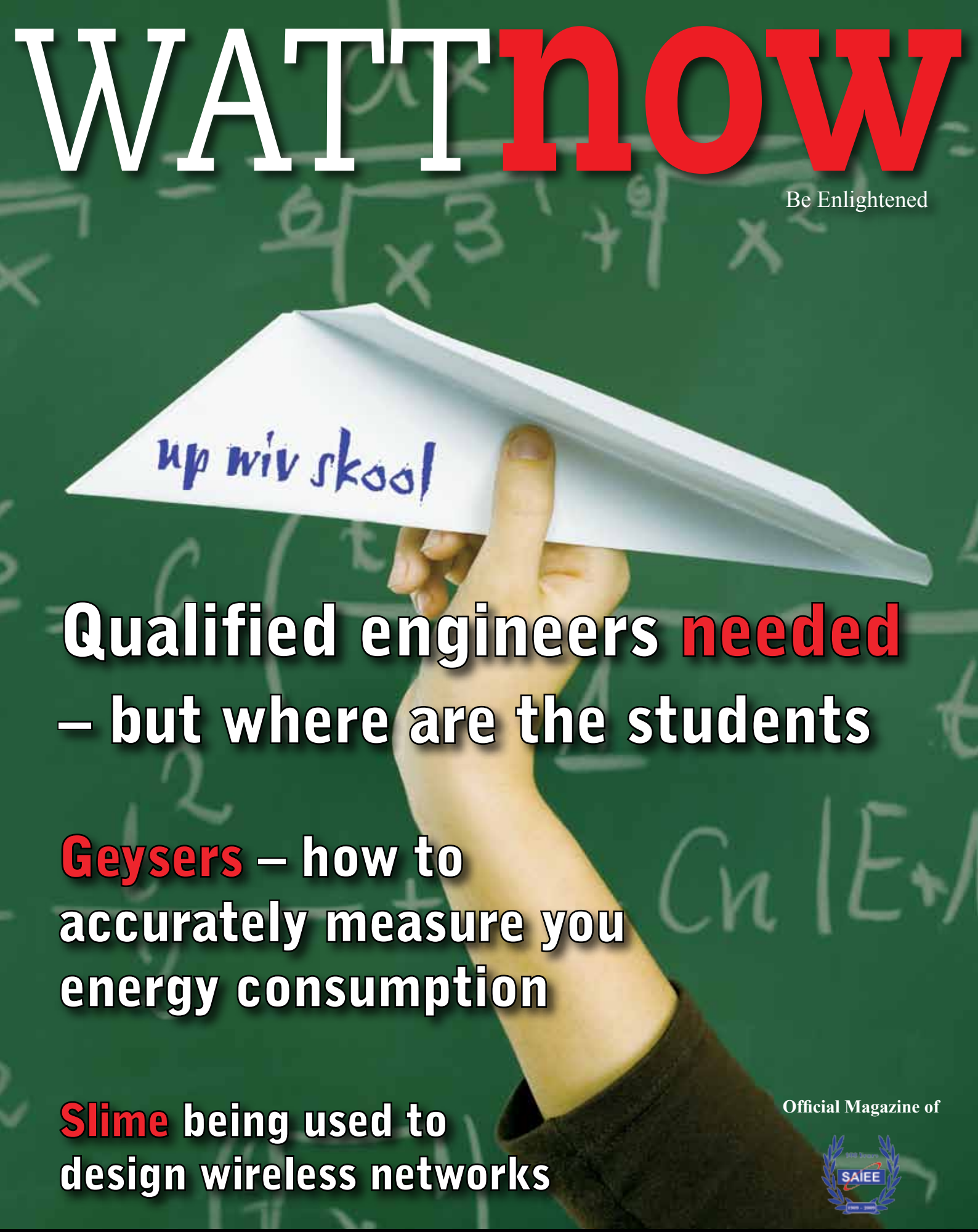
WATTnow

Be Enlightened



Qualified engineers needed – but where are the students

Geysers – how to accurately measure you energy consumption

Slime being used to design wireless networks

Official Magazine of SAIEE

February 2010

Start telling us the truth

Like many people in South Africa today, I want our government officials and spokespersons to stop lying to me and the rest of the South African population.

Take our education system for example: some officials in the Department of Education insist that outcomes-based education is doing wonders for our nation, yet the Director-General of the same department says it's failing the students.

Briefing Parliament's portfolio committee on basic education, he said that 38 percent of Grade Six pupils are currently functioning at the required level of literacy and only 35 percent at the required level in maths.

And nothing's wrong with our education system?

The Human Sciences Research Council conducts the South African part of the Trends in International Mathematics and Science Study (TIMSS), which lists South Africa as the worst-performing country of the 50 countries surveyed.

Yet our education officials keep telling us that the education system is fine.

Young students who spend 12 years of their lives at schools are failing at university level – if they are lucky enough to get into a faculty – because of the poor standard of teaching in South Africa.

And our education officials tell us that the universities are setting standards that are far too high.

Artisan training has ground to a halt and technical schools no longer offer any certainty that the students emerging from these institutions will be able to be indentured as apprentices and, in time, emerge as artisans who can contribute to growth and prosperity in our land.

And our education officials tell us that the government's goal is to create jobs for the millions of unemployed and unemployable school-leavers who've been ejected from a schooling system that's failed.

The anomalies and conundrums are everywhere as double-speak flows out of the mouths of our leaders in education, science and technology. This happens at every level, not just at national level.

How bad is it when teachers create a group known as the Concerned Maths Educators and appeal to government to change the curriculum for mathematics and science because our teachers are not qualified to teach either of these subjects?

And still the government persists in trying to dumb-down education levels; to artificially inflate mathematics and science marks; set papers that are below the required standard and then increase those marks in an effort to persuade the electorate that they are doing something of value.

It's a load of hogwash – what they are doing is lying to us all.

What is the use of our freedom if we can't get a decent education? What is the point of greater human rights for all, if basic education cannot be provided? What are we going to do with the millions of children who have come through this system and who are in the system now?

They are the legacy our teachers have provided.

What are the answers? Well, I might be just the editor of a magazine but even I can see some of the most obvious solutions:

- Reintroduce proper technical colleges (or Technikons if you like) for artisan training.
- Government and industry must re-introduce apprenticeships on a mass scale in the form of a Marshall Plan for skills.
- Government must invest in our teachers by educating and training them sufficiently, paying them well and giving them the fringe benefits they deserve. Then we can attract good teachers and send the bad ones away. Far away.
- Make our universities elitist organisations that attract the top five percent of properly prepared pupils who can achieve what they are capable of achieving.

Is it really that hard?

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Circulation and Subscriptions:
Norma Massey
normam@crown.co.za
R240 (incl. Vat) per annum
Postage extra outside RSA

CROWN PUBLICATIONS

All enquiries for WattNow:
P O Box 140
Bedfordview, 2008

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South African Institute of Electrical Engineers

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ISSN: 1991-0452

Printed by: CTP Web, Cape Town

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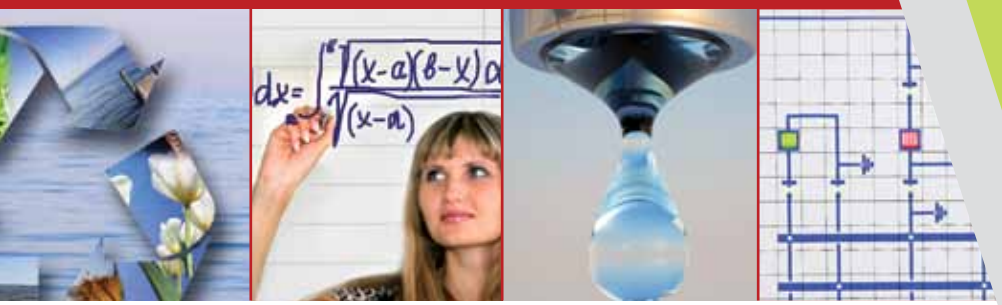


INSTITUTE PAGES

Inside

ABC Certified
Total Paid Circulation 343, Total Free 4111, Total Circulation 4454
Apr-Jun 2009

Information technology offers students new opportunities

The dismaying 2009 matriculation results and the low numbers of students qualifying in mathematics can only exacerbate the shortage of information technology (IT) skills facing the corporate sector, claims Sandra Burmeister, chief executive of Landelahni Recruitment Group.

The 2009 matric pass rate showed a drop to 60,7 percent. Of those who wrote mathematics, one of the 'gateway subjects' to a career, only 45,9 percent achieved more than 40 percent.

"With South Africa's official unemployment rate at 24,5 percent, according to Statistics SA, many school leavers are going to battle to find jobs. However, if you are one of the few who achieved a good maths mark, information technology (IT) could be the career for you, since the sector is facing a dire shortage of skills, and is currently importing talent from countries such as India.

"Computer literacy along with data input or call-centre training will give you access to the workplace. Acquiring basic functional skills, such as general secretarial or administrative skills can also be a good starting point. Employers are looking for skilled people – even if they don't have formal job experience.

"Courses for basic functional skills are usually shorter and cheaper than university programmes, and they will make you marketable as a candidate. Just be sure you undertake the course with an accredited institution."

Burmeister says that information technology is an excellent choice of subjects to study because it opens up many and varied career opportunities. And it isn't always necessary to approach companies pre-armed with a formidable list of qualifications, since most IT companies put an extremely high emphasis on on-the-job training and mentorship, as well as on short courses and vendor certification.

"Do bear in mind that it's not only IT companies that are looking for IT skills," says Burmeister. "Because IT is a business enabler, these skills are in high demand throughout the commercial world, particularly in the financial sector."

A skills survey carried out by ITWeb and the JCSE indicates that the most important skills companies need are business intelligence and knowledge management, followed by software-as-a service, web development, software-oriented architecture and mobile computing.

Broadly-speaking, IT falls into three areas: operations, development and strategy.

Operations provide a good starting point when embarking on a career in IT. Certifications (A+, N+) will stand you in good stead, as will an understanding of the ITIL and Cobit frameworks. This could be the entry point for jobs such as desktop support, security and network administration and Voice over Internet Protocol (VoIP).

For systems development you would need programming languages (Java, C+), database management and probably a BCom in knowledge management or informatics. This could set you up for a career as a developer, business analyst, database administrator or systems architect.

To manage IT at a strategic level, you would need hands-on working experience in a range of areas such as project management, systems architecture and business intelligence, as well as a thorough understanding of ITIL and Cobit frameworks, possibly supported by an MBA. These would provide access to a career in disaster recovery, business architecture and risk management, and pave the way to a chief information officer (CIO) position.

"The CIO role is changing from one of technology custodian to business leader," says Burmeister. "CIOs are increasingly expected to focus on their role of deploying technology as a business enabler, rather than just a back-office administration system. Because of the critical and growing role of IT in business, we are today seeing some CIOs moving up to take the top CEO spot, formerly the territory mainly of those who had risen up through the accounting ranks.

"Whether you are just starting out, or progressing up the career ladder, it's critical that you take responsibility for your own career development. Your company will always develop your skills within relevance to its own business. So it's up to you to make sure you take your own development to a higher level. The most fundamental transaction in the work environment is the exchange of skills and expertise for reward. Your skills are your best tool to ensure that you are always in demand, and receiving appropriate reimbursement for the work you do."

Professor at UCT honoured for work in Addis Ababa

Professor Irwin Brown of the Department of Information Systems at the University of Cape Town has been honoured by the Association for Information Systems (AIS) for his volunteer work in assisting the University of Addis Ababa develop its research capacity in a bid to keep information systems (IS) talents in Africa.

UCT's Head of IS, Professor Jean-Paul van Belle, welcomed the recognition as it demonstrated just how committed the department is in assisting other universities build their own capacity in other parts of Africa.

Brown is highly rated as an established researcher by the National Research Foundation and is a member of AIS, whose global goal is to increase the number of professionals in this discipline.

Bernard Tan, President of AIS, says there have been many pioneering efforts by members to reach out to universities in Africa and South America. An excellent example of this is that a group of our members helped the Addis Ababa University in Ethiopia to launch a doctoral programme in IS.

"The group travelled to Ethiopia to share their knowledge with the local faculty. Members of this group include Donald Amoroso and Solomon Negash, from Kennesaw State University, Marie-Claude Boudreau and Richard Watson from the University of Georgia, Irwin Brown from the University of Cape Town, Monica Garfield from Bentley University, Shawndra Hill from the University of Pennsylvania, Dawn Medlin from the Appalachian State University and Detmar Straub from the Georgia State University.

Brown says the group held a workshop to initiate the launch of the IS track of the IT PhD programme at Addis Ababa University (AAU) in March 2008. The workshop included speakers such as Detmar Straub editor-in-chief of the MIS Quarterly, Rick Watson, a leading international IS researcher and the first PhD graduate from the University of Cape Town's IS department and Alemayehu Molla, an Ethiopian national and now Associate Professor at RMIT University in Melbourne.

Brown was invited to share his experiences at UCT having successfully run an IS doctoral programme as part of Centre for IT and National Development in Africa research initiative. The AAU IS Doctoral programme (by coursework and dissertation) started in December 2008 with nine doctoral candidates.

He was invited back to Ethiopia in June last year, to run one of the core modules for the programme entitled Systems Thinking and Sustainability. Systems thinking ideas and approaches were explored and practised, and their relevance to IS, sustainability and research in developing countries' contexts were comprehensively debated.

In recent years there has been a large movement of Africa's most educated people to more developed economies to do their doctorates and many never to return to Africa.

The Addis Ababa University in Ethiopia designed its programmes locally with the help of foreign scholars. The programme involves at least one international professor travelling to Ethiopia for up to three weeks to present each course and to co-supervise the dissertations produced by doctoral candidates.

Universities must lead the way with greener buildings

Going green, especially when it comes to buildings, is no longer something that's nice to have, but is now fundamental for the future according to Marius Brits of Johnson Controls Systems and Service Africa. He says that more than 75 percent of the world's electrical energy is used in buildings, with more than half of this energy being used in non-residential areas.

Brits claims that as much as 30 percent of this energy is wasted and governments around the world are enacting legislation to enforce energy control and management systems.

He says that higher education institutions in South Africa must now set the example when it comes to implementing greener building infrastructure and technology in an effort to reduce wastage and minimise environmental impact.

In a typical commercial building, heating, cooling and ventilation equipment uses up to 45 percent of the total electricity usage. This is mostly wasted energy compounded by old equipment where the energy efficiency of the building has declined dramatically since its construction.

He claims that universities, schools and many of the older government or municipal buildings must now implement low energy demand strategies to save costs and provide other environmental benefits.

This, he says, is particularly important given the pending electrical energy cost hikes which may cripple businesses that do not improve energy consumption. Moreover, new legislation is driving energy efficiency and governments around the world are implementing energy quotas for public institutions including universities.

Providing low energy demand heating, cooling and ventilation in buildings involves not only intelligent design, but means that better machinery and more sophisticated management systems will have to be installed.

Brits claims that the first step is to measure the electrical demand of buildings at different locations such as campuses, buildings, libraries, hotels and so on. Once this has been established, energy efficient systems can be designed using equipment and controls, and then installed and commissioned into the facilities.

These controls will indicate actual energy usage in each location. The next step is to ensure effective live operations of equipment and controls and monitor performance to reduce electrical demand within the building.

Building management systems play an integral part in reducing the energy demand while demand limiting technologies can shed loads during peak times in order to reduce demand in order to maintain specified consumption. Optimal start and stop times determine when to start heating and cooling to gain comfortable levels at a set occupancy time and stop these systems as soon as possible.

Is South Africa a gateway to the rest of Africa?

Off-shore companies have viewed South Africa as a business gateway into sub-Saharan Africa and attitudes and business practices on the continent have improved but its market potential has never been fully exploited, claims Bennie Langenhoven, managing executive at Tellumat's Telecoms and Technology Group business units.

He says there has been a significant shift, both in the scale and volumes of deals and the manner in which they come about with offshore companies showing remarkable interest in Africa south of the equator.

Langenhoven says the tipping point came in the third quarter of 2008, when the current worldwide economic crisis first took hold. He says that South Africa and parts of Africa generally escaped the fallout of this worldwide economic crisis.

He says that interest in Africa as a growth region is real and likely to be sustainable as major multinational organisations seek new markets for their products.

"Africa needs to be developed as a market, in terms of its appetite for sophisticated technologies in high volumes, but the growth potential alone makes it attractive," he says. "Also, it is not a very competitive market yet. The lessons that foreign firms have learnt in their domestic markets will stand them in very good stead in Africa."

He says these factors point to the continent's sustainability as a business partner for foreign businesses, and he believes it will become a self-perpetuating force as latent demand meets leading technologies

Langenhoven predicts that, in time, Africa will be on a par with other developing regions in technological sophistication. He says that South Africa is a natural base for foreign companies to market products to other parts of Africa because it has the banking system, transport and communications infrastructure necessary for efficient business relationships.

We have the benefit of physical proximity and existing business channels as well as direct trade relations into some African countries. It is relatively easy to do business with us, as English is the business language, and we're close to European time zones."

But in order to be reliable business partner for foreign companies on the continent, he says South African distributors, solution and service providers must take note of a few basic necessities. "In a nutshell, international vendors are looking for sufficient skills to sell and support solutions."

He concedes that it isn't always necessary to have a presence on the ground. "Much of Tellumat's African business is conducted via certified channel partners. In our call centre installations, our customers have basic training in maintaining systems. We also have remote management links from our Cape Town head office, making it unnecessary to be present or to have help on hand."

Where support beyond remote login is needed, and the scale and number of installations justifies it, Tellumat may establish a local in-country office.

Langenhoven says there is "definitely a mobile focus" to current African demand. Mobile operators and suppliers of wireless technologies can capitalise on this trend.

Other than that, he says, there is opportunity to act as strategic advisors to in-country operators, given the relatively high level of experience of South African firms. "The challenge is to identify an area of strength that can add strategic value to African customers, and to go in with that as a selling proposition," he says.

Langenhoven adds that the recent African trade missions have done much to open African doors for SA firms. Angola, currently in the process of rebuilding its infrastructure on a massive scale, offers considerable opportunities in that regard.

