 million jobs between now and 2020.

CALL FOR PAPERS AND PROPOSALS

IEEE International Conference on Communications (ICC 2010)

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

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

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PLANNED TECHNICAL SYMPOSIA

> Paper Submission: 10 Sep 2009

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

General Symposium on Selected Areas in Communications
Tarik Taleb, talebtarik@ieee.org
Sumit Roy, sroy@u.washington.edu
Chunming Qiao, qiao@computer.org
Yacine Ghamri-Doudane, ghamri@ensiie.fr
Riccardo Raheli, raheli@unipr.it

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

Signal Processing for Communications Symposium (SPS)
S. Boussakta, s.boussakta@ncl.ac.uk
Donglai Xu, d.xu@tees.ac.uk
T.J. Lim, limtj@comm.utoronto.ca

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

Wireless & Mobile Networking Symposium
Thomas Hou, thou@vt.edu
Randall Berry, rberry@ece.northwestern.edu
Hai Jiang, hai.jiang@ece.ualberta.ca
Farid Nait-Abdesselam, farid.nait-abdesselam@lifl.fr

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

Next-Generation Networking and Internet Symposium
Wanjiun Liao, wjliao@cc.ee.ntu.edu.tw
Achille Pattavina, pattavina@elet.polimi.it
Hussein Mouftah, mouftah@site.uottawa.ca

Communication QoS, Reliability and Modeling Symposium
Nelson Fonseca, nfonseca@ic.unicamp.br
Charalabos Skianis, cskianis@aegean.gr
Toshinori Tsuboi, tsuboi@cs.teu.ac.jp

Ad Hoc, Sensor and Mesh Networking Symposium
Nirwan Ansari, Nirwan.Ansari@njit.edu
Walaa Hamouda, hamouda@ece.concordia.ca
Nei Kato, kato@it.ecei.tohoku.ac.jp
Hongchi Shi, hs15@txstate.edu

Multimedia Services, Communication Software and Services Symposium
Mohammed Atiquzzaman, atiq@ou.edu
Zhu Li, zhu.li@ieee.org
Marcus Brunner, brunner@nw.neclab.eu

Communication and Information System Security
Wenjing Lou, wjlou@ece.wpi.edu
Pramode K Verma, pverma@ou.edu
Abderrahim Benslimane,
abderrahim.benslimane@univ-avignon.fr

TUTORIALS

> Tutorial Proposal Due: 10 Sep 2009

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

PANEL DISCUSSIONS

> Panel Proposal Due: 28 Aug 2009

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

WORKSHOPS

> Workshops Proposal Due: 30 June 2009

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

FROM THE CENTENARY PRESIDENT ...

du Toit Grobler

Three months have gone by since the SAIEE AGM of the 26th of March this year and during this time a number of important SAIEE activities have taken place. On the 31st of March I performed my first presidential duty when I presided over the election of the Centre Committee at the Mpumalanga Centre in Secunda before delivering an address on the benefits of belonging to the SAIEE. Barend Rademeyer was elected as the new Centre Chairperson.

Between the 29th of April and the 21st of May, I visited the Southern Cape, Western Cape and KwaZulu-Natal Centres as well as the East London, Port Elizabeth and Bloemfontein interest groups to deliver my Presidential Inaugural Address: "The SAIEE: A Century of Achievements behind us, a Century of Challenges ahead of us". Prior to delivering my address, I presided over the establishment of the Eastern Cape Centre in Port Elizabeth and the election of the first Centre Committee of nine members with Graham Hopewell as the first Centre Chairperson. On my visits to East London and Port Elizabeth I was accompanied by my wife, Elize. The Centre Committees were encouraged to structure the Centres as mirror images of Council and its Committees and to establish rapport with the various Council Committees. Centres and interest groups were unanimous in their appreciation of the Presidential visits and expressed the desire to receive a visit from the Bernard Price Lecturer.

On the 28th of May, the Annual President's Invitation Lecture was held at the University of Johannesburg. Mr Jack van der Merwe, CEO of the Gautrain Management Agency, delivered a most interesting presentation on the 'Gautrain Project'. A follow up presentation is being arranged at KwaZulu-Natal Centre on the 30th of July 2009 and a site visit to the Gautrain Project will take place on the 1st of October.