"There has seldom been a better time to enter Africa, whether with an existing portfolio or new solutions. Armed with adequate capacity, well-chosen solutions and the requisite skills, local firms can benefit immeasurably from this shift in the international commercial landscape," he claims.

Goodyear saves water by recycling

In just two months, tyre giant Goodyear South Africa has managed to save 5,6-million litres of water – the amount 180 houses would use in a month – through an intensive recycling initiative.

While water restrictions do not yet apply to industry, the tyre firm is determined to save where it can, in light of the Eastern Cape's critical water shortage.

Utilities manager Douglas North says the Uitenhage plant has adopted a three-pronged approach to saving water: it recycled waste water from its boiler house, collected and re-used water run-off, and ensured steam condensate from various production processes did not go to waste.

The recovered water is either redirected through a newly-installed, separate plumbing system to the plants' toilets or used as additional water for cooling machinery. The firm has also installed numerous water meters to monitor water usage – and further reduce its consumption where it can.

North says: "Goodyear's biggest water use comes from the boiler house. It uses an electro-boiler – where the water itself is the element, and therefore it must be very pure. We make use of a reverse osmosis filter plant to purify city water, but it has a high backwash cleaning cycle. For each litre of water it cleans up, about half a litre is wasted. This water used to go into the sewer system. Now, it is directed to our toilets or used as process water to cool machinery."

He says the recycled water is being closely monitored by water treatment experts to ensure it is sufficiently clean and not corrosive to the firm's piping system. "The water recovered from the reverse osmosis process has a high dissolved solid content. This is reduced by blending it with other recycled water."

Goodyear risk control manager René van der Merwe said the plant also used "a huge pit" designed to catch storm water run-off along with any other water (resulting from leaks, for instance) in the plant. "The water is passed through filters and then redirected to a storage tank and collected as required."

She says the company's water saving initiative was primarily driven by the severe water shortage in the Eastern Cape. However, it also formed part of a larger Goodyear philosophy termed the "3-R principle" – reduce, reuse and recycle.

"From an environmental point of view, Goodyear is committed to conserving our natural resources. We evaluate all potential waste by the 3-R principle, in an effort to minimise our impact on the environment," says Van der Merwe.

In addition to its water-saving initiatives, the South African plant was recently recognised for its eco-friendly waste management – resulting in an 85 percent reduction of non-recyclable waste – with its on-site waste management supplier achieving ISO 14001 certification, one of the highest global standards for environmental management systems.

Since taking over Goodyear's waste management two years ago, Khangela Hygiene and Industrial Services and The Waste Trade Company – two companies in the Impala Group – have managed to reduce Goodyear's non-recyclable waste by 85 percent.

Their various innovative waste management systems include colour-coded bins to promote recycling throughout the plant, a vegetable garden and an on-site aviary to ensure that even breadcrumbs from the canteen do not go to waste.

Goodyear's Van der Merwe says: "The company is ISO 14001 accredited, and so we insisted that our vendors and their sub-contractors operate according to these principles. However, it has been quite onerous financially for the smaller companies to get the necessary certification as annual ISO certification fees – which include a full audit – are in the region of R120 000.

The Waste Trade Company's Howard Bulkin, manager: green projects, says the ISO 14001 accreditation means that Goodyear is well-positioned in terms of the new Waste Act, which requires companies to declare what waste is generated, where it is taken and what happens to it. The whole stream of waste and its various handlers are audited to ensure compliance with the Waste Act.

Goodyear, however, already carries out its own audits on all its waste vendors and their sub-contractors, based on ISO 14001. Van der Merwe says that Goodyear is a zero-waste-to-landfill facility.

"Our philosophy is to segregate, re-use and recycle to ensure we do not have an impact on our environment. Non-recyclable waste is thermally destroyed and the ash is used to make bricks. We insist that our waste contractors and their sub-contractors apply the same philosophy," she says

In the run-up to the cleaning group's successful accreditation, Goodyear initiated a joint venture with Khangela Hygiene and Industrial Services and The Waste Trade Company to set up on-site ISO 14001 waste management training in a programme aimed at uplifting existing and potential sub-contractors. Thus far, nine sub-contractors have completed the first of several training sessions.

Bulkin claims that is seems likely that ISO 14001 compliance will be compulsory in the next few years as non-renewable resources diminish and pollution increases. Because of this, he says, everyone must adapt their lifestyle to reduce waste.

Watt's Going On?

Renewable energy projects underway countrywide

Bosch Projects, specialists in the fields of equipment design, project management and engineering, is committed to developing and implementing renewable energy solutions in Africa and includes biofuels projects, co-generation, energy optimisation, ethanol distilleries and energy from waste projects, as well as feasibility studies and process engineering.

These processes are designed to be cost effective, using versatile Energy and Mass Balance software that sets out to optimise plant efficiencies; equipment selection and configuration; co-generation of renewable electricity into the national power grid; cleaner air emissions using advanced scrubber technology and reduced carbon footprint, as well as sustainable energy production and job creation.

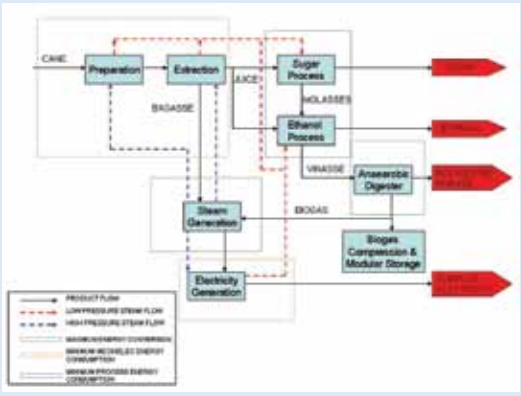
"Sugar cane, which is able to convert up to two percent of incident solar energy to biomass, is one of the most efficient photosynthesisers in the plant kingdom. In addition, sugar cane has the ingredients required for further processing for fuel and water," says Butch Carr, business manager: energy at Bosch Projects.

"The company uses advanced technology for the production of raw and refined sugar from sugar cane; bio-ethanol from sugar, molasses or sugar cane juice; steam and electricity from bagasse (sugar cane biomass) and bio-methane from anaerobic digestion of vinasse for steam or electricity."

The company has been involved in many renewable energy projects, offering services that range from feasibility and consulting studies, to large construction and upgrade projects. These specialist services also include equipment supply and commissioning.

Bosch Projects integrates engineering and technology to provide multi-disciplinary solutions, from concept to conclusion, in sectors that include the sugar industry, power utilities and materials handling, as well as commercial and industrial operations.

Production of ethanol from renewable resources is not new. Apart from being used by humans as an alcoholic beverage for over 2 000 years, fuel ethanol was first used in 1908 by Henry Ford for his Model T Ford, which was originally designed to run on ethanol. A typical conversion process of sugar cane to various energy forms is reflected in the diagram below:



Working adults sacrifice comfort to save energy?

Business owners should think twice before tweaking workplace temperature settings this autumn because, according to a new survey of office workers, 69 percent said they would be willing to sacrifice their preferred ideal temperature in the office to help their company conserve energy.

However the survey also found that nearly four in five participants (78 percent) say they are less productive at work when they are too hot or too cold.

Johnson Controls, a provider of energy efficiency solutions, commissioned a survey of nearly 800 American adults who work in an office setting. The findings indicate that many workers think their employers could be doing more to be energy efficient but business owners must avoid a negative impact on office productivity and the possibility that workers may take action to circumvent their discomfort, including the use of portable heaters or fans, if temperatures are not ideal.

Although South African summers are hot, employers may be tempted to turn down the thermostats as the season changes but this quick fix could lead to hidden costs, claims Douglas Weinrich, regional executive and general manager, Johnson Controls Global Workplace Solutions, Sub Saharan Africa.

He says energy efficient systems and equipment provide a win-win alternative, allowing businesses to save energy without sacrificing workplace productivity."

Almost all participants said their offices had been too hot or too cold at some point in the past year (98 percent) and when that occurs, most (78 percent) said they are less productive. Not only does workplace productivity suffer, individual actions - such as bringing a heating or cooling device into the office - result in increased energy use. Other findings from the study showed:

- Forty-nine percent of office workers have used a fan when it was too hot in their office, and 28 percent used a space heater when it was too cold.
- Nearly one-third (30%) have left their office building to take a walk outside when it was too hot or too cold in their work space.
- Forty-one percent have informed their office manager or custodian of their discomfort.
- Approximately seven in ten (69%) have adjusted their clothing, such as adding a sweater if was too cold or removing a layer if it was too hot.

The results indicate that 45 percent of workers think their employer is not doing enough to make their office environments energy efficient. Harris Interactive conducted the study on behalf of Johnson Controls in April last year and interviewed a nationwide sample of 2 160 adults aged 18 years and older, of whom 784 are employed full time/part time and work in an office setting.

Data was weighted using propensity score weighting to make it representative of America's adult population on the basis of region, age, gender, education, household income, race, ethnicity and propensity to be online.

Are smart grids really the panacea they are made out to be?

By Stan Bridgens, business director of the SAIEE

An efficient policing and juristic system, skilled field teams, effective analytic and diagnostic network and system processes, a meaningful and no nonsense customer service unit – what have all these functions got to do with smart grids and the supply of electricity to the consumer??

I believe these essential functions are a prerequisite before you even attempt to spend millions on implementing smart grids in a distribution system. This is particularly relevant in South Africa at this time.

Failing to ensure that these so-called supporting requirements are not properly addressed? Then there is a very real danger of wasting serious money that could be better spent on other aspects of electricity supply that will give a much higher return on investment.

New technologies must not be implemented without ensuring that the support is in place to effectively manage the implementation and act effectively on the output from a new smart system.

The paramount problem a supplier of electricity has is the management of the processes around the smart grid technology. Are the overall desired results in savings and better control going to be achieved? This cannot be answered without taking into account the essential supporting functions.

If the processes and procedures within the undertaking, prior to instituting prosecutions for theft of electricity are not effective, if the response teams for tampering or illegal connections from overhead lines or other points on the distribution system are not in place, should the expertise to decipher the output of the system not be adequate to institute effective counter measures for waste of energy, then the question/reality of poor return on investment becomes an important issue.

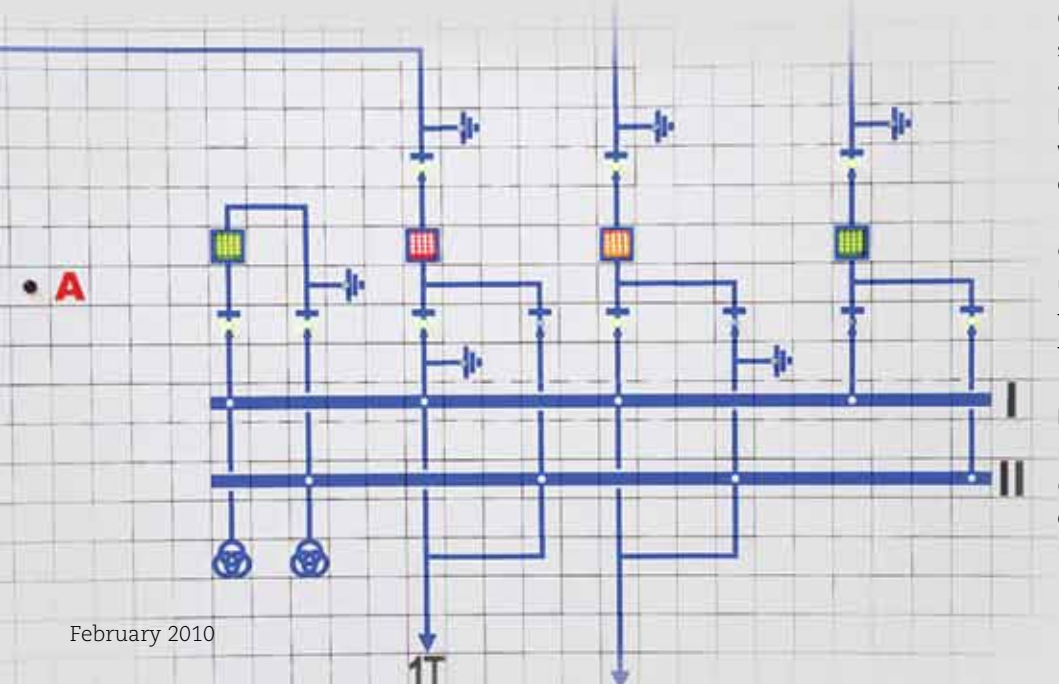
This is particularly pertinent to smart grids. It is all good and well knowing where every watt goes but it is just as important to know what is to happen with every eventuality that the output of the system produces. Furthermore one must be sure that the appropriate action taken will be legal and will be supported by the macro systems.

Having all this data assembled at various nodes and eventually coupled up to the billing system to be used for effective billing, customer service and cut-offs is very convenient for effective control, however the supplier must not decide to implement a smart grid without including all the costs of the support functions necessary to ensure success. The issue of political will and community buy-in are matters not easily assessed nor addressed prior to the commitment to smart grids in South Africa. These issues are perhaps unique and need innovative strategies and much foreplay - at great cost to the supplier to give the new smart system an even chance of justifying its implementation.

Systems are already in place which have fine tuned the operational side down to the last and most accurate level so that action could be taken almost instantaneously to reconnect or disconnect customers. A fast acting response was also in place where there were signs of illegal connections and above normal losses for suspicion of tampering. And it has not realised all the benefits envisaged nor worked to the overall benefit of the community, good management and fairness to all parties. I shall not go into detail suffice it to say that there was mass community action against the system, much destruction of equipment and infrastructure and consequent loss of control until much reinforcement was done. Ultimately a good and sustainable resolution did not emerge.

Sadly I believe there is little evidence of any sort of improvement where smart systems have been introduced – and the question must be asked why? How many cases of successful prosecution for theft of energy have been recorded to date? How many cases have been thrown out of court due to poor management processes by the supplier in bringing delinquents to court and for the courts not being adequately briefed or trained for that matter to deal with the theft of an invisible and intangible commodity such as electricity.

I would like to see that suppliers of smart grid technology not only concentrate on their unquestionable state of the art of distribution management but also pay attention to the wider management of the whole process. Suppliers must also not be blinded by the benefits of smart grids and be aware of their responsibilities and commitments required outside of the smart grid technology and the concomitant cost thereof.



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Creativity meets technology in lighting design competition

Resourceful designers once again have the opportunity to harness their creativity and technological know-how – and win handsome cash rewards from Eskom's Energy Efficient Lighting Design Competition for 2010. The competition challenges both the novice and the seasoned professional to come up with designs that fuse flair and functionality, efficiency and aesthetic appeal using energy-efficient lamps.

For this competition Eskom has invited students and professional designers to design and build imaginative lamp prototypes that work and are pleasing to the eye. As the name implies, it is important for all designs to use energy-efficient light sources.

Secondly, professional designers are invited to submit innovative energy-efficient designs, systems or products that are suitable for residential applications. These may include, for example, a complete lighting system for a low-cost housing development or any other solutions that increase energy-efficiency and the use of alternative power sources.

Eskom's drive to promote energy efficiency stems from the fact that South Africa needs to save energy and if consumption levels are not reduced, more power stations will have to be built. This will mean that electricity tariffs increase.

Given South Africa's rapidly growing population, the demands on local energy resources are increasing sharply and this will, in time, have a severe impact on the country's natural resources.

Eskom says that since compact fluorescent lamps were introduced to the local market it became apparent that existing lamp designs are not suitable for use in the newer energy-efficient technologies. To address this dilemma, Eskom launched the competition to encourage new designs that demonstrate efficient lighting technologies can be used in a contemporary and attractive way within the residential lighting arena.

Prizes to the value of R200 000 have been earmarked for the competition and the winning designs may mean that the designer will hold a patent for the new product offering some exciting and lucrative possibilities for the patent holder.

The prizes are as follows:

Category A: Residential luminaire design (students – individual):

- First prize: R30 000
- Second prize: R20 000
- Third prize: R10 000
- Educational institution (of the winner) gets: R10 000
- The ten most promising previously disadvantaged designers each receive R1 000.

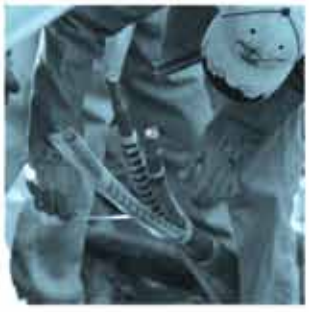
Category B: Innovative energy efficient lighting design (professional):

- Innovative energy-efficient design, system or product: R30 000.
- The winner in the professional category will receive the Sparks' floating trophy.
- Twenty top regional finalists each receive R5 000.

Designers are invited to design a luminaire which both makes use of and complements a compact fluorescent (or energy-saving) light bulb. In addition, professional entrants are also invited to submit innovative energy-efficient designs, systems or products which are suitable for residential application.

The closing date for entries is 30 July 2010 and entrants may participate in one of the two categories.

Full details are available on the web at www.lighting-design.co.za or via e-mail at amroux@mweb.co.za.



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Qualified engineers are needed but where are the qualified students?

According to various education experts at different institutions around the country, South Africa's education system needs to be comprehensively revised if it hopes to meet its targets for job creation, economic growth and greater prosperity.

The Trends in International Mathematics and Science Study (TIMSS) showed that South Africa was the worst performing country of the 50 participants and scored just 264 compared with the average international scale score of 467.

The Human Sciences Research Council, led by Dr Vijay Reddy, did the South African part of the study. There were 255 schools and 8 952 learners who participated in this survey.

For the South African study, the School Register of Needs database was used to select the sample of schools by province and by the language of teaching and learning. The study had a three-stage stratified cluster design and randomly selected a mathematics and science class from each sampled school and then sampled learners within a class in cases where the number of learners per class was greater than 40.

The lowest-performing countries were Lebanon, the Philippines, Botswana, Saudi Arabia, Ghana and South Africa. The top countries were Singapore, the Republic of Korea, Hong Kong, Chinese Taipei, Japan and Estonia.

South Africa had the largest variation in scores ranging from mostly very low to a few very high scores meaning that the score distribution was skewed. South Africa's performance in mathematics was around 10 percent and in science around 13 percent.

Essentially the report shows that Ghana and South Africa have the highest percentage of learners achieving a score of less than 400 points, which is below the Low International Benchmark.