On June 5, the highlight of the Centenary Celebration took place in the form of a celebration party in a marquee next to Innes House. The Guest of Honour was the honourable minister of Science and Technology, Mrs Naledi Pandor, MP. I unveiled the Centenary Plaque and the event concluded with an official Monthly Meeting of Council and visits to the SAIEE Museum and Library, the telescope and SAASTA facilities.

The three main Centenary Celebration activities which lie ahead are the launch of the Centenary Book on October the 29th, the Centenary Banquet on the 19th of November and the Centenary Conference on the 20th of November.

2009 is indeed a year of celebration for the SAIEE. In addition to the celebration of the 100 years since its establishment, it is also exactly 50 years since the existing Coat of Arms of the Institute was registered. Finally, the Annual Banquet was first held as a regular event in 1959, the year in which the SAIEE celebrated its 50th anniversary.

Please take part in the activities of the SAIEE and enjoy the Centenary Celebrations in particular.

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

SOUTHERN CAPE CENTRE:
Left to right: Willem du Toit (Member), du Toit Grobler, Les Stuart (Chairperson), Neel Smuts (Imm. Past Chairperson).

EASTERN CAPE 1ST CENTRE COMMITTEE:
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EAST LONDON INTEREST GROUP:
Left to right: Simphiwe Hashe (Member) (Eskom), du Toit Grobler.

BLOEMFONTEIN INTEREST GROUP:
Left to right: Ben Kotze (Member)(Central University of Technology), du Toit Grobler, Koos Kriek (Senior Member), Prof Farhad Aghdasi (Central University of Technology).

Gautrain - The Golden Train

Gautrain is more than just a train. Based in the economic heartland of South Africa, it is one of several strategically integrated Gauteng Provincial Government projects to meet future transport demands anticipated as a result of economic and population growth. It is expected that an additional two million job opportunities can be created in Gauteng during the period 2005 to 2025 should the economy of the province grow at an average annual rate of between 4,5% and 5%. The population of Gauteng is also expected to be around 14,6 million people by 2015.

For most of us, Gautrain has become synonymous with pride and awe. It is awe-inspiring to know that South Africa has the expertise necessary to build a project of this magnitude and complexity. We are also proud of the fact that Gautrain uses best global practices and technology to build a much-needed public transport system in a province frustrated by traffic gridlocks.

It is estimated that Gautrain will be able to carry more than 100 000 passengers per day in each direction when operating at full capacity to provide economic mobility and the convenience of door-to-door commuting. The concessionaire will also be supplying and operating a fleet of modern city low entrance buses with comfortable seating as well as feeder and distribution services to and from the Gautrain stations. Commuters will thus not have to experience the frustrations and delays as motorists associated high-density urban areas. These also comprise mixed-use developments, which integrate high-rise office towers, hotels, shopping centres and apartments.

Property developers and entrepreneurs have already started to anticipate the future impact of Gautrain on the socio-economic landscape of Gautrain. The future trend will be to live, work and seek entertainment along Gautrain's route. In turn, a high-density urban landscape will become more conducive to public transport.

As a catalyst for economic and land restructuring, Gautrain is playing a vital role in countering unplanned urban development, which destroys the precious green lungs of the province. Instead, the ripple effect is urban regeneration in Johannesburg, Tshwane and Ekhuruleni. In addition, future developments in the vicinity of the ten stations include the building of new road bridges, upgrading feeder roads, road intersections, pedestrian pathways, safe parking bays and passenger drop-off zones.

Overall progress to date

The first four-car train sets are being tested on the mainline test track section near Midrand. Track laying and the installation of overhead electrification masts are underway between Linbro Park and Midrand and Linbro Park and Modderfontein. Track laying has also commenced in the tunnel section.

Civil construction works on the Airport Link between OR Tambo International Airport and Sandton has intensified. Stations and viaducts tunnel route has been completed.

The construction of Gautrain's ten stations is making good progress. In many instances, parkade and station foundation works are nearing completion. The roof structures of Marlboro Station, Rhodesfield Station and Pretoria Station are already visible. The construction of Sandton Station is the most challenging, as it will be one of the deepest underground stations in the world.

Construction of the depot facilities, including both the bus depot and the train depot administration buildings, is substantially complete. Installation of the Operations Control Centre equipment is in progress in the train depot administration building. This centre will be the heartbeat of Gautrain from where signalling, telecommunications, automatic fare collection, traction power and overhead distribution CCTV cameras and maintenance will be managed, using world-class, high technology systems.