Clearly South Africa's education system – specifically in mathematics and science – is a mess and has failed all the young people of this country. Yet, it is from this education system that the universities around the country have to draw the students who will make the engineers, doctors and scientists that we so urgently need in this land.

Ian Jandrell, Head of the School of Electrical and Information Engineering at the University of the Witwatersrand points out that Taiwan, with a population that is about half the size of South Africa's, produces ten times the number of graduate engineers.

"Between 30 percent and 46 percent of all graduates in China are engineers and that equates to about 500 000 new engineers every year. No wonder that country is doing so well and is able to recovery from a global economic recession so quickly," he says.

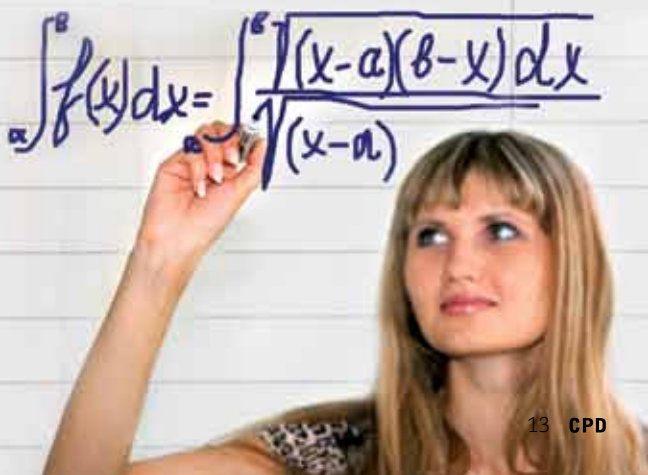
Current figures from the Engineering Council of South Africa suggest that South Africa graduates about 1 400 engineers a year and this has been the average figure for the past seven years. The number of students graduating with BTech qualifications has gradually risen to about 800 a year, and those with a national diploma rose to about 2 500 a year.

Consider that in 1975 there were about 30 000 artisan apprentices at work throughout South Africa. By 2006 there were less than 3 000 indentured apprentices across all trades and the number has continued to dwindle since then.

As Jandrell says, one of the critical elements is to look at the engineering team, which comprises artisans, technicians, engineering technologists and professional engineers. Artisan training has all but ceased and the number of technicians and technologists coming out of the universities of technology is hopelessly low, at just over 3 000, in terms of what the country needs.

"Engineering is a combination of conceptual work based on engineering knowledge and competency and sets out to conceive, create, design and plan components, systems and processes aimed at solving problems of economic or social value," says Jandrell

"It is the engineering team, not the individual that plays a critical role in these solutions," he says.



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The method or design should be technically relevant. In other words, the authors should show how their method supersedes the currently available methods in practice.

Closing date for entries: 31 March 2010.

(Entries should not be longer than six typed pages, double-spacing)

Email the Editor, Glynnis Koch, at chemtech@crown.co.za for more information and an entry form, or telephone 011 622 4770 and ask for Glynnis.

A cocktail party will be held in April when winners will be announced and prizes awarded. In addition, the winning articles will be published in the May 2010 issue of 'Chemical Technology'.

* THE OTHER AWARDS CATEGORIES:

- 'Chemical Technology' Undergraduate Student of the Year 2009
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Jandrell used the analogy of a pyramid with the base of qualified and competent artisans, backed by technicians and technologist and, at the top point of the pyramid, the engineers who have the engineering knowledge to conceptualise solutions.

"The problem facing South Africa is that the country is under-producing at all levels of the engineering team and the situation does not appear to be getting any better. In fact, it would appear that the mathematics and science competencies being developed at secondary schools is deteriorating fast, as the TIMSS study so clearly indicates," he adds.

There are only 15 000 Professional Engineers from all disciplines registered with the Engineering Council of South Africa and the sad fact of the matter is that this number might decline further because fewer school-leavers are adequately qualified and prepared for basic tertiary education in an engineering field.

South Africa spends proportionately more on education than many other developing countries and is still not achieving what it needs to in providing basic secondary schooling.

This is borne out by the assessment from TIMSS that shows South African learners are far worse off than those in Botswana, Egypt, Tunisia, Morocco and Ghana. In fact, local students are simply not being properly taught at primary and secondary schools.

Referring to some of the figures collected over the years, Jandrell points out that in 1991, 14 percent of learners wrote mathematics on a higher grade in their matriculation year and by 2006 this had dropped to just nine percent.

The figures show that in 1991 20 000 learners passed higher grade maths. Some 15 years later, in 2006, 25 000 students passed but only 16 percent of candidates' results were sufficient to gain university entrance. Just five percent of students passed maths at the higher grade while six percent achieved a pass in higher-grade science.

"Essentially, what this meant was that most students emerging from South Africa's schooling system did not have the fundamental science and mathematics knowledge to allow them to enter the engineering field or, more importantly, to pass engineering in their first year," says Jandrell. The new national Senior Certificate (NSC) was an attempt to address this problem, by trying to increase the number of learners completing Mathematics at school and to ensure that the rest did a Maths Literacy course.

The tragedy is that there is scant evidence to suggest that this new approach has delivered the desired effect. As Jandrell points out, there's no point in manipulating standards to achieve certain throughputs or targets if the outcome is not the required level of competence being achieved. While it is evident that Government has recognised some of the serious challenges in School education, particularly in the areas of Maths, Science and Technology, the path to solving the problem is a long and difficult one.

There's no doubt that the lack of basic engineering skills this was one of the many factors that contributed to Haiti's recent appalling loss of life after an earthquake struck that country.

International experts have blamed Haiti's lack of building standards, poor building regulations and a lack of basic engineering skills for much of the destruction that caused and estimated 300 000 people to lose their lives.

Had the buildings been properly built in the first place, the loss of life may have been very much lower.

Haiti is an example of what can happen when engineering skills are simply not available and given the state of South Africa's schooling system, there is little doubt that an engineering crisis may soon face this country too.

Another problem in this country is that South Africa is currently losing about 20 000 teachers a year – either through emigration or to more lucrative positions in the commercial world – and is graduating just 6 000 teachers a year – an annual shortfall of about 14 000 teachers and the position is getting worse every year.

Referring to the time it takes to provide qualified engineering skills, Jandrell points out that if an engineer enters university in 2008, he or she will only graduate in 2011 and will be permitted to register as a professional in 2014. Thus it takes at least seven years to have a productive professional person in the field.

Respected professional, Hu Hanrahan points out in a paper on engineering education that there is an acknowledged and significant under-production of engineering professionals in this country and yet it is these skills that are a fundamental enabler for developing countries.

He says that if South Africa wants to grow its economy then there will be an increase in demand for electricity, water, transportation, communications, manufacturing and mining and each of these sectors relies heavily on engineering in one form or another.

To produce engineers, technologists, technicians or even artisans starts with national and institutional policies and requires some support from industry along with adequate resources and funding.

From a student's perspective, the preparedness, commitment and funding must be in place so that universities are able to accept learners and start teaching them the appropriate skills.

With the collapse of artisan training in South Africa, the skills pool of artisans has been drained to virtual depletion and according to some skills statistics the average age of artisans is now 55 and there is still no growing pool of artisan training underway.

There is just as great a problem with the rest of the engineering team because, as Hanrahan, Jandrell

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and others point out, there are not enough engineers, technicians or technologists either. Returning to the pyramid model, this means that, whatever we do, the base, made up of artisans, remains frighteningly narrow making the structure unstable.

Perhaps, for South Africa anyway, it's time to reintroduce proper artisan training and then even to use the different universities of technology as feeders for the professional engineering faculties.

Jandrell seems to think that this might be a way to handle part of the education crisis in South Africa but also says that we need to boldly embrace excellence as a necessary attribute of education – and even encourage elitism is certain sectors because the country needs the best skills in the world in order to both compete internationally and to build itself up The fact of the matter is that only a very small proportion of learners have the aptitude and ability to complete engineering programmes. We need to ensure that the limited resources we have are best deployed in the national interest.

It's interesting that the TIMSS survey indicated that mathematics and science are fundamental prerequisites for university education but just as important for many of the other skills too.

In 1975, when there were more than 30 000 apprentices in South Africa, many of them had passed mathematics at standard grade and were actively being trained in a skill that would serve them for the rest of their lives.

Nowadays, with no engineering apprenticeships and no drive by industry or government to reintroduce apprenticeships or artisan training there are millions of unemployed school-leavers who are unemployed and unemployable.

That's the legacy of schooling in South Africa.

So literally millions of young people emerge from school in an ill-prepared state and are unable to get jobs or further their education or even embark on specific skills training.

Some of these young students might find that the courses followed at schooled allowed them to gain admission to a university of technology but without basic mathematics and science knowledge, they are precluded from entering the engineering field.

And it is in the entire engineering field where most severe shortages of skills are.

The problem is compounded by the fact that fewer and fewer students are drawn to the engineering profession as a career choice and many of those that express an interest in the engineering field are so ill-prepared by the schooling system that they cannot fulfil that interest.

Jandrell says that the single biggest hurdle currently facing universities is finding school leavers who are sufficiently well prepared for university education. "School performance is becoming a less and less accurate means of measuring likely performance at university. In fact, in engineering programmes school marks in general are no longer a measure of preparedness at all," he says.

He says that industry, individuals and universities must all lobby government to produce teachers that are capable of preparing students for university and this is particularly true when it comes to teaching mathematics and science.

We must be sure that teaching is in the hands of people who are highly educated in their areas of expertise. Identifying, attracting and retain those people within the teaching profession is a huge challenge.

A group calling itself the Concerned Maths Educators (CME) issued a statement saying that the 2008 maths paper had deliberately been watered down and spokesman for the group, Aslam Mukadam said that the teaching of maths and science was now in a crisis.

He blames the structure of the outcomes-based education system for the drop in maths and science marks and says that the Department of Education must take a step back, reassess teaching processes or talk to universities and teachers about how they can improve the situation," he says.

In fact as long ago as 2008 a coalition of Western Cape-based maths teachers appealed to the National Department of Education to suspend the format of the maths curriculum for grade ten to twelve learners, claiming that educators are unable to teach the students according to the existing curriculum.

More than 50 percent of South Africa's maths and science teachers are unqualified and Jonathan Jansen, vice chancellor of the University of the Free State supports the scrapping of the system.

He said, during an interview at the end of 2008, that the reality is that good curriculum ideas run way ahead of the implementation realities. There are simply not enough teachers with the necessary depth of knowledge to teach these two subjects properly.

And that is probably where the problems in maths and science begin: the inability of teachers to teach the subject.

Sadly, though, the one's that pay the price are not the teachers or the parents but the students themselves. They leave school after spending 12 years in a system that has failed completely.

That failure has lifelong consequences.

Geysers
– How to evaluate different energy-saving strategies

By T. C. Verster, a retired electrical engineer and former member of the SAIEE

There are literally millions of electric hot water geysers installed countrywide and this appliance is so simple, effective and long-lasting, that it is mostly not even given a second thought. In the past, very little technical information about its thermal characteristics was published, and even now that the local and global energy crisis has gained public awareness, sufficient facts and figures on geysers are still not easy to come by.

Without these, any systematic energy saving strategy cannot be quantified. I was keen to assess methods of saving energy and as a starting point, used the most prevalent size (150-litre) domestic hot water geyser , to analyse, in some detail its performance and to gather the needed figures. From these figures it is possible to derive scaling factors for smaller and bigger size geysers.

In terms of basic heat loss, when the water in the internal metal tank is warmer than the ambient temperature outside, it gradually loses heat by conduction through the insulating layer (2-3 cm polyurethane) to the external sheet metal enclosure. The latter gets rid of this heat by conduction through the surrounding air, convection of this same air and radiation into space.

It is possible to calculate and add the contribution of each effect to the thermal behaviour of the geyser but it is complex and difficult to do so accurately. It is more straightforward to make measurements where necessary. One such procedure is:

- If a 150 L geyser filled with cold water (20 °C, say) is switched on, how long will it take a 3KW element to heat the water to 65 °C? The basic equation is
  Q = mc(T2-T1)/3600
  where: Q = energy in KWh needed to raise water temperature from T1 to T2
  m = mass of water (Kg); = 150 in this case
  c = specific heat of water (4.19 KJ/Kg/ C)

Therefore Q can be calculated as 7.85 KWh, and a 3 KW element will take 7.85/3 = 2.6h to bring the geyser's water up to 65 °C.

When switched off, the cooling down process takes place much more slowly (figure 1). This specific geyser (Kwikot 150L horizontal) was set to reach its maximum possible temperature (72 °C) and then allowed to cool down undisturbed for three days. Its measured

temperature decline was found to closely fit eqn. (1), with T_{amb} about 15 °C during this period.

$$T = T_{amb} + 14e^{-t/17} + 43e^{-t/110}$$

To maintain the temperature at 65 °C, say, just a small fraction of the heater element's 3 KW capacity is utilised as the thermostat switches it on and off several times a day, with a duty cycle of about 5 percent. This standby energy, although seemingly low, adds up to a significant value over a month, and represents lost energy, which should be minimised as far as possible. This is the main driving force in obtaining dependable parameters, and if possible, calculable trends for geysers.

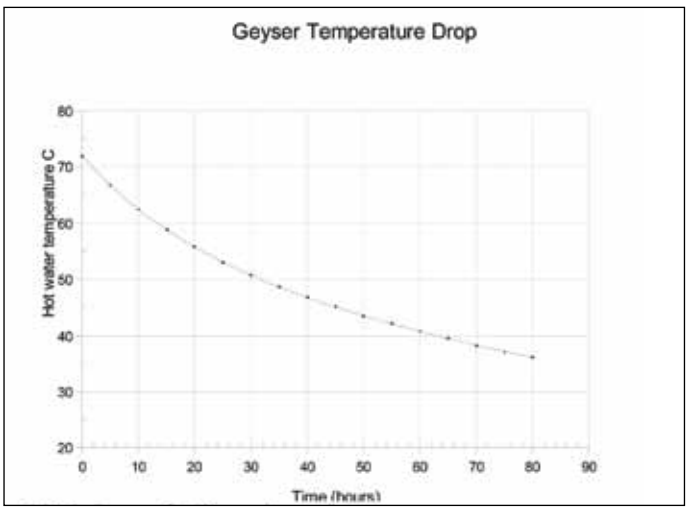

Figure 1: Cooling curve of a 150L geyser (measured).

The standby energy depends strongly on the temperature level of the hot water, and can either be measured directly, or simply derived from the cooling curve above. The basic derivation is as follows:
Standby energy, P = dQ/dt = -mc(dT/dt)
Specific to this case:

- P (in KWh/mo) = -125.7dT/dt
  where: dT/dt = slope of the cooling curve (Fig.1) at any point, in C/hr.
  From eqn. (1), therefore,
  $P = 125.7(0.824e^{-t/17} + 0.391e^{-t/110}$

From equation one and equation two, calculations can be made to plot a curve of standby energy as a function of temperature, from which values of standby energy at any temperature can be read as necessary. This clearly is a non-linear curve, which means that the heat loss does not gradually increase, as the water temperature rises, but quickly becomes much worse.

This is not the only way of measuring the standby energy, but all methods of covering the whole practical range from room temperature to 75 °C, are time-consuming, particularly if data for all different geyser makes and sizes are to be obtained. This data is necessary for modelling savings for different strategies and different situations, but for modelling purposes it is desirable to express standby energy, P, in terms of temperature instead of time as in equation two, or having to read values off a curve.

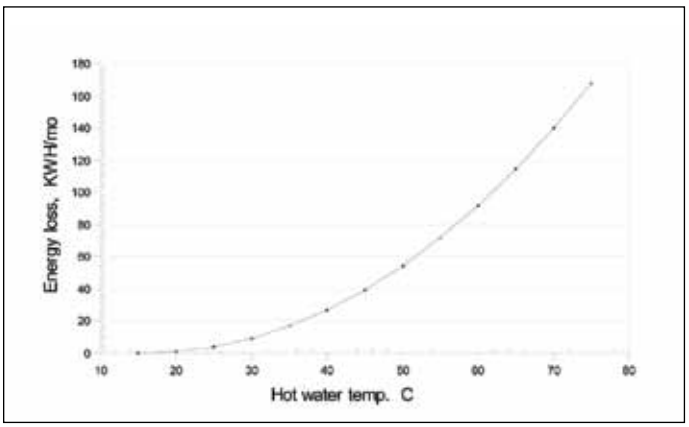

Figure 2: Standby energy of a 150L geyser (derived from cooling curve).

A very useful approach was found in fitting a relatively simple analytical function to the measured/derived values over this temperature range, which showed that this non-linear curve is more or less a quadratic equation:

$$P = K (T - T_{amb})^n$$

where K is a scaling constant (K = 0.031 for the 150L Kwikot geyser), and n = 2.1

The different sizes of geyser from this manufacturer, which follow the same basic design, can be assumed to obey the same quadratic equation, but with different scaling factors.

The important question is – are savings being achieved by switching the geyser off? Let us assume that the householder decides to save power by switching off for 24 hours while the family goes visiting. The usual hot water temperature is 60 °C (say) and in 24 hours it will have dropped to 47.5. How much power has been saved?

- Firstly, no standby power has been provided for 24 hours. The monthly standby energy usage (from figure 2, or better still, from equation three) is 91,9 KWh, which converts to 3,06 KWh/day (or per 24 hours).
- Secondly, the heating element now has to heat up 150L by 12, 5 °C, from 47,5 to 60 °C.
- The energy required for this = mc (60-47.5)/3600 = 2.19 KWh.
- The nett energy saved in one day is therefore = 3.06 – 2.19 = 0.87 KWh
- This equates to a monthly saving of 30 x 0.87 = 26.1 KWh.

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If this calculation is repeated for shorter and longer switch-off periods (fractions to many multiples of a day), an insightful curve can be drawn (See figure 3). It illustrates the monthly KWh savings achievable if the geyser is kept switched off during regular periods when nobody requires hot water, and switched on shortly before demand for hot water will resume (it takes about 2.5 hours to reheat the water after a month's absence, after all, and about 30 minutes after one day's absence).

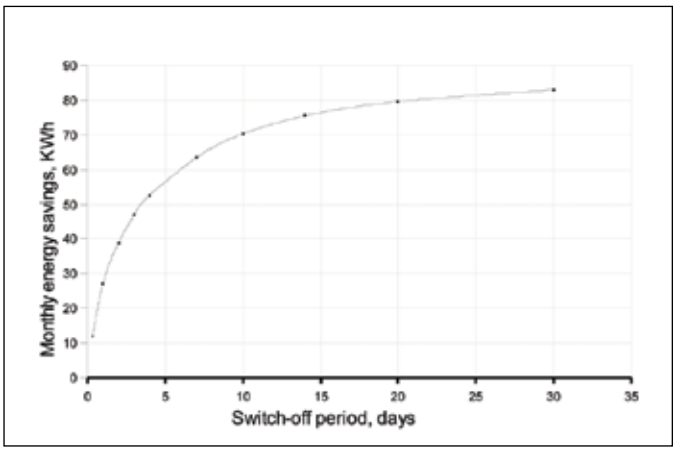

Figure 3: Standby energy saved by switching the geyser off during non-use periods.

The main impact of this curve is that short switch-off periods (less than a day) do not really contribute meaningfully to energy saving, particularly as it is too much hassle for the householder to keep up with, unless a programmable electronic timer is installed.

Longer switch-off periods (> 1 day), however, could be very usefully incorporated in a savings strategy. A household with few people and more than one installed geyser (separate flat, laundry, or whatever) could fruitfully implement a different switch-off strategy for each. A household with several people and a single installed geyser, however, will find it difficult to go this route, and should rather reduce the hot water temperature setting as far as comfortable, to reduce electricity use.

There is one special situation, if one thinks it through carefully, in which a timer can be used daily to eliminate practically all standby power. If the occupant of the flat is single and a creature of habit, who only needs hot water to bath or shower at 07:00 each day, a small (50L) geyser could be run like an electric kettle: an electronic timer could be set to switch the geyser on for one hour at 06:00 every morning, to ensure hot water at 07:00, but not to reheat the geyser after its hot water has been used. The geyser remains cold until the next morning at 06:00, thus no standby power is required.

How do external geyser blankets assist in saving energy? Most geysers have very good internal thermal insulation, but the energy crisis has caused a variety of external geyser blankets to become available, in an effort to still further suppress leakage of heat. Practically no systematic data on their efficacy with specific geysers could be traced, and the results given below are also for the one type only (Kwikot 150L), wrapped in turn in each of the following blankets:

- regular (heavy) household blanket
- thick bubble-wrap with aluminised outside surface
- shiny (very reflective) lightweight emergency blanket

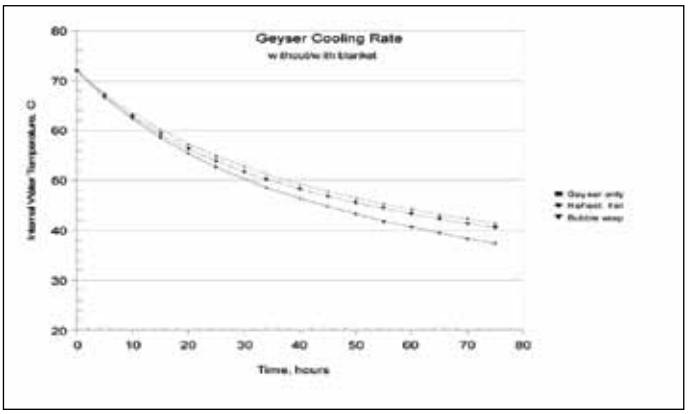

Figure 4: Geyser blankets: effect on cooling rate.

The results of this experiment are plotted in the graphs of figure 4. The first two items on the list gave such similar results that only one of them is displayed. The effect caused by all of the blankets do not seem dramatic, and to judge their value, it could be more helpful to calculate their effect on standby energy values (figure 5).

Again, it appears that somewhere in the region of 10 percent reduction, at the most, can be achieved. It is possible that a geyser with less effective inherent insulation could benefit more from a geyser blanket, but the obvious direction to go, in order to reduce standby energy by 50 percent +, is to reduce the hot water temperature to 55 °C or lower, rather than to expect much from a blanket.

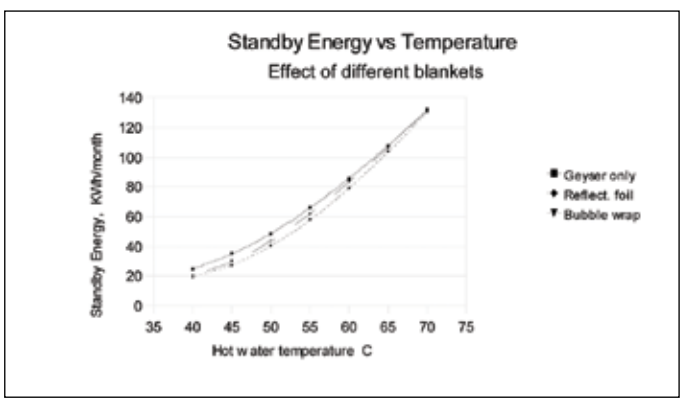

Figure 5: Reduction of standby energy with different geyser blankets.

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There are many choices possible to save energy in the provision of hot water for domestic purposes, and geyser size is one of them. Is it better to have one big geyser in a house or building, or a more distributed layout of small geysers closer to the points of use?

It is fairly standard to install one 150L geyser in a medium-sized house, serving the bathroom/s and kitchen, but is this the most energy-effective way, in view of the real cost of energy in the future?

The equation used to calculate energy cost (Equation Three) is valuable for making further theoretical assessments of situations with different-sized geysers of the same design type, without having to make detailed measurements for each individual size.

The only assumption made, which is close to reality, is that the heat loss through the wall of the internal high pressure tank, is proportional to its surface area. It must also be kept in mind that the capacity (volume) of a tank scales up proportionally to the third power of the linear dimension, while the surface area only scales up proportionally to the square of the linear dimension.

If all other properties of two tanks, except size, are similar (like materials, thickness of insulation and so forth) the bigger tank will have less surface area per litre capacity, and therefore cool down more slowly than the smaller tank. This feature can be exploited for energy-efficient supply of hot water, but if daily hot water demand is low, a small geyser may be the better choice.

It is useful to have the most relevant factors for geysers across the size spectrum spread out in a table, as below. Some clear trends are visible:

Geyser parameters

Capacity		20L	50L	100L	150L	200L	250L
Scaling constant, K (see eqn. above)		.014	.019	.025	.031	.037	.043
Cooling rate (°C/hour) at 60 °C		2.1	1.6	1.2	1	0.8	0.7
Time (hrs) to heat up water from 15 to 60 °C		0.35	0.83	1.75	2.6	3.5	4.3
Heat loss at	65 °C	52	70	93	115	137	160
(KWh/month)	60 °C	42	56	74	92	110	128
	55 °C	33	44	58	72	86	100
	50 °C	24	33	44	54	64	75
	45 °C	18	25	32	40	48	55

- It is evident that, whatever size geyser is chosen for installation in a building, the most substantial energy/cost saving action is to reduce the thermostat setting to as low a setting as comfortable (55 °C is good enough for most purposes).
- A bachelor's flat with one inhabitant could get along more cost-effectively with a small 50L geyser. Even if one bath depletes all the hot water, it heats up in less than an hour (with a 3 KW element), to be ready for the next demand.
- A bigger household with three 50L geysers instead of one 150L geyser will waste more energy, but will break even with two 50L units.
- Multiple smaller geysers in a building can be used with good effect if the hot water demand pattern has long periods of slack, eg a laundry room used only once or twice per week, or a guest flat used over week-ends only. Programmable controllers can be set to keep such geysers off when not required. In this way the energy use of very different consumers can be customised to minimise wasteful use.
- There are obvious cases where a single big geyser is the most energy-effective choice, e.g. a gym or hotel, where it can provide large quantities of hot water at the lowest heat loss per litre.

There are many tips and hints being distributed on how to reduce the cost of producing hot water for a household, but the tools to calculate how much effect each action will have, and which are the most cost-effective, are lacking. It is therefore worthwhile exploring a few scenarios with the aid of the analytical tools (Equations 1 and 3) presented above.

What about using 'green' showerheads or thermostat timers? A useful accessory may be to use a so-called 'green' shower head which limits the water flow to say 6L/min, even if the pressure is sufficiently high to allow 10L+ per minute through a conventional shower head. Similarly, saving might be achieved by using a thermostat timer to regulate heating of the water in the geyser.

The fixed assumptions are:

Timer settings:	**ON:**	04:00
	OFF:	06:30
Shower time:		07:00
Shower duration:		5 minutes
Water flow rate:		10L/min (conventional shower head), or 6L/min (green shower head)
Shower temperature:		45 °C
Cold water temperature:		15 °C
Geyser size:		150L

Because the capacity of the geyser is large, only a portion of the hot water is used and replaced by inflow of cold water, and the mix will eventually stabilise at an in between temperature, substantially lower than the thermostat setting, but will still lose some of this heat until the next day's switch-on time. With the available theory, the required daily replenishment energy can now be calculated, which includes both heat loss and hot water productively used.

the challenge is on

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The results (KWh/month) are shown in the table below, for seven different scenarios:

Monthly energy requirements for hot water (KWh):
Different Thermostat Temp. Settings, °C

Scenario	70	65	60	55	50
1. Geyser on 24/7, no hot water being used	141	116	93	73	55
2. Geyser on 24/7, one deep bath (75L)/day	219	193	170	150	133
3. Geyser on 24/7, one shallow bath (50L)/day	192	167	144	124	107
4. Geyser on 24/7, one shower (normal head)	192	167	144	124	107
5. Geyser on 24/7, one shower ('green' head)	171	146	123	103	86
6. Geyser with timer (2.5 hrs), normal shower head	112	101	91	83	76
7. Geyser with timer (2.5 hrs), 'green' shower head	101	89	78	68	60

It is revealing that someone in the worst scenario, with a 150L geyser, always on, thermostat set at a very high 70 °C (a not uncommon example), who takes a deep soaking bath every day, can reduce his hot water cost by more than 70 percent, by switching to a daily five minute shower, adding two relatively low cost devices and turning his thermostat down to 50 °C. Even by only reducing the temperature from 70 to 50 °C, and nothing else, he can still save 40 percent.

However, it is important to note that this analysis is not applicable if the householder reheats the hot water again any time during the 24 hour period. Any passive storage of hot water for many hours per day causes losses.

As a matter of interest: the 'zero standby energy' situation with the 50L geyser, set at 50 °C, results in a monthly energy consumption of 52 KWh, which the bigger geyser cannot reach, but comes quite close to, with the aid of two devices that are more cost-effective than replacement with a small geyser.

I hope that this article has indicated clearly that the thermal behaviour of the electrical hot water geyser can be described analytically sufficiently well to obtain numerical results for different conceptual energy saving strategies in a domestic household.

This can enable anyone to individually customise his or her energy patterns optimally for the household, rather than to follow general guidelines. This is the only way to realistically maximise own cost savings. It is hoped that these tools could also similarly be helpful in the design of hot water supply in bigger buildings.

This investigation covers only the macro properties of available commercial geysers, and does not attempt to analyse its internal workings*1, which is a challenge in itself.

Moreover, one needs to see the role of hot water in perspective and it seems that Eskom is concerned about the savings and many home-owners are still blasé about saving energy and reducing consumption levels of hot water.

Eskom knows a lot of things that home-owners have generally not cottoned onto yet.

This article sets out to provide some BBCEE (broad-based consumer electricity empowerment), since the industrial sector quite certainly has the facts and ability to make good economic decisions for themselves, but home-owners generally do not. The first issue is: Why is there so much emphasis on domestic users of electricity? Let us look at some figures to start with, and then try and see what conclusions can be drawn from these. For this purpose rounded figures are sufficient.

Eskom's energy production per month:
20 000 Gwh (Gigawatthours)
Domestic sector consumption/month:
17% of total production = 3400 Gwh
How much is used for hot water:
0 – 50% (36 percent average) =1200 Gwh
Hot water as a percentage of total generation:
6%

It seems strange that such a small proportion of electricity generation capacity is singled out for so much official attention. For example the remotely controllable geyser switches, and the solar water heater (SWH) roll-out plan of one million units in five years. In mitigation it must be stated that most of the groundwork has been laid for implementing a compulsory power saving programme (PSP) at Eskom's 300 biggest consumers, but domestic households, because there are so many, cannot be monitored in the same way. Therefore why bother with a minor sector, with the potential to contribute just six percent to total country savings, at most?

From Eskom's point of view the answer is simple: during peak demand times by day the domestic sector's consumption shoots up to something like 30 percent of total, and if hot water can temporarily be removed from the equation, it will relax demand not by six percent but effectively by more than 10 percent during these periods.

This is terribly important in view of the reserve margin which is too small and shrinking, while the new power stations are still being built. The fear is that SA will run out of reserve margin before 2013.

The situation unfortunately is that we do not have a differential tariff structure with low cost electricity by night, which would provide an economic incentive to defer some operations to night time, like swimming pool cleaners, bore-hole pumps, hot water geysers, under-floor heating and so forth.

It is also unfortunate that many consumers, who would be willing to participate in this way voluntarily, are not aware that SA is really much more subject to a day-time electricity shortage than a general shortage.

The message just seems to be: "save electricity". The economic incentive (rising tariff, even the sliding scale tariff) also just

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

encourages electricity saving, at any time. The fact that energy saved by day, particularly during the early peak time (06:00 – 09:00) and the late peak time (17:00 – 21:00), is much more valuable than that saved at other times, has not been communicated effectively to the general public.

An argument that would work well, is the following: If your efforts to save energy are focused on the peak periods, you could also help avert applications for rolling 35 percent tariff increases, and you could benefit on several counts and save a large amount of money too.

The other side of the coin is somewhat puzzling: If you, as a home-owner pay an electricity account of a thousand rand a month, just R360.00 is due to hot water use. If you want to do something about it (this amount is going to rise steeply in the future), why don't you find out what the options are? Surely 36 percent forms a large part of any household's costs?

With this background information, let us look at the choices for effecting savings. Solar water heaters are an option and Eskom benefits because it means that a large chunk of demand is removed permanently, during peak times and off-peak times.

This justifies the rebate Eskom has offered to purchasers of solar water heaters. However, it is taking Eskom (and home-owners) a frustratingly long time to accept that solar water heaters are a solution. Unfortunately, Eskom needs electricity now, not when the new power stations are operational.

For a domestic household an SWH will mean immediate disappearance of most of its hot water costs. In some areas like the Karoo >95 % will be attainable, but most urban areas are situated where cloudy periods will necessitate occasional use of the auxiliary electrical element and this is an important consideration for a potential buyer. The price of solar water heaters is high (even after deduction of the rebate).

So are there other options that should be considered? The answer lies in the following facts:

- The rate of uptake of SWHs will not be high enough to ward off an electricity short-fall in the next two years.
- Transformation to SWHs in existing buildings will never be a hundred percent so large numbers of conventional geysers will remain running for a long time to come.
- Procedures and strategies for minimising the energy requirements of electrical hot water geysers have been documented and show that a lot of energy can be saved at short notice, and at low expense. It is based on the predictable (or calculable) effect of adjusting the hot water temperature, hot water flow rate, and when not to switch the heater element on.
- Some categories of consumers can effect savings by 'tuning' their geysers, making it more cost-effective than switching to SWHs*1.

The net effect for Eskom is to introduce a systematic programme for home-owners to make the appropriate energy-saving adjustments to in-service geysers, free of charge. That way up to 600 GWh/month (or three percent of total energy), but effectively more during peak demand can be saved.

This can be implemented during the next two years, when the effect of SWHs will not yet be noticeable.

For householders as a group there is no general advice which applies. The table offers three real life examples, assuming that a SWH will cost R15 000.00 and financing it will attract interest at 12 percent.

Size of household	**Family of 6**	**Family of 4**	**Single person**
Main use of hot water	Bath & shower at various times	Bath & shower at various times	One shower in early morning
Electricity consumption for hot water (KWh/month)	665	440	203
Electricity consumption after 'tuning' hot water system	375	355	103
Payback period for conversion to SWH (yrs)	5.4	6	Never

The strongest economic motive to install a SWH is for a big family, with many people showering and bathing daily. Even after 'tuning' the hot water system, they still need to pay R315/month, at current rate of R0.84/KWh, just for hot water usage, and this is sufficient to pay off a SWH in 5,4 years (or four years if a rate rise of 25 percent is approved).

The householder with the least incentive to install a system is a single person living in a bachelor flat, who is often absent from home and whose hot water costs may be less than 100 KWh (R84.00) per month after tuning. His payback time would be 15 years if interest costs are excluded and this means it's not actually a viable economic proposition.

Any householder who decides to analyse his or her hot water energy footprint could just as well obtain an electricity audit of the rest of his household at the same time, and may be surprised at the energy savings attained from other appliances.

In conclusion therefore, the householder must be given a direct economic incentive to reduce his or her electricity consumption/costs.

References:

1. T. C. Verster: The Electric Hot Water Geyser: Figures and Characteristics needed to numerically evaluate different Domestic Energy Saving Strategies. "WATTNow", (To be published, Feb.2010)
2. Thomas, R.S.M., Xia, X. and Zhang, J.F.: "Energy Efficient Geyser", University of Pretoria

Watt's Says

Dear Sir

I say, what a splendid line of reasoning. In fact it could be developed further! As engineers we dug out the old Vernier calipers, and after several measurement samples determined that the average point of egress is 22,7 mm diameter. Allowing 25 percent on either side for grip and alignment inaccuracies shows that a design width of 45,4 mm would be appropriate. Round up to a manufacturing size of 50 mm to allow for quality errors (no ISO 9000 required on this one). This gives a gross savings of 57,73%. A job well done, as one might say. This could save the world!

Regards
Bev Lawrence

[Unfortunately, I'm not sure what Bev is referring to, but maybe one or two of the other bright spark engineers will understand his meaning directly – Editor]

Hi Paddy,

I read your article on bank charges in SA and agree completely. I am currently living in Germany, but still run an account in SA and am flabbergasted at the charges for every conceivable, and inconceivable, reason they trump up.

I can only explain it by collusion between the banks to keep the fees high.