2008 - 2009 milestones and highlights

- Gautrain reached its top speed for the first time on the test tracks on 18 June 2009. Gautrain's highest speed during operation will be 160 km/h.
- Arrival of the first two completed rail cars at the train depot in Midrand in December 2008 from Derby in the UK. On 3 February 2009, guests attending a special homecoming event were taken on the first ride in Gautrain on the test tracks at the depot.

employed as a planner and a trainer. There are also three learners included in the 95 newly created jobs. In accordance with Gautrain's socio-economic development goals, the UCW Partnership invested around R15-million of which R5-million is used for training staff. Following a comprehensive skills and technology transfer programme, the UCW Partnership sent 17 employees to Derby in the United Kingdom where 15 rail cars are being manufactured at Bombardier Transportation's workshop.

- The meeting of two tunnels that were being simultaneously excavated from Marlboro Portal and Mushroom Farm Park broke through on 24 September 2008 to form one continuous tunnel.
- Custom branded in Gautrain's distinctive golden colour, the first four-car train set was proudly handed over to Gautrain's Political Committee at Bombardier's Derby assembly plant in the United Kingdom on 8 July.

Socio-Economic Development

Although construction only started in September 2006, successful outcomes in Gautrain's socio economic objectives have been widely reported. Sustainable job creation further contributes to Gauteng's booming economy. Gautrain has created or sustained more than 4 700 local direct jobs and an estimated total of more than 25 400 direct, indirect and induced jobs in the 2007/08 financial year. It is expected that these jobs will increase to about 33 000 in 2008/9.

Jobs created to date

- 11 700 direct jobs
- 63 200 direct, indirect and induced jobs.
- Companies benefited includes:
- 260 BEEs (R1 900 million)
- 90 New BEEs (R800 million)
- 230 SMMEs (R600 million)

Training

- 10 400 courses for unskilled/semi-skilled staff
- 1 250 courses for management

Key features

- Ten stations on an 80 kilometre route, between five and eight kilometres apart.
- 24 separate four-car train sets, which allow a more than adequate stand-by margin.
- The two forward rail cars on the airport service will comprise special airport cars with fewer but wider and more luxurious seats and special areas for baggage storage near the doors.
- To increase capacity after the initial period, an increasing number of train sets will be operated as eight-car train sets, comprising two four-car units coupled together.
- A maximum speed of 160 km per hour.
- Only 15 minutes between OR Tambo International Airport Station and Sandton Station.
- Only 42 minutes between Johannesburg Park Station and Hatfield in Tshwane.
- Trains every 12 minutes during peak periods during the first three years; thereafter, at ten minute intervals during peak periods.
- Quick 30 to 45 second stops at stations.
- Tight security on trains and stations through access control, electronic surveillance (over 650 CCTV cameras) and visible policing.
- Bus feeder and distributor services for passengers up to 10 km from stations. The bus and train schedules will be synchronised.
- Passengers can transfer easily between Gautrain and other forms of transport, such as the new Bus Rapid Transport services, planes, taxis, Metro Rail trains and cars.
- Park-and-ride facilities with more than 10 000 parking bays at stations.
- Smart card electronic ticketing needing only one ticket for the train, bus and parking.

World-class airport link

A quick 15-minute airport connection will run between Sandton Station and the OR Tambo International Airport at the same frequency as the rest of the system. This service is modelled after the operations of a select group of global cities that successfully offer rapid rail links to international airports.

Design features at Sandton Station and the interiors of airport coaches will accommodate passengers who need to carry luggage.

Smart ticketing

Commuters will be able to use preloaded smart cards at self-help, computerised ticket vending machines in order to pay for train trips, bus trips or parking. Money can be loaded onto the smart card via cash, debit cards or credit cards.

Contactless technology means that smart cards will be scanned electronically when they are swiped past station access gate readers. In future, this automated ticketing system will form part of a single ticketing system for all modes of public transport across Gauteng.

High tech security

Only valid ticket holders will have access to station precincts and rail cars. Security will be further enhanced by constant closed circuit television surveillance in every rail car, at stations and platforms. Gautrain's entire 80 km rail network will also be securely fenced with a 2,4 m high security fence that will be regularly patrolled and maintained to prevent vandalism and unwanted entries.