Here in Europe there is a lot of competition between banks, driving down fees to virtually zero - where they should be in a world of automated computer transactions, on-line banking and ATMs. I have a number of accounts, all 'free' in the sense of no monthly fees, no transaction fees for on-line transactions, no 'cash-handling' fee. Also free credit card accounts (e.g. http://www.dkb.de), allowing FREE cash withdrawals anywhere in the world (they cover the fee to the issuing ATM bank), and paying competitive interest on positive balances (obviously they make their money by re-lending that). Actually using it to pay for things outside of Euroland does attract a 1,75% fee.

Regards,
Manfred Illenberger

Hi, Paddy,

The headline of your December WATTnow page 1 editorial puts me in mind of the response "Nothing is difficult for anyone who doesn't have to do it!"

One of your points, non-payment for the electricity consumed in 'certain' areas, is partially answered by the item about the SECC on page 45 of the same issue.

Your somewhat lengthy article "Let's call on our engineers" contains a lot of valid stuff (also, I think, some questionable assertions), but it begs the questions in many areas: OK, so you assign all these tasks to engineers, technicians and artisans, but where do you find them? Probably in London, Toronto, Sydney... To quote the apocryphal advice in Mrs Beeton's cookbook: "To make a rabbit pie... first catch your rabbit!"

There is a need to reverse the brain drain; this is not caused primarily by salary levels, but by the general breakdown of social infrastructure in SA. In spite of popular management misconceptions, engineers are not primarily in the game for the money. (If they were truly avaricious, they would have become accountants, lawyers or medics, or something like that.) However the issues of perceived high crime levels, poor public educational and health-care facilities (plus very expensive private alternative options in both cases) and so on, coupled with high taxation rates (particularly if measured by returns for what you pay) compared with tax rates elsewhere, such as W. Europe, simply scare them away. The much-publicised "Emigrants Return" campaign seems largely to lack credibility. The current Eskom price-hike and the intended toll-road costs also don't help the situation.

The problems at Eskom and other public bodies are - in a broad sense - almost entirely political, rather than technical. Unfortunately this lies outside the expertise of most engineers. The journal "E&T", published by the IET in London, recently ran a speculative article on the theme of "What would happen if engineers ran the government?" Apparently, this is largely the case in Mainland China, and somewhat less so in some other countries. I felt the article in question (www.theiet.org, magazine vol. 3, issue 17, 11 Oct 2008) raised more questions than it provided answers.

Regards
Tony Fisher, Retired SAIEE member

Good day Mr. Hartdegen,

I received a copy of Watt now Dec 2009 edition from an Electrical Engineering associate of mine, and fully appreciate the article "Lets call on our Engineers" as the content is applicable to my profession, as well as the Civil Engineering environment in which I function, in fact applicable on practitioners of all the engineering disciplines.

The above mentioned article in particular refers to the cost impact of the Gautrain etc. which is of great general interest, and more so to the civil and traffic engineering professions.

I would like to use the article to sensitize senior management members of my Department, the Gauteng Department of Roads and Public Transport, to the plight of technical personnel in the department and the greater Gauteng departments, which include Engineers, Architects, Surveyors etc. all tasked with providing necessary services.

I would also like to use the article to create an occupational group for technical personnel in the union I belong to, namely the Public Servants Association, (PSA), where the matters of interest to the masses enjoy preference in negotiations with government, over the critically necessary scarce skills of the technical minority personnel in the Public Service.

I was, until recently, a member of the Board of Directors of the PSA, but changing circumstances and a populist election by members have returned a new Board.

However, I am still a member of the Public Service Education Training Authority (PSETA) Board of Directors, and have also been nominated by the SA Geomatics Institute (SAGI) to represent the Engineering Survey profession on CETA.

Through membership of the PSETA I will also attempt to create an awareness in this training authority to the need for a change of focus in training initiatives to the technical disciplines.

The published article invokes comment, and stimulates thought by highlighting problem areas in service delivery, and apart from a few parastatals, largely found in various tiers of government service from municipal to central government.

The plight of Technical Professional personnel in the Public Service financially, and with relation to dwindling numbers can best be addressed by a multiple approach and the recognized unions in the Public Service are an avenue to be utilized.

I hereby apply for your permission to reproduce the article for reference purposes in the aims stated in this communication.

I await your communication in this regard.

Best regards
Hennie (Henk) A. Bresler (Deputy Director: Survey Services)
Pr. S. SA.(Eng), JCD

Dear Sir,

Ruanne, your third year student contributor makes a timid point on the issue of Standards. But, Sir you have allowed the opportunity to state the obvious slip through your inattentive (distracted?) neurons.

That point is the unethical profiteering that goes on with the subject of safety awareness.

How does a student afford the exorbitant fees for a copy of an international Standard? These documents are some of the most viscously enforced examples of copyright protection on this planet, notwithstanding that there is no royalty for the contributors, who were paid for their efforts at the time of their unsung input. The advent of the internet and of electronic documents has evidently had scant impact on making these worthy Standards available to those who will most likely put into effect the purpose of their very creation and existence.

All international efforts to enable such documents to become freely available have failed. Why is this? For me the answer is embedded within the Darwinian process.

I was going to ask what you may think of this glaringly unethical business, especially within SANS and the IEC; but I may be preaching to the unfortunately converted.

If so, I suppose I should shy away from you, for I know what can happen when Darwinian process starts to salivate.

I enjoy WATTnow, and thereby your efforts. But please keep the profit/power motive in check. Let's get ethical.

Ciao, Cliff Jackson

SANEA

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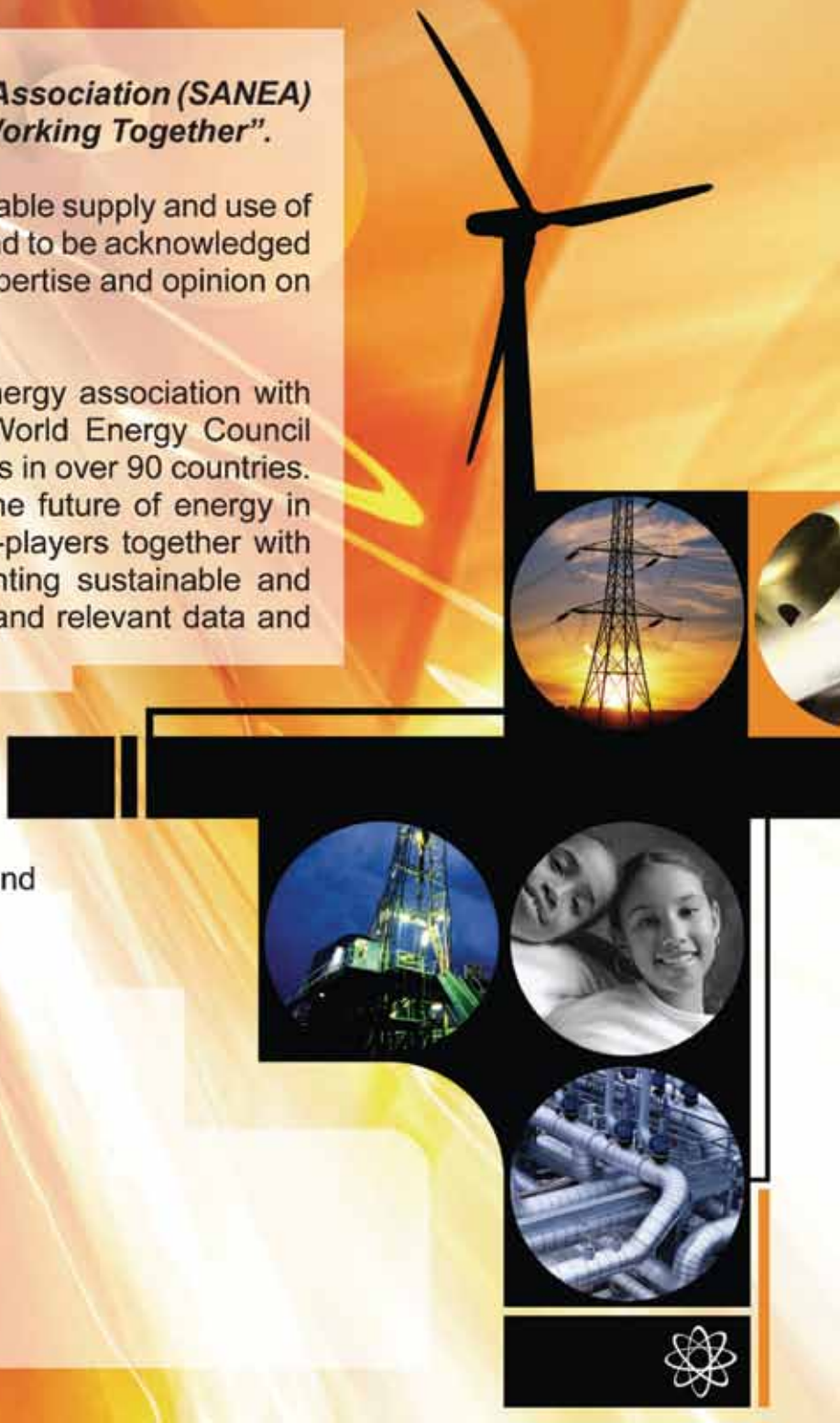


Forget the iSlate or any other names - Apple's made the iPad

Apple Computers has unveiled its brand new tablet computer – expected to be available worldwide from March at a base price of $499 – called the iPad. Chief executive, Steve Jobs describes it as a cross between a smart-phone and a laptop computer.

Initially reports praise the excellent graphics quality, the ease of use and the functionality. The device has a 9,7 inch (246,4 mm) multi-touch display, allowing people to type directly on the screen as well as manipulate pictures and controls the action in games with their fingers. It has an adapter port for an external keyboard.

Essentially the iPad looks like a large iPhone and can be used to watch movies, play games and browse the Internet. Apple has also negotiated directly with Penguin, Macmillan and Harper Collins to allow e-books to be downloaded directly onto the device through Apple's new iBook Store in much the same way as music is distributed via iTunes to the iPod.

Jobs claims the new device offers the best web-browsing experience on the planet. It has a claimed battery life of 10 hours and is pre-loaded with 12 applications that are basically multi-touch versions of existing Mac software such as Keynote, iPhoto and iWork.

Owners can also download third-party applications designed specifically for the iPad and already available for the iPhone. The applications can be synchronised between the two devices.

Scott Forstall, who runs Apple's applications division says that the iPad creates a whole new gold rush for developers who will be adapting existing software for the new unit or creating entirely new applications with added functionality.

The iPad has been described as a super-sized iPod Touch.

The specifications include a 1 GHz Apple processor, 16, 32 or 64 GB flash memory, is just 125 mm thick, weighs 700 grams, has Wi-fi, Bluetooth and 3 G connectivity, has built-in speakers and microphone, an accelerometer and a compass.

The cheapest iPad with 16 GB memory will cost $499, rising to the most expensive version with 64 GB of storage and the ability to connect via a mobile 3 G signal and will cost $829.

Insurance to insure cattle using satellite imagery

Herdsmen in northern Kenya are being offered livestock insurance that will protect them from losing their livestock because of droughts in the country. An initiative launched by Marsabit, working with the International Livestock Research Institute (ILRI) uses satellite imagery to monitor the landscape and show where pastures are poor.

If the pastures are poor, animals will be likely to die and owners can expect to be paid out for the animals that die.

Last year parts of northern Kenya suffered a severe drought and thousands of animals died. Until now, insuring herds of cattle in Kenya was all but impossible. However, ILRI has now come up with an insurance scheme that will protect herdsmen from losses based on the satellite imagery.

A Kenyan bank and a local insurance firm are running the scheme and the initial goal is to get one thousand families in northern Kenya to insure their cows, goats, sheep and camels. For a herd of ten cows, for example, the insurance premium would be equivalent to $50. This is less than a third of the value of a single cow.

The premium for the insurance will depend on the area so in the Upper Marsabit region, which is more prone to drought, the premium is 5,5 percent of the value of the livestock whereas in the Lower Marsabit, people will pay just 3,25 percent of the value of the herd.

The scheme assumes that because many people regard their herds as an equivalent of their bank account, insuring their herds might be a way of averting an economic crisis for a family.

If successful, the initiative will be rolled out to a number of other districts around Africa. Kenya currently has a population of about two million sheep and goats and about 300 000 of these animals died in the Turkana district during last year's drought.

Mentorship

The SAIEE is offering mentorship and advice to young engineers.

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

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

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

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

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

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

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

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

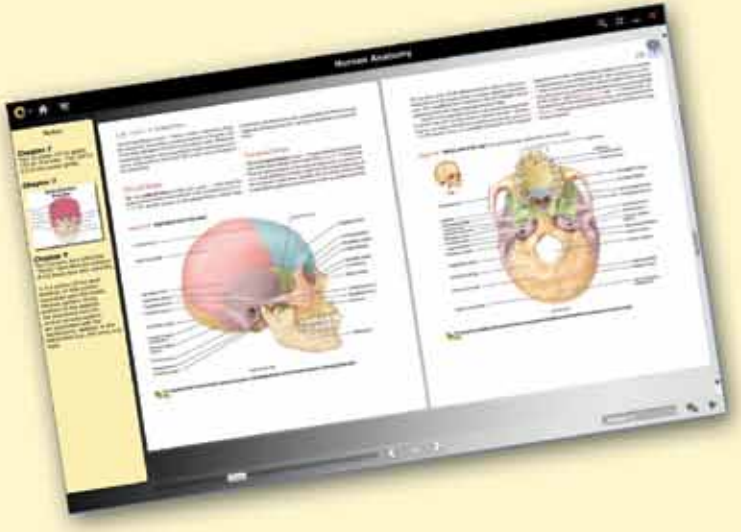
Among its more than 5000 members the SAIEE has many experienced engineers who are willing to act as mentors. They are are spread across the country and include engineers who are experienced in steelworks, furnaces, rolling mills, mining, manufacturing, electrical generation, transmission and distribution,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

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

Prospective SAIEE Mentors

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

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



Free e-book reader available from Blio for any platform

A new e-book reader for personal computers – that is absolutely free and available for Unix, Mac-OS and Windows – has been launched in the United States and is available for free download. Known as Blio it was originally developed to help blind people read electronic books.

Futurist and artificial intelligence expert Ray Kurzweil, famed for inventions like speech-recognition software, is the brain behind Blio, which is taking on dedicated e-book readers such as Kindle.

His goal is to turn any computer into an e-reader whether it is a computer, a smart-phone, a netbook or a tablet computer. Kurzweil believes that people are already being forced to carry too many devices around with them and are, increasingly, looking for a single device to provide many different functions.

Blio is a joint venture between Kurzweil Technologies and the National Federation of the Blind, which set up a company called knfbReading Technology to create products for people with disabilities.

Kindle, made by Amazon, is the most popular of the e-readers currently on the market and according to Forrester Research it accounted for about 60 percent of sales last year with competing readers making up the balance.

About 10-million e-Readers are expected to be sold in the United States next year but with the launch of the iPad, numbers could be much higher than that.

One of Blio's main advantages over its competitors is that the software offers a full-colour experience unlike most other e-Readers that provide black and white display because of the E-Ink technology used so that the device can be easily read in any light conditions.

Blio preserves the original layout of the book with typography and illustrations as they appeared along with the original fonts and pagination contained in the original book. This is not the case with other e-Readers.

Blio displays the entire page as it appeared in the original form. Blio is believed to currently be negotiating with major publishers to allow their copyrighted material to be available for the Blio (probably at a rate that is cheaper than printed copies) through a proprietary store. People who buy books from the store will be able to keep a copy on their computers or on a compact disk.

There are already more than a million free e-books available on the market today.

Depression linked to excessive Internet use

Excessive use of the Internet has been linked to depression according to a report from British psychologists who say that 1,2 percent of people in Britain are Internet addicts and many of them were depressed largely as a result of going without human interaction for protracted periods.

However, the Leeds University team were unable to say, without fear of contradiction that Internet usage caused the depression or whether users who spent excessive time on the Internet were suffering from mental health problems anyway.

The conclusions were based on a survey of 1 319 people who took part in an on-line questionnaire. Recruitment for the survey was done using social networking sites.

According to Sophie Corlett, who works for the charity Mind, says that if a web-addict is substituting meaningful friendships and socialising with virtual contact through social networking groups this might have an adverse effect on their mental well-being.

Respondents to the survey were aged between 16 and 51 and the average age was 21. They classed 1,2 percent of respondents as Internet addicts. The group also spent proportionately more time on sex, gambling and online community websites.

Dr Catriona Morrison, lead author of the research says that while the Internet now plays a huge part in modern life, a darker side accompanies its benefits where the Internet interferes with their daily activities.

The Internet addicts were apparently more depressed than the non-addicted group with depression scores that were five times higher than those who used the Internet to pay bills, shop online and send e-mails.

She says that the research clearly indicates that excessive Internet use is associated with depression but we don't know which comes first – are depressed people drawn to the Internet or does the Internet actually cause the depression.

Critics of the study say that it is flawed because Internet addiction cannot be diagnosed reliably and the recruiting method could have resulted in a biased sample.

[Given that I and about 15 other people in our office spend anywhere up to 14 hours a day on the Internet I guess we should all be suicidal by now, not simply just depressed. – Editor].

Worldwide recession – but not for Apple Computers

Apple Computers has seen profits increase by 50 percent to $3,38-billion from $2,26-billion despite the global recession. A bumper Christmas sales period boosted profits for the company seeing iPhone sales double for the year.

Apple sold 8,7-million iPhones in the last quarter of the year and sales of Mac computers increased by 33 percent although iPod sales dropped marginally by eight percent during the final quarter.

Sales of Apple's products rose to $15,7-billion from $11,9-billion in the first quarter of this year compared with the previous year and analysts say that with the new iPad having just been launched by company chief executive, Steve Jobs, the outlook for the company remains buoyant.

Daniel Ernst, an analyst at Hudson Square Research says that Mac sales have continued to be phenomenally strong and its products have now gained about 3,6 percent of the global computer market.

Apple has forecast sales for the current quarter of between $11-billion and $11,4-billion indicating that it expects to keep growing its share of the various markets in which it operates.

However, while Apple is upbeat about its new iPad product, sceptics say that it's little more than an oversized iPod and will not gain a mass following as the iPod and iPhone achieved. However, it is expected to have a small cult following of Apple aficionados who will buy almost anything that the company produces.

Apple has not always had block-buster products and its Newton technology from the 90s was one such product that, while its sold in reasonable quantities, still has a cult following of users who expected the iPad to have incorporated at least some of the older Newton technology (such as handwriting recognition) in the new iPad.

Of course, it's early days for the iPad and it's almost impossible to predict what Apple will do with its new products. Who knows, there may be a whole string of unannounced applications waiting to go once the iPad goes on sale in March.

Jason-3 to be built to study world oceans

A new Jason altimeter spacecraft that is able to monitor the behaviour of the world's oceans will be built after a decision was taken to provide funds for a craft to monitor the shape of the sea's surface.

It is the Jason craft that has traced the steady rise in global sea levels and shown that the oceans are rising by about three millimetres a year. The data has been invaluable to oceanographers, weather forecasters and climatologists.

Eumetsat, which looks after Europe's meteorological satellites, has indicated that its members will meet their 25 percent share of the E252-million project. Costs for the balance of the project will come from the United States and France. French company Thales Alenia Space will provide the spacecraft bus or chassis.

Moreover, various other space agencies have already started discussions about a Jason Continuity programme that would see an altimeter put on a spacecraft bus that will be used for the Cryostat mission that is collecting information about the Earth's ice fields.

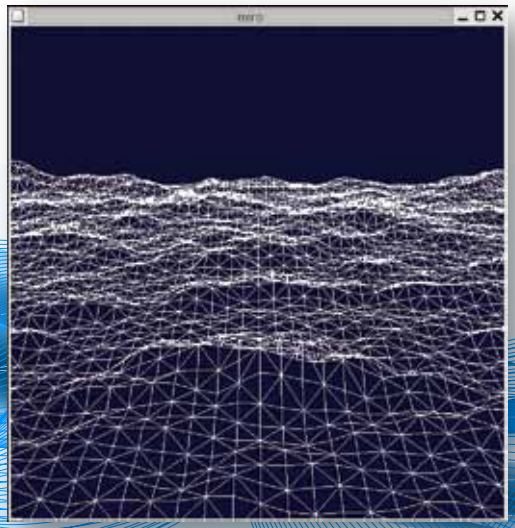
Jason-3 is expected to launch by 2013 and this will allow enough time for it to crosscheck data being supplied by the Jason-2 observatory. It is necessary to fly the pair of craft in tandem for a period of months so that scientists minimise any calibration errors between the two satellites and their data.

Knowing the ocean surface elevation has many different applications. Surface air pressure reveals what the atmosphere is doing and the ocean height exposes details of the behaviour of the water deep under the seas.

The data provides clues to temperature and salinity and, when combined with gravity information, indicates the direction and speed of ocean currents. Oceans store an enormous amount of heat from the Sun and how that energy around the globe interacts with the atmosphere is critical for climatologists and weather forecasters.

Right now Jason is being used to monitor the profound influence of the El Nino phenomenon on global weather systems and it is viewed as the primary cause for profound changes in precipitation patterns.

There are a number of space altimetry missions flying at the moment and Jason provides a global reference point for all other ocean topography datasets.



Don't waste your money on expensive HDMI cables

Is it worth spending a fortune on buying special cables to connect your high definition television sets, BluRay recorders or audio devices? These cables range in price, in Britain anyway from 95 pence (R11,43) to £110 (R1 324). The High-Definition Multimedia Interface (HDMI) cables are used for transmitting uncompressed digital data to audio and video equipment.

The HDMI cables are rarely included with the gadget that you buy and many shoppers in Britain report that they are always advised to buy the more expensive cables for the new BluRay device or the high definition television sets.

A recent survey carried out in Britain showed that there is little real difference (among consumers) for the more highly priced cables. Consumer Marcus Hodges bought a really expensive cable costing more than £50 and a cheap one for £12 and could find no difference between the two. They gave him precisely the same quality.

Professional audio and television equipment specialist, James Hollard says that the cable itself doesn't contribute to the quality of the picture. BluRay players and television sets are completely digital and work on digital technology of ones and zeros. The cable is simply used to carry that data from one point to another.

Dr Eric Chowanietz, principle lecturer in Media Technology at De Montfort University also believes there is almost nothing to support claims that the more expensive cables provide better quality pictures.

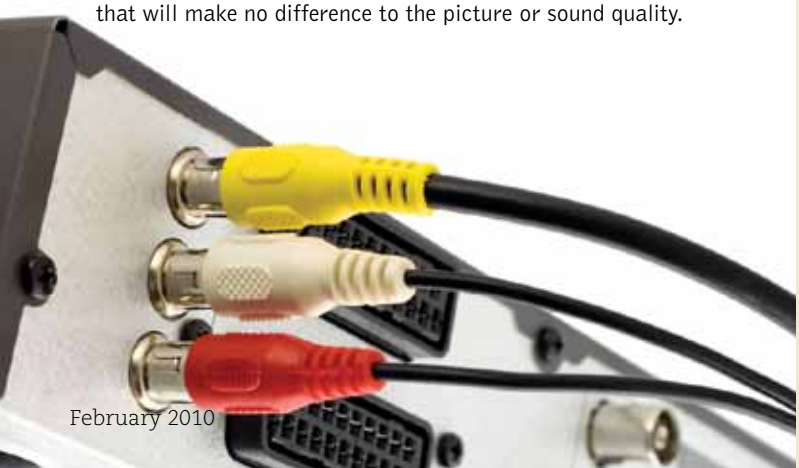
He says that you wouldn't buy a more expensive printer cable and connect it to a poor quality printer and expect the cable to give you a better print out.

However, Chris Jenkins, a TechLabs manager says that as you connect more and more devices together, such as an HD box, a games console or multi-channel amplifier it is necessary to use higher quality cables to maintain the signal to all the different devices.

In a test-shopping spree, Newsbeat (an overseas consumer advice centre) went to several top digital equipment retailers and were told (by most of them) that the more expensive cables were essential for quality. However, one salesman at Micro Anvika pointed out correctly that HDMI is HDMI and the cables will make little or no difference at all.

So, while the prices are considerably higher in South Africa for many of the HDMI cables than they are in the UK or other parts of the world, the simple reality is to buy a middle-of-the-road cable because, in truth, that's all you're going to need.

So don't get swayed into spending thousands of rands on cables that will make no difference to the picture or sound quality.



Take to the air in a cork plane

Portuguese researchers are working on scientific projects to find new uses for cork, possibly as a natural fire retardant, as demand for the traditional bottle stopper starts to wane.

Portugal produces 157 000 tons of cork, just over 50 percent of all cork used throughout the world, and researchers are now looking at designing parts for planes built at the DynAero aircraft plant, situated in the main cork-growing area of the country.

DynAero is working on plans to produce ultra-light two- and four-seater planes built from cork instead of plastic and it's one of many similar projects aimed at reviving the ailing cork industry. The prototype of the plane should be ready to fly later this year.

Light polyvinylchloride products are likely to be replaced with cork composites in the fuselage, wings and flaps and in other parts of the plane where the cork will be coated with carbon-fibre sheets.

The cork-carbon composite is not only light but is a natural fire retardant. In fact shredded cork is already used in the thermal protection coatings on the Space Shuttle's external fuel tanks.

The cellular bark that protects cork during forest fires, has led to the Australian authorities planting hundreds of these trees as fire breaks to prevent runaway forest fires in Victoria State where thousands of homes and hundreds of hectares of forests have been destroyed in deadly forest fires in the past few years.

Cork is harvested every nine years from an oak tree without damaging the tree at all. The oak can live for at least 200 years while being regularly harvested, making cork one of the naturally sustainable materials in the world. However, it takes up to 40 years to harvest the first useable cork.

The world's largest cork producer, Corticeira Amorim, has seen its market share in the stopper market reduced to just 70 percent from over 90 percent a few years ago. Wine producers are increasingly using metal screw caps and plastic stoppers, and because of this the demand for cork has declined sharply and is expected to continue to decline.

A man places a prototype cork wing on top of the currently-used plastic wing in DynAero's light plane to verify measurements, in a hangar at the Evora airfield September 20, 2009.
Image courtesy REUTERS.

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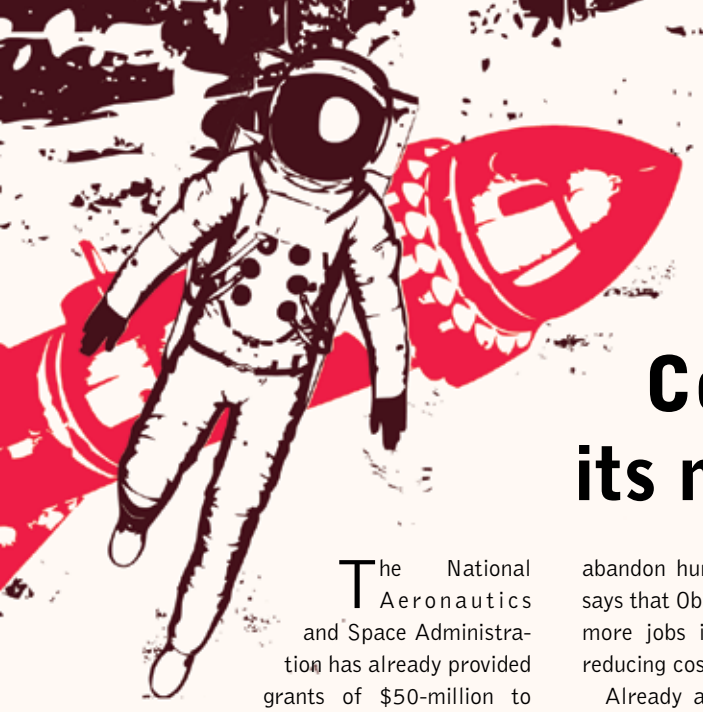


Obama cans NASA's Constellation project and its manned mission to Mars

The National Aeronautics and Space Administration has already provided grants of $50-million to five private companies in the first step towards implementing President Barack Obama's plan to turn all space transportation over to the private sector.

In a shock announcement early in February, Obama cancelled NASA's Constellation programme that planned to develop a human settlement on the Moon as the first step towards the planned mission to Mars that would see humans walking on that planet for the first time in history.

NASA has already spent more than $9-billion on the Moon mission.

NASA's Administrator, Charles Bolden ,says that the United States is not going to abandon human space flight in future. He says that Obama's plan is aimed at creating more jobs in the commercial sector and reducing costs for NASA itself.

Already a group of congressmen in the US have promised to save the costly lunar programme and Senator Richard Shelby, a senior Republican on the appropriations sub-committee handling NASA funding says that the plan itself is a "death march" for human space flight.

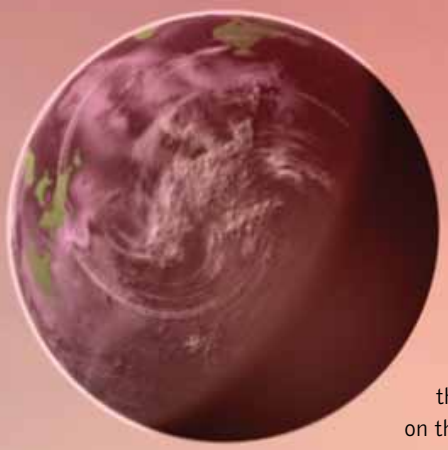
However, he did endorse the plan to involve the private sector saying that it would mean that missions such as those to the Moon, Mars and to an asteroid would probably be undertaken more quickly because private sector companies are now working on the projects with NASA.

The grants for companies tasked with developing manned space flight include:

- Sierra Nevada Corporation of Louisville, which received $20-million;
- The Boeing Company of Houston, paid $18-million;
- United Launch Alliance, Centennial got $6-million;
- Blue Origin from Kent, Washington got 3,7-million;
- Paragon Space Development Corporation from Tucson got $1,4-million.

NASA has already had contracts with Space Exploration Technologies and Orbital Sciences Corporation to deliver cargo to the International Space Station. SpaceX and various other firms are developing spaceships for human flight into orbit.

Virgin Galactic is already booking flights into space with vehicles entering a near-Earth orbit and has taken deposits of $300 000 per passenger from more than 20 people.



Life on Mars – scientists think there was

Ancient lakes about 20 kilometres wide along the Mars equator are extremely similar to those found in Alaska and Siberia and a forensic examination of the satellite images of these Martian lakes prove that there could once have been life on that lonely planet.

Importantly, say the British scientists, who conducted the examination, small tributaries and rivers, suggest that water was moving and because of that would have been able to support microbial life.

The scientists, from the Imperial College London, say that previous images suggested that these lakes were merely ice. The lakes have been dated back to about three billion years ago and were probably created following volcanic activity in the region around the equator, which had previously been thought to be arid.

Researcher, Sanjeev Gupta, says the new findings shed some light on scientific understanding of life on Mars possibly between 3,8- and 4-billion years ago but the more recent research suggests that life could have been sustained over a considerably longer period than that.

Images from the Mars Reconnaissance Orbiter were used by the scientists who now plan to focus their study on other areas of the Mars equator to examine if any other habitats there could have supported life on the planet.

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Were pyramid builders free workers not slaves?

New tombs found in Giza suggest that the Great Pyramids were built by free workers and not by slaves as widely believed, claims Egypt's chief archaeologist, Zahi Hawass, who is heading the excavation teams working on the Giza sites.

He says that tombs for free workers were built alongside those of the kings entombed in the pyramids and points out that if the workers had been slaves they would not have been entitled to build their tombs anywhere near a king.

A collection of workers' tombs was found in the 1990s alongside the pyramids of Khufu and Khafre. Hawass has also found graffiti on the walls from workers who referred to themselves as friends of Khufu, another sign that they were not slaves.

The tombs, on the Giza plateau on the western edge of Cairo are about 4 500 years old and lie at the entrance of a one kilometre long necropolis. Furthermore, evidence has been found that shows farmers in the Delta and Upper Egypt region had sent 21 buffalo and 23 sheep to the plateau every day to feed the thousands of builders, estimated at at least 10 000 workers.

This is about ten percent of the Greek historian Herodotus's estimate that 100 000 workers were needed to work on these tombs every day. The farmers were exempted from paying taxes to the government of ancient Egypt and this emphasises the fact that they, like the free workers, were participating in a national project.

The first discovery of the workers' tombs came about by accident when a horse stumbled on a brick structure ten metres away from the burial area.

Antarctica's first plane or 'air tractor' found

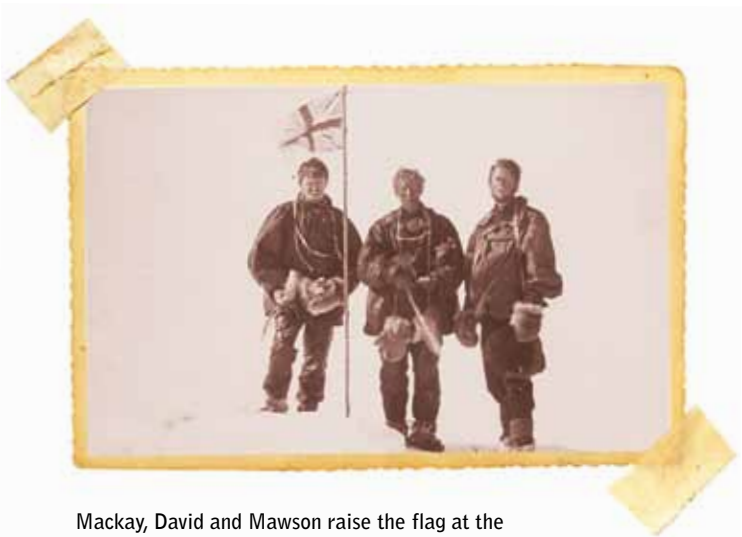
The remains of the first aircraft taken to Antarctica have apparently been found on an icy shore where it was abandoned almost 100 years ago. The single-propeller Vickers plane was dumped at Cape Denison by renowned explorer Douglas Mawson during his team's expedition between 1911 and 1914.

Australian, Dr Tony Stewart, leader of the current expedition searching for the plane, says that the plane was damaged in a flight just weeks before Mawson's expedition left for Antarctica so Mawson took the plane without its wings and planned to use it as a flightless 'air tractor' to haul equipment across the ice.

Its wheels were replaced with sled-runners but even then the plane proved to be useless, particularly as its engine continually seized in the freezing Antarctic conditions.

After many failed attempts to use the air tractor, Mawson eventually abandoned it. Over the years, the aircraft became entombed in the ice and gradually eased its way towards the sea as the glacial ice moved. It was discovered, perched on the edge of an ice shelf, a long way from where it had been abandoned.

Meanwhile, Stewart and his team are planning to restore the log cabins built by members of the Mawson expedition at Cape Denison. The Mawson Huts Foundation is a charity that funds conservation work at the site.



Mackay, David and Mawson raise the flag at the Magnetic South Pole 16 January 1909.

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Thermo-nuclear power may happen in a lab this year

The controlled fusion of atoms – similar to conditions that exist on the Sun – has been the focus of intensive research and a major hurdle for producing fusion energy using lasers has apparently been swept aside according to a report from the National Ignition Facility in the United States.

The report is based on the first experiments from the 192 laser beams, smashing the record for the highest energy from a laser by a factor of 20. Construction of the National Ignition Facility at Lawrence Livermore National Laboratory began in 1997 and was completed in May last year.

The goal is to harness the power from the largest laser ever built and start ignition or what scientists refer to as a carefully controlled thermo-nuclear explosion.

This is different from the methods of making current nuclear power, which operates through splitting atoms – or fission – rather than squashing them together in fusion. The scientists hope to prove that laboratory-based fusion reaction can release more energy than was required to start it. If successful this could herald a new era in large-scale energy production.

The National Ignition Facility uses the approach of inertial confinement fusion. In this process, 192 laser beams are focused through holes in a target container called a hohlraum.

Inside the hohlraum is a tiny pellet containing an extremely cold, solid mixture of hydrogen isotopes. Lasers strike the hohlraum's walls, which in turn radiate X-rays.

The X-rays strip material from the outer shell of the fuel pellet, heating it up to a million degrees. If the compression of the fuel is high enough and uniform enough, nuclear fusion may result. At least that's what scientists are hoping to achieve.