Security officers will be on guard and will maintain a visible presence. Should any suspicious activities be spotted near the Gautrain network, the central control centre will act immediately. The control centre, which is located at the Midrand depot, will integrate closed circuit television networks, security surveillance, automated ticketing, fibre optics, public address systems, passenger information displays, radio and wireless voice communication systems. Each station will also be linked to the central control facility. This will bring commuters the best in global security standards used in rail transport today.

Advanced safety systems

A fully computerised rail signalling system will prevent train-to-train collisions, ensure safe movement at junctions or crossings and maintain safe following distances.

Advanced technology known as an Automatic Train Protection (ATP) system will monitor the trains' top speed limit of 160 km/h as well as every lesser speed limitation, which will be pre-set for every single metre of track. Should the driver exceed the posted speed limit at any point by more than three kilometres per hour an alarm will sound in his cab. At more than six kilometres per hour above the posted speed limit the train's service brakes will be automatically applied to slow the train to below the posted speed limit. It also has the ability to bring a train safely to a stop in the unlikely event that a driver is incapacitated.

To ensure safety at higher speeds, Gautrain will use a wider track gauge, known as 'Standard Gauge'. This is the track gauge used by virtually every high-speed train in the world.

Science, technology and education critical for SA's development

This is the full text of the speech by Minister of Science and technology, Naledi Pandor at the South African Institute of Electrical Engineers' centenary celebration, held in Johannesburg in June 2009.

Let me begin by paying tribute to the Institute's one hundred years of service to the engineering profession. At the outset I want to congratulate all of you – Institute, staff, engineers, supporters – on your years of progress and achievement.

The Institute has had a great deal of interaction with the Department of Science and Technology.

Only a few days ago I met a delegation led by your President, Mr du Toit Grobler, and members of the Institute have previously met with Deputy Minister Derek Hanekom and Dr Phil Mjwara, the Director-General of the Department.

As you know, one of my department's key focuses is on fostering and enhancing partnerships across the national system of innovation in order to promote research, development and innovation.

We see the Institute as an important partner of government in placing science and technology at the heart of progress and development in our country.

The activities of the electrical engineering profession, including research, manufacturing, electronics, telecommunications, mining, measurement control, and power infrastructure services, are all critical for South Africa, and make a valuable contribution to human-capital development.

The Institute and the Department are committed to increasing the number of learners enrolling for engineering qualifications.

We have grappled, through JIPSA over the past two years, to find ways of strengthening engineering education. This has involved funding more places for engineers in higher education institutions, creating and strengthening training activities, as well as creating new engineering initiatives and schools.

We are the only country in Africa that has an engineering academy.

Engineering academies recognise young engineers who have played important roles in providing innovative solutions to sustainable development challenges.

Over the last three years, we earmarked funding for engineers in the higher education budget and graduate through-put rates have improved at the leading universities.

Currently, 1 500 BEng and BSC Engineering students graduate each year.

We need to produce more. We have a shortage of engineers in municipal employment, in industry, and at universities.

JIPSA played an important role in increasing investment in engineering and this policy will continue under the new government of President Zuma.

We also need to increase the number of artisans.

The reorganisation of the functions of government will assist us to reach our target, which is to train 50 000 qualified artisans by 2010.

In the mean time, we encourage the Institute to adopt some of the Dinaledi schools, which are desperately in need of benefactors.

The Institute has shown an interest in partnering with the Department in some of its planned projects, particularly the National Space Agency and the Square Kilometre Array. There is plenty of room for cooperation, perhaps made easier by the Institute's affiliation to the Institute of Electrical and Electronics Engineers, which works closely with the National Research Foundation.

You are probably aware of the Department's relationship with the Institute of Electrical and Electronics Engineers (IEEE) involving the Group on Earth Observations.

This is an intergovernmental group currently leading a worldwide effort to build a Global Earth Observation System of Systems, GEOSS. The Group on Earth Observations was launched in response to calls for action by the 2002 World Summit on Sustainable Development and the G8. GEOSS will enable the world to respond better to the many environmental challenges we face.

The work of the Group on Earth Observations is directly linked to what we refer to as the global change 'grand challenge', which aligns South Africa with other countries in managing challenges brought about by climate and related change.

A capacity building programme involving the Institute of Electrical and Electronics Engineers is underway and will be implemented with the involvement of the National Research Foundation.

In closing, let me say, as a non-scientist or engineer, that scientists and engineers have to do a lot more to popularise what they do. Everyone knows who Isambard Kingdom Brunel was or Christian Barnard. But can someone name a leading electrical engineer?