For the experiment, a tiny pellet of fuel made from an isotope of hydrogen called deuterium was used. However, during the past 30 years of laser fusion debate, the potential stumbling block in the process has been the 'plasma' that lasers create in the hohlraum.

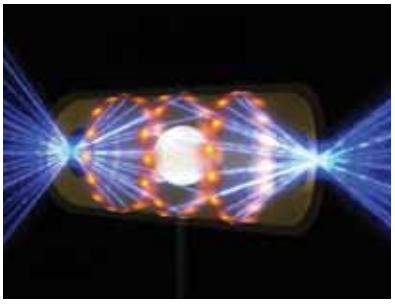
According to Siegfried Glenzer, the plasma scientist at the National Ignition Facility, the pellet was hit with 669 kilojoules in laser pulses lasting little more than 10 billionths of a second.

By way of comparison, if the energy delivered by these pulses could be maintained it would be sufficient to boil the contents of 50 Olympic-sized swimming pools in about a second.

Glenzer says that a crucial part of the experiment proved that plasma did not reduce the hohlraum's ability to absorb the incident laser light as it managed to absorb about 95 percent.

Since this experiment was done, the Lawrence Livermore National Laboratory has, in a separate announcement, confirmed that energy of just over one megajoule has hit the target. The National Ignition Facility estimates that about 1,2-megajoules will be enough to start ignition although the machines at the centre can run as high as 1,8 megajoules.

Glenzer confirmed that slightly larger hohlraums, with fusion-ready pellets that include deuterium and tritium – should begin before May this year. He remains confident that man's quest to create fusion inside laboratory conditions will be achieved this year.



This artist's rendering shows a NIF target pellet (the white ball) inside a hohlraum capsule with laser beams entering through openings on either end. The beams compress and heat the target to the necessary conditions for nuclear fusion to occur. Image courtesy of DOE/Lawrence Livermore National Laboratory.

Russia has a stealth fighter – but will it rival the Raptor?

Russia has built its own stealth fighter jet, the latest weapon in its ageing arsenal that is expected to rival the United States F-22 Raptor.

Known as the Sukhoi T-50 or the PAK FA, it has made its maiden flight in a remote part of eastern Russia. However, Prime Minister Vladimir Putin says that much work still has to be done before mass production of the jet begins in 2015.

The stealth technology is aimed at preventing radar from detecting the fighter jets. The plane has been developed at Sukhoi's Komsomolsk-on-Amur production plant.

According to company director Mikhail Pogosyan it will be better than any jet produced by Western countries in terms of its cost-effectiveness. Various countries have already expressed interest in buying the new jets.

The plane was developed by Russian and Indian aeronautics engineers and its features include an all-weather capability, an ability to take-off in just 300 to 400 metres, capacity for sustained supersonic flight, including repeated in-flight refuelling, advanced avionics and is capable of initiating simultaneous air and ground attacks.

Military analyst Pavel Felgenhauer claims that the prototype is actually disappointing because it lacks a new engine and uses older radar technology.

The plane was originally expected to be ready for its test flight in 2007 but test flights were repeatedly postponed because of many technical and quality problems that plagued its development.

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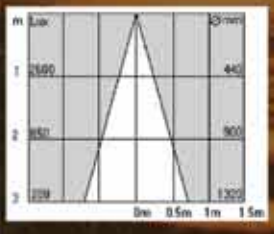
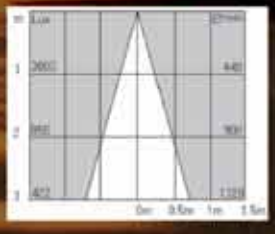
MR16 LED retrofit - source 3 x Cree or Osram LEDS - 350mA driving current
15 degree beam spread warm white 2800 - 3000 K

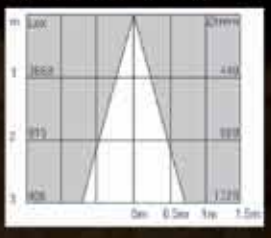


MR16 LED retrofit - source 3 x Cree or Osram LEDS - 350mA driving current
15 degree beam spread soft white 4000 K



7W LUMINOUS INTENSITY DIAGRAMS

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



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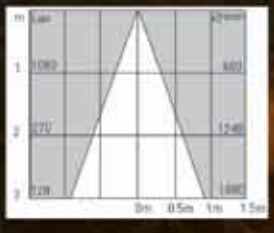
30 degree beam spread warm white 2800 - 3000 K



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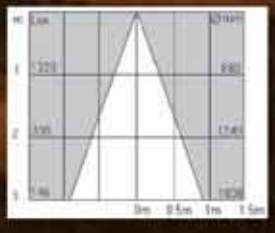
30 degree beam spread soft white 4000 K



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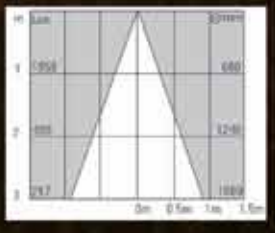
30 degree beam spread warm white 2800 - 3000 K



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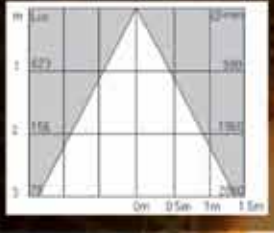
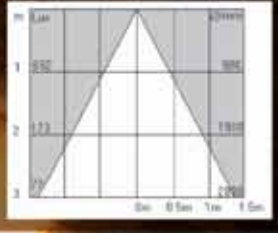
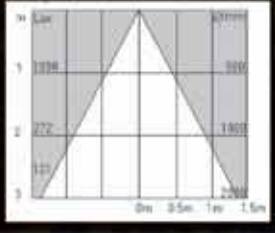
50 degree beam spread warm white 2800 - 3000 K



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



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



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

Miliband defends strategies to prevent global warming

Britain's Climate Change Secretary, Ed Miliband says that the recent controversies over the validity of scientific data have not undermined efforts to tackle global warming and to devise strategies to prevent human-induced climate change.

He was responding to reports that various scientists had actually exaggerated the extent of melting glaciers in the Himalayas, which the Intergovernmental Panel on Climate Change (IPCC) said would cease to exist by 2035.

This assertion has proved to be untrue.

Furthermore, researchers at the Climatic Research Unit at the University of East Anglia broke the Freedom of Information rules by refusing to release their research data and are now at the centre of a row – through leaked e-mail messages – that evidence against man-made global warming was deliberately being suppressed.

Miliband has admitted that the recent revelations have been damaging for the international bodies supporting climate change but he warned that unless carbon emissions were reduced the effects could be devastating for future generations.

It's not the first time that such climate change doomsayers who, several years ago, suggested that the hole in the Earth's ozone layer would eventually prompt total catastrophe as the atmosphere would be too hot to maintain human life. These ozone fears seem to have evaporated, along with the thought that the Earth's atmosphere will soon be too hot to handle.

Now it's carbon emissions that are the focus of climate change. Of course, if it is a load of bunkum then Ed Miliband might no longer have a portfolio to administer either.

Small tremors may show when a huge earthquake may happen

Tidal forces that run parallel to a part of the San Andreas Fault in central California could be causing some of the non-volcanic tremors that can be used to predict earthquakes according to a research document from the University of Califonia, Berkeley.

Low-level tremors have long been associated with volcanoes as the often warn of impending eruptions. According to researcher Amanda Thomas the faint tug of the sun and the moon on the fault is often the cause of tremors.

They also found that rock deep underground is lubricated with pressurised water allowing the rocks to slip more easily, thus weakening a part of the San Andreas Fault.

Thomas and her team analysed nearly 2 000 tremors detected over an eight year period in the Parkfield segment of the San Andreas Fault. They also looked at micro-earthquakes in the same area and the calculated the stresses produced by the Earth and the ocean tides.

They found a strong correlation between non-volcanic tremor activity and extremely small, tidal stresses parallel to the San Andreas Fault.

The researchers believe that smaller tremors may be an indicator of a much larger earthquake as it is these tremors that signal an increase in the strain below the fault zone.

The San Andreas Fault is expected to produce an enormous earthquake, the only problem is nobody knows when it will occur.

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What really went wrong with the IPCC's report on the Himalayan glaciers?

Based on an article by Christopher Booker writing in The Telegraph

Scientific misrepresentation has reared its ugly head in several ways over the past six or nine months, starting with revelations that one of the leading medical publishers was producing sponsored editorial material from pharmaceutical companies that was not necessarily accurate or unbiased.

More recently, within the scientific arena, the United Nations Intergovernmental Panel on Climate Change had to admit that scientific procedures had not been followed when its issued a report on the melting of the Himalayan glaciers.

What actually went wrong in this case?

Apparently the report contained wildly alarmist, unfounded claims about the glaciers and the IPCC, led by Dr Rajendra Pachauri, was forced to take the unprecedented step of refuting the report entirely, saying that the report that the Himalayan glaciers would disappear by 2035 had no scientific basis.

It admitted that the report reflected a poor application of IPCC procedures.

Surprisingly, the scientists from whom this claim originated, Dr Syed Hasnain, has for the past two years been working as a senior employee of The Energy and Resources Institute (TERI), the Delhi-based company of which Dr Pachauri is director-general.

Furthermore, the claim – that has openly been refuted by Dr Pachauri as chairman of the IPCC – helped TERI win a substantial share of a $500 000 grant from one of America's leading charities along with a share in a three-million euro study funded by the European Union.

Dr Pachauri is now at loggerheads with the Indian government after he described as voodoo science an official report by leading glaciologist Dr Vijay Raina, which dismissed Dr Hasnain's claims as baseless.

Remember that just two years ago, Dr Pachauri collected the Nobel Peace Prize – along with Al Gore – in his capacity as chairman of the IPCC. He has been asked whether he now intends to resign as the chairman but has refused to answer any questions on this subject.

Why are the Himalayan glaciers so important? In Al Gore's movie, *An Inconvenient Truth*, he points out the glaciers actually feed seven of the world's major river systems and help to provide water to 40 percent of the world's population.

The IPCC prediction that the glaciers would disappear by 2035 and maybe sooner than that sent shock waves through India and many other Asian countries that rely on the glaciers for fresh water supplies. It is this statement, made by the IPCC, that it has now refuted as rubbish.

The IPCC apparently based its report on an interview given by Dr Hasnain to the New Scientist in June 1999. It came at a time when environmental researchers were making extravagant claims about global warming that included American Dr Michael Mann's famous hockey stick graph that purported to show that temperatures had risen faster in the late 20th Century than at any other time in the Earth's history. It was this graph that made the centrepiece of the IPCC 2001 report, though, since then it has been comprehensively discredited.

Dr Hasnain had first made his own controversial claim about the glaciers melting in an Indian environmental magazine, *Down to Earth*, in April 1999 and it was the wording in this interview which the IPCC quoted in its report in 2007.

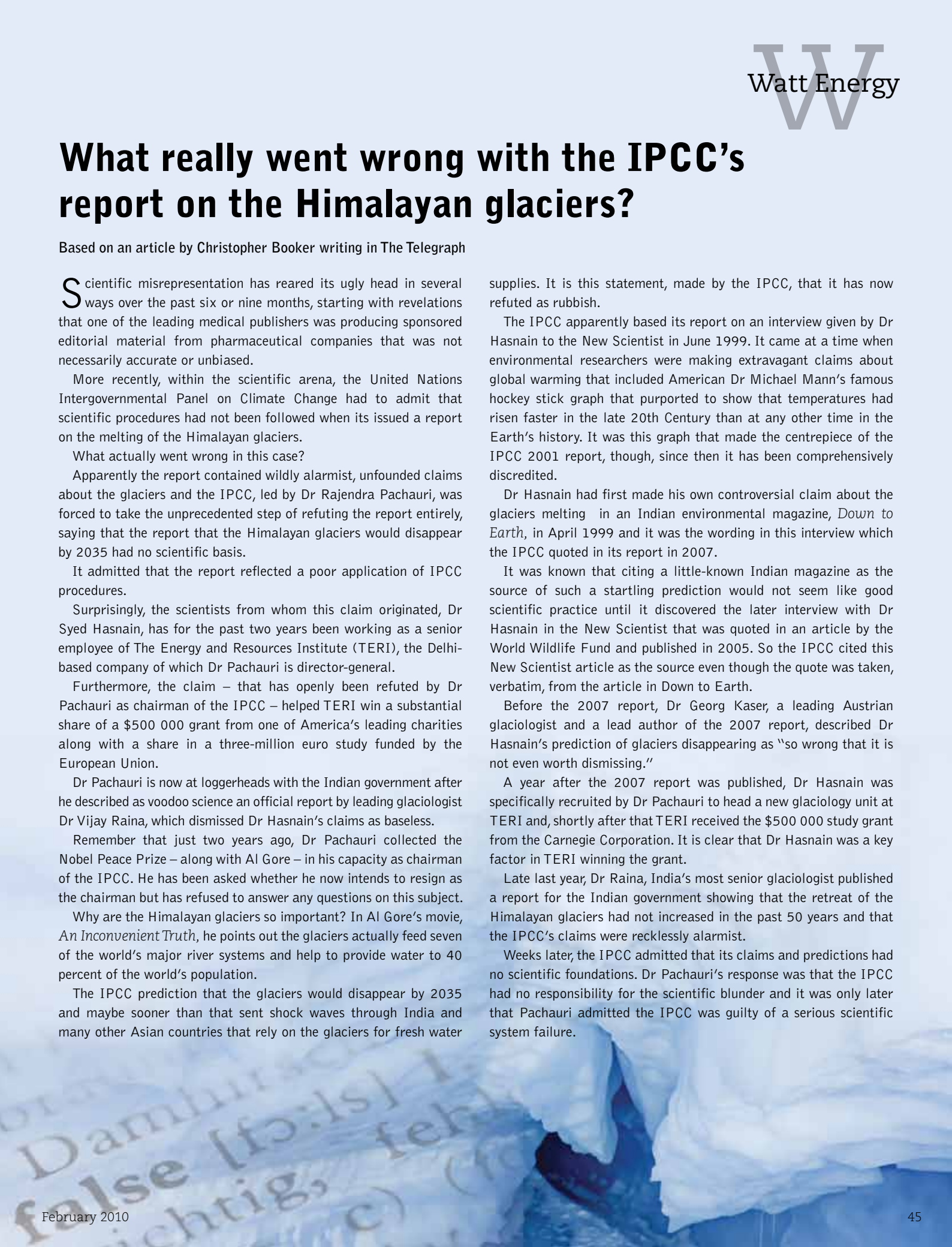
It was known that citing a little-known Indian magazine as the source of such a startling prediction would not seem like good scientific practice until it discovered the later interview with Dr Hasnain in the New Scientist that was quoted in an article by the World Wildlife Fund and published in 2005. So the IPCC cited this New Scientist article as the source even though the quote was taken, verbatim, from the article in Down to Earth.

Before the 2007 report, Dr Georg Kaser, a leading Austrian glaciologist and a lead author of the 2007 report, described Dr Hasnain's prediction of glaciers disappearing as "so wrong that it is not even worth dismissing."

A year after the 2007 report was published, Dr Hasnain was specifically recruited by Dr Pachauri to head a new glaciology unit at TERI and, shortly after that TERI received the $500 000 study grant from the Carnegie Corporation. It is clear that Dr Hasnain was a key factor in TERI winning the grant.

Late last year, Dr Raina, India's most senior glaciologist published a report for the Indian government showing that the retreat of the Himalayan glaciers had not increased in the past 50 years and that the IPCC's claims were recklessly alarmist.

Weeks later, the IPCC admitted that its claims and predictions had no scientific foundations. Dr Pachauri's response was that the IPCC had no responsibility for the scientific blunder and it was only later that Pachauri admitted the IPCC was guilty of a serious scientific system failure.



European Union at odds over how money should be divided

Members of the European Union are at odds over how billions of Euros will be used to help develop advanced renewable energy sources or implement carbon-trapping technologies. Germany, Britain and Italy are among the biggest critics of the plan after it was agreed to provide funding to support Carbon Capture and Storage (CCS) technology.

Apparently the costs of using this technology have escalated by about a billion Euros per plant and this has stopped the CCS technology from being implemented.

The European Union has invited pioneers in developing cutting-edge renewable technologies to compete for funding worth about E4-billion. The money will come from the EU's carbon market, known as the EU Emissions Trading Scheme and handled by the European Investment Bank.

Meanwhile, the scientist who is at the centre of the row over climate change research has defended his findings saying that he did not manipulate the data that showed glaciers were rapidly melting.

Professor Phil Jones, former director of the Climatic Research Unit at the University of East Anglia claims that his results stand up to scientific scrutiny. His 20-year-old study is being questioned by sceptics but he says his findings have been corroborated by more recent research.

The Guardian newspaper claims that Jones deliberately withheld information from the late Douglas Keenan who queried the data from a Chinese weather station used in a 1990 study on global warming.

He said, at the time, that some Chinese sites had moved to warmer or cooler places and that a large-scale average was used. The Intergovernmental Panel on Climate Change has also reported errors in its calculations and this has undermined, to some degree, the data reported by climate change scientists.

Sceptics meanwhile have been saying that this just proves that climate change is a lot of bunkum and will have little or no bearing on the future of the Earth in the next millennium.

British politician Chris Davies is the many who designed the scheme for a funding mechanism for clean coald and it was agreed, in 2008 to support the Carbon Capture and Storage technology that basically allows harmful gases to be buried under the ground. It is this that many producers of carbon believe will be the silver bullet when it comes to curbing the many different and harmful climate-warming gases that come mainly from coal.
But the additional costs of about E1-billion per power plant have prevented the carbon capture and storage technology from being widely adopted by power producers. So to try and be fair to all power producers, the EU has invited pioneers of the cutting-edge renewable technologies to now compete for funding under a project dubbed the NER 300, which will be worth abour E4-billion.
The money will be taken from the EU's carbon market and will be known as the EU Missionts Trading Scheme. It will be handled by the European Investment Bank.

Belo Monte dam will go ahead despite concerns

Brazil's government has granted an environmental licence for the construction of a huge and highly controversial hydroelectric dam in the heart of the Amazon rainforest.