There is a serious point here. Radio, podcasts, and Youtube provide us with a magnificent platform for the popularisation of science and for explaining "how things work". We have to do more to exploit these new technologies and explain how they can improve the lives of ordinary people.

I have to remind engineers that there is immense distrust and mistrust of sci/eng/tech, especially in regard to new research. I think of the huge public quarrels over AIDS or the Millennium bug, the bug that never was. There was public misunderstanding of these topics, but the experts and the professionals did not help us ordinary mortals understand.

Let me encourage the Institute to do more to communicate with South African citizens about the work of electrical engineers.

The Department will continue to engage with the Institute, as there is considerable opportunity for useful cooperation between us.

Finally, allow me to express on behalf government our best wishes to the Institute and its more than 5 000 members on one hundred years of productive engagement.

Thank you.

Invitation

Convention Centre Cape Town, South Africa, 24-28 August 2009
Organised by: University of KwaZulu-Natal, University of Stellenbosch, University of Cape Town, University of the Witwatersrand, Johannesburg
Endorsed by the South African Institute of Electrical Engineers

Dear Colleagues and Friends,

The prevailing economic climate and the daunting environmental pressures we face challenges engineers and decision-makers in the electrical power industry to be innovative and to lead the industry in to a new paradigm. It is important that current research is understood, developed and integrated into refurbishment and new work.

In South Africa we have a unique opportunity to come abreast with current research in the field of high voltage engineering – the technology influencing the design and operation of transmission and distribution systems, and of all insulation diagnostics. The International Symposium on High Voltage Engineering (ISH2009) is taking place in South Africa, at the Cape Town International Convention Centre, from 24-28 August 2009.

This is the premier, biennial, international event for the dissemination of current research in high voltage engineering. And it is in South Africa in 2009! Just over 300 papers, with authors coming from 30 countries around the world, will be presented in the space of five days.

The papers have all been peer-reviewed and represent a show-case of current research and development. In addition to the published papers, there is a significant technical exhibition with some twenty industrial organisations displaying current technology.

This exhibition offers the possibility of coming abreast with new and innovative products available in the marketplace.

I invite you to take this opportunity to interact with your peers in the vital field of high voltage engineering.

Jan Reynders

Jan Reynders
Chairman of the Organising Committee of ISH 2009.

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Exhibition Opportunities

There will be an exhibition held in conjunction with the conference. Organisations who wish to exhibit their products and services, should contact the ISH 2009 secretariat.

CPD Points

Attendance at the ISH 2009 conference is validated for five CPD points. The ECSA CPD validation number for the conference is: SAIEE-0354

Topic Areas

Topics of interest include, but are not restricted to the following areas of high voltage engineering:

- Electromagnetic Fields: EMC, Computation, Measurement, Environmental Effects, Corona
- Transients, Lightning, Switching & Repetitive Transients Emerging HV Technologies, Advanced Materials and Interface Phenomena
- Outdoor Insulation, Ceramic and Composite Insulators and Pollution Performance
- Intelligent Systems in HV Engineering; Data Mining and Knowledge Rules, Power System Applications
- Asset Management of HV Equipment: Strategies and Tools, Preventative Maintenance
- Diagnostics and Online Monitoring for CBM; Automated Conditions; Assessment of Remote Monitoring
- High Voltage Insulation Systems for AC and DC; Gas Insulation Systems, Liquid and Solid Dielectrics
- High Voltage Measurements, Testing Techniques and Quality Assurance, Ageing, Space Charge and Dielectric Measurements
- Live Line Technology & Practices
- Insulation Coordination & Practices (HVAC & HVDC)
- Modelling of HV Phenomena: Long Sparks & Floating Objects, Systems Aspects, Studies

FEE CATEGORIES

	Full Delegate	Students	Accompanying Person
Early (Before 30/06/2009)	R6 900	R6 100	R2 700
Late (After 1/07/2009)	R7 200	R6 350	R2 700
Technical Tours	R300	R300	R300

Secretariat

Email: secretariat@ish2009.org

Sponsorship & Advertising Opportunities

There are various sponsorship options available to organisations who would like to support ISH 2009 and promote their products and activities.

The ISH proceedings, exhibition and banquet venues will have space available for promotional material. All enquiries should be addressed to the ISH 2009 secretariat.

FOR INFORMATION AND REGISTRATION GO TO: www.ish2009.org

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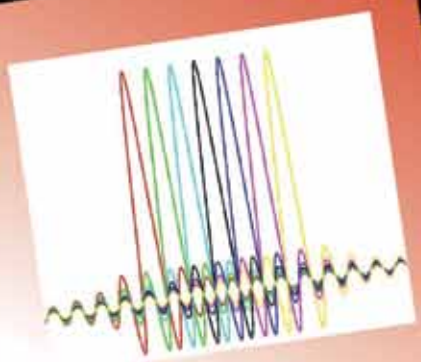

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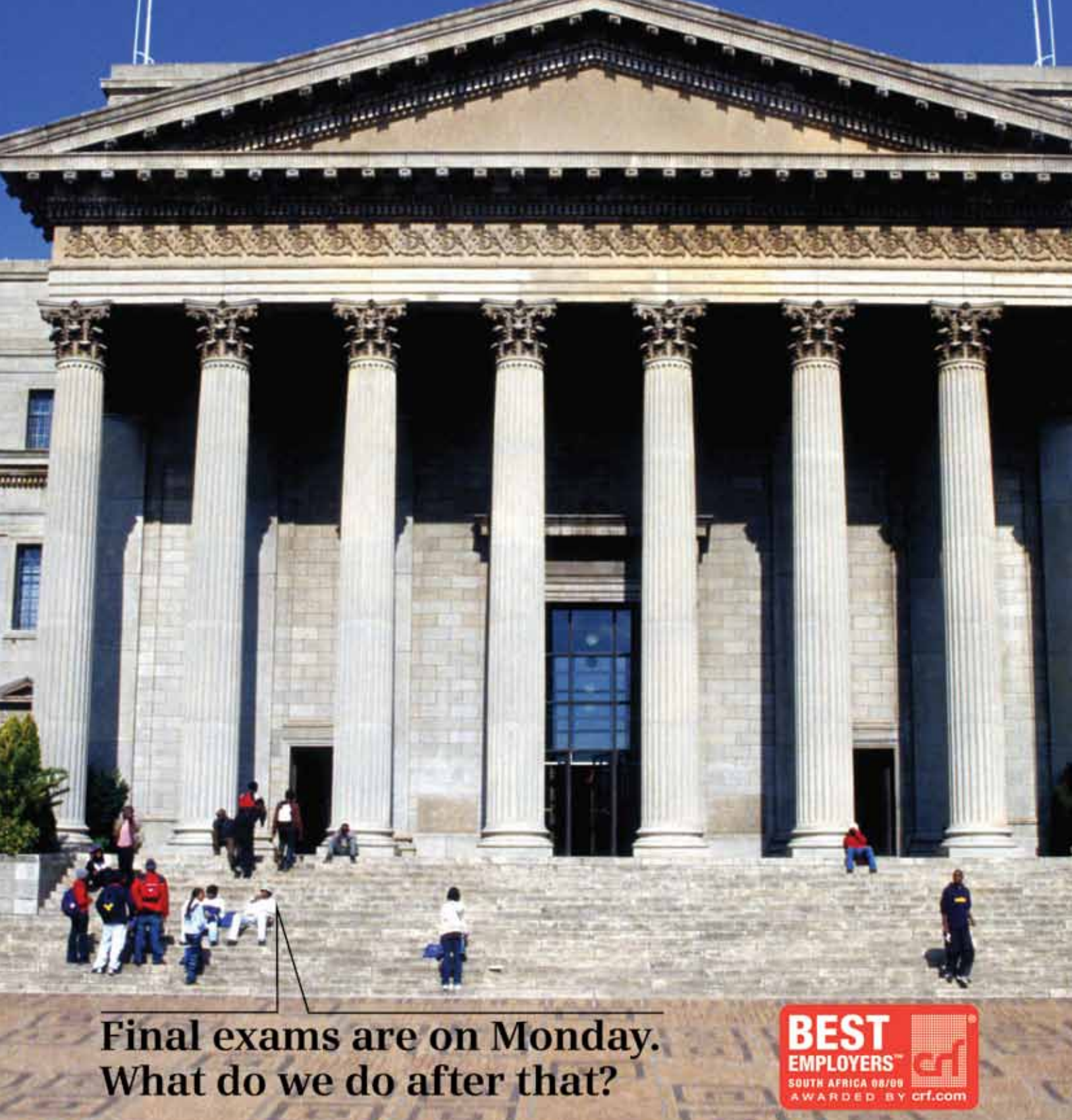

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