The $17-billion project on the Xingu River in the northern state of Para is being built to boost the expanding demand for electricity but it has raised concerns that its impact on the environment will be extremely damaging.

The 11 000 MW Belo Monte dam is part of Brazil's largest concerted development plan for the Amazon since the country's military government cut highways through the rain forest during its 20-year reign starting in 1964.

Dams, roads, gas pipelines and power grids worth more than $30-billion are being built to tap much of the region's rich raw materials resources and to provide transport infrastructure for its agricultural products.

About 250 square kilometres of the rain forest will now be flooded, considerably less than the original plan that would have allowed more than 5 000 square kilometres of forest to be submerged under water.

A waterway will be constructed to carry agricultural commodities grown in the Amazon and environmentalists fear that this will damage the sensitive ecosystems and even threaten some fish species.

The winning bidder will have to pay 1,5-billion reais ($803-million) to create national parks, help monitor the forests and provide projects that directly benefit the communities affected by the new dam. There are apparently another 40 conditions that the winning bidder will have to meet.

Belo Monte will be the third-largest hydro-electric scheme in the world after the Three Gorges in China and the Itaipu, jointly run by Brazil and Paraguay. At least 70 new dams are planned for the Amazon region.

During the three-month long dry season, Belo Monte will generate just ten percent of its capacity, making it an extremely inefficient hydroelectric plant on an annual basis.

Slime moulds may help design new wireless networks

The way that fungus-like slime moulds grow could help scientists and engineers design new wireless communication networks according to a team of researchers who discovered that the slime mould turns into a network that was almost identical to Tokyo's railway system.

The scientists have described their ideas as biologically inspired networks and have incorporated the slime mould's strategy for growth into a mathematical formula that, they believe, will help engineers develop better and more efficient designs.

The findings have been published in Science.

Single amoeboid cells of slime moulds fuse and spread into a network as they feed and grow and, according to lead researcher Dr Atsushi Tero of Hokkaido University in Japan, have been honed by many cycles of evolutionary selection pressure.

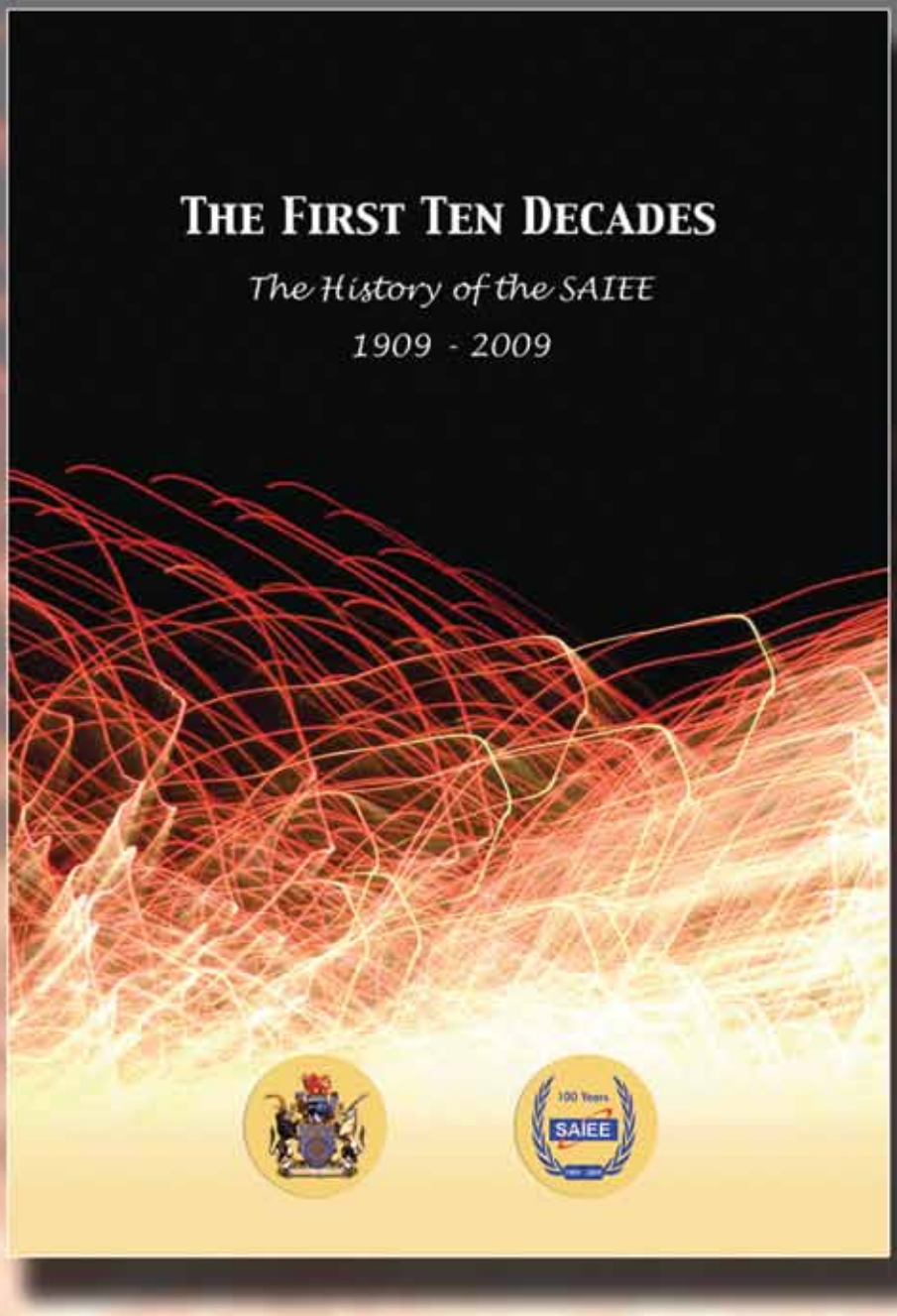
The scientists have already put the slime to the test by allowing it to grow on a wet surface on which they placed flakes of oats in locations that corresponded to the cities surrounding Tokyo.

Then they placed the slime mould Physarum polycephalum, in the centre and watched as it grew outwards, organising itself into a network around the food that closely resembled the existing train network that connects the different cities.

The researchers say that this model could provide a starting point for improving the efficiency of self-organising networks and could reduce the costs particularly for computer and mobile communication networks that are not centrally controlled.

To obtain your copy of this valuable record of the role of the SAIEE in South Africa call the Observatory Headquarters of the SAIEE on 011 487 3003.

Special centenary price: R300 (including VAT, Packing and Postage).
If you collect your copy the cost is R250 all inclusive.



FROM THE CENTENARY PRESIDENT ... du Toit Grobler

ESKOM'S APPLICATION FOR A 35% INCREASE IN THE PRICE OF ELECTRICITY

The President presented the SAIEE response, to the Eskom application for a 35% increase in electricity tariffs, to NERSA at the public hearings. The hearings took place at Nelspruit on 11 January, at Durban on 18 January, at Port Elizabeth on 19 January, at Cape Town on 20 January and finally at Midrand on 22 January 2010. The hearings were conducted under oath and only the panel of Regulators under the leadership of Mr Thembani Bukula, Electricity Regulator, were allowed to ask questions of the presenters, who were allowed to consult before answering any questions. The presentations were well received and the printed and electronic media gave ample coverage of the comments made by the SAIEE. NERSA will announce its decision on the tariff increase application on Wednesday 24 February 2010 at a public meeting.

On behalf of Council, I would like to express my gratitude to those members who responded to requests via Watt's On (2009-12-07) to contribute to the SAIEE submission, and to those members who commented on the submission that was circulated on 2010-01-12.

The effort to collate the comments received was done under the capable leadership of Andre Hoffman, Chairperson of the Technology Leadership Committee of Council. They delivered a commendable submission and fully deserve the appreciation of Council and fellow SAIEE members.

COMPOSITION OF COUNCIL 2010/11

The composition of the 2010/11 Council will be finalised at the last meeting of the current term of office on 2010-03-05. This will be an extended council meeting and all centre chairpersons have been invited to attend.

Council is composed of Fellows, Senior Members, Members and Past Presidents. It is most encouraging that more nominations were received than the number of vacancies in all three member categories and as a result SAIEE members have been invited to take part in a ballot to determine who will serve on the 2010/11 Council. Members are encouraged to exercise their constitutional right and duty by taking part in this ballot. Ballot papers and CVs of the nominees have been sent to members. Closing date for the ballot is 12:00 on 2010-02-26.

Council decided to invite all past presidents to serve on the 2010/11 Council.

SAIEE ANNUAL TRANSACTIONS 2009

The Centenary Committee proposed the publication of an overview of the Centenary year to close the Celebrations. It was suggested that it should be a glossy edition with suitable coverage including photographs.

The compilation of the Centenary book by Mike Crouch also highlighted the sad reality that since the demise of the Transactions of the SAIEE in 1983, records of events and documentation around the activities of the SAIEE are seriously lacking.

NERSA Public Hearing on the Eskom Tariff Increase Application at Gallagher Estate 2010-01-22: du Toit Grobler explaining a point to the NERSA panel of Regulators. He made presentation on behalf of the SAIEE and his company, Sappi SA.

NERSA Public Hearing on the Eskom Tariff Increase Application at Gallagher Estate 2010-01-22: The panel of NERSA regulators: From left to right: Ms. Ethèl Teljeur, Piped Gas, Mr. Thembani Bukula, Electricity, Chairperson of the Public Hearings, Mr. Smunda Mokoena, Chief Executive Officer and Dr. Rod Crompton, Petroleum.

Planting of the Centenary Tree: Black Monkey Thorn 2009-12-04: President du Toit Grobler surrounded by Council Members after he had planted the Centenary tree to the west of Innes House.

Office Bearers therefore agreed that in future the SAIEE activities would be published annually in a 'SAIEE Annual Review' of which the centenary year edition will be the first. Subsequent editions will probably not be as glossy as the Centenary Edition. Proposed content has been submitted to the Publications Committee of Council and the aim is to have the Transaction completed within two months of the AGM.

ANNUAL BERGVILLE COMMUNITY BUILDERS CAREERS DAY

On 2010-02-06 the SAIEE under the leadership of Viv Crone, Past President of the SAIEE, took part in the annual careers day, held at Amangwe High School in the district of Bergville at the foothills of the Drakensberg. Presentations and demonstrations were made by Chris Ramble, Chairperson of the KZ-N Centre of the SAIEE, Vaughn Stone, Angus Hay, Deputy President of the SAIEE and delegates from the University of the Witwatersrand. The SAIEE has taken part in this event for a number of years and we appreciate the effort and time put in by members of the SAIEE to provide career guidance to learners in this part of the country.

ENGINEERING COUNCIL OF SOUTH AFRICA

Council nominated Professional Electrical Engineers to serve on the Professional Advisory Committee: Electrical Engineers and EPAC during the 2009 - 2013 term of office of the ECSA Council. At the first meeting of 2010 of the PAC: Electrical on 2010-02-03 Rod Harker was re-elected as Chairperson and TC Madikane was elected as Deputy Chairman. They both serve on the SAIEE Council.

NATIONAL PLANNING COMMISSION

The Office of the Presidency issued an invitation for the nominations of 20 Commissionaires to serve on the proposed Commission. Council endorsed the nominations of Pat Naidoo, Paul van Niekerk, Pierre Ballot, Hope Mashele and du Toit Grobler. The appointees will serve on a part-time basis for a period of five years.

FUTURE EVENTS OF THE SAIEE

- Planting of a Memorial Tree in honour of the late Victor Wilson, Immediate Part President of the SAIEE. The 2010 tree of the year a Fever Tree/Koorsboom/Acacia Xanthophloea will be planted by Victor's wife, Christa van Schalkwyk on Friday 2010-03-05 after the Council Meeting. The tree will be planted to the northwest of Innes House.
- Annual General Meeting of the SAIEE, 25 March 2010, at the Neotel Auditorium in Midrand. The incoming President, Dr. Angus Hay and the Office bearers will be inducted whereafter Angus will deliver his presidential address.

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

Bergville Community Builders Careers Day, Amangwe High School, Bergville 2010-02-06: From left to right: Viv Crone, SAIEE Delegation Leader, Angus Hay, du Toit Grobler, Vaughn Stone and Chris Ramble.

SAIEE CWC 2010/11 Centre Committee at the AGM held on 2010-02-11 at the Athenaeum in Cape Town: Jaime Mabota, second from left, re-elected chairperson and du Toit Grobler, President, extreme right.

Annual Dinner-Dance of the SAIEE Western Cape Centre 2010-02-12: From left to right: Crystal and Chris Schnehage, Chairman: ICMEESA Western Cape Branch, Elize and du Toit Grobler, SAIEE President.

Nobel Prize for Physics goes to Charles Kao

The Nobel Prize for Physics was presented to Professor Charles Kao for his work on optical transmission using glass fibre. Interestingly enough, he worked in South Africa for a number of years at the Standard Telephones and Cable company, having started there at the same time as Mike Crouch in 1957.

Kao's wife, Gwen, delivered his acceptance of the Nobel Prize because he sadly has Altzheimer's Disease.

In the speech, entitled *Sand from Centuries Past; Send Future Voices Fast*, Gwen recalled how, 43 years ago, Kao wrote a paper that gave birth to the use of glass fibre cables and changed the world of telephony.

Much of Kao's early work was focused on improving the capabilities of the existing communication infrastructure.

Millimetre waves at 35 to 70 GHz could have a higher transmission capacity. But the waters were uncharted and the challenges enormous, since radio waves at such frequencies could not be beamed over long distances due to beam divergence and atmospheric absorption. The waves had to be guided by a waveguide.

Charles joined the long-haul waveguide group led by Dr Karbowiak at STL. He was assigned to look for new transmission methods for microwave and optical transmission. He used both ray optics and wave theory to gain a better understanding of waveguide problems – then a novel concept.

The invention of the laser in 1959 gave the telecommmunications community a great dose of optimism that optical communication could be achieved. The coherent light was to be the new information carrier with capacity a hundred thousand times higher than point-to-point microwaves – based on the simple comparison of frequencies: 300 terahertz for light versus 3 gigahertz for microwaves.

The race between circular microwave waveguides and optical communication was on, with the odds heavily in favour of the former. In 1960, optical lasers were in their infancy, demonstrated at only a few research laboratories, and performing much below the needed specs. Optical systems seemed a non-starter.

But Charles still thought the laser had potential and asked himself what are, today, two obvious questions: Is the ruby laser a suitable source for optical communication and what material has sufficiently high transparency at such wavelengths?

In 1963 Charles was already involved in free space propagation experiments: The rapid progress of semiconductor and laser technology had opened up a broader scope to explore optical communication realistically. With a helium-neon laser beam directed to a spot some distance away, the STL team quickly discovered that distant laser light flickered. The beam danced around several beam diameters because of atmospheric fluctuations. Gradually the thinking at STL shifted towards dielectric waveguides.

Dielectric means a non-conductor of electricity; a dielectric waveguide is a waveguide consisting of a dielectric cylinder surrounded by air. Dr Karbowiak suggested Charles and three others work on his idea of a thin film waveguide. But thin film waveguides failed: the confinement was not strong enough and light would escape as it negotiated a bend.

When Charles took over the project leader he recommended that the team investigate the loss mechanism of dielectric materials for optical fibres.

A small group worked on methods for measuring material loss of low-loss transparent materials. George Hockham joined to work on the characteristics of dielectric waveguides. With his interest in waveguide theory, he focused on the tolerance requirements for an optical fibre waveguide; in particular, the dimensional tolerance and joint losses. They proceeded to systematically study the physical and waveguide requirements on glass fibres.

The team also worked on semiconductor laser in the near infrared, with emission characteristics matching the diameter of a single-mode fibre designed for the transmission of a single ray or mode of light as a carrier.

The laser had to be made durable, and to work at room temperatures without liquid nitrogen cooling. In the early 1960s, esoteric research was tolerated as long as it was not too costly. The team, all novices in the physics and chemistry of materials, made credible progress in collecting material samples from various glass and polymer companies while working on the theories, and developed measurement techniques to carry out a host of experiments.

They developed an instrument to measure the spectral loss of very low-loss material, as well as one for scaled simulation experiments to measure fibre loss due to mechanical imperfections.

Charles zeroed in on glass as a possible transparent material. Glass is made from silica.

The optical loss of transparent material is due to three mechanisms: Intrinsic loss, caused by the infrared absorption of the material structure itself, which determines the wavelength of the transparency regions; Extrinsic loss, due to impurity ions left in the material, and the Rayleigh loss, due to the scattering of photons by the structural non-uniformity of the material.

Charles reached the following conclusions:

- Impurities, particularly transition elements such as iron, copper, and manganese, have to be reduced to parts per million or even parts per billion.
- High temperature glasses are frozen rapidly and therefore are more homogeneous, leading to a lower scattering loss.

The ongoing microwave simulation experiments were also completed. The characteristics of the dielectric waveguide were fully defined in terms of its modes, its dimensional tolerance both for end-to-end mismatch and for its diameter fluctuation along the fibre lengths. Both the

theory and the simulated experiments supported the approach.

They wrote the paper entitled, *Dielectric-Fibre SurfaceWaveguides for Optical Frequencies* and submitted it to the Proceedings of Institute of Electrical Engineers. It appeared in July 1966 – the date now regarded as the birthday of optical fibre communication.

The substance of the paper was presented by Charles at an IEE meeting in February 1966. Most of the world did not take notice – except for the British Post Office (BPO) and the UK Ministry of Defense, who immediately launched major research programmes. By the end of 1966, three groups in the UK were studying the various issues involved: Kao himself at STL; Roberts at BPO; Gambling at Southampton in collaboration with Williams at the Ministry of Defense Laboratory.

The experts at first proclaimed that the materials were the most severe of the intrinsic insurmountable problems.

Charles visited many glass manufacturers to persuade them to produce the clear glass required. He got a response from Corning, where Maurer led the group that later produced the glass rods and developed the techniques to make the glass fibres to the required specifications.

Meanwhile, Charles continued to pour energy into proving the feasibility of glass fibres as the medium for long-haul optical transmission.

In 1968 and 1969, Charles and his colleagues Davies, Jones and Wright at STL published a series of papers on the attenuation measurements of glass that addressed the problems. At that time, the measuring instruments called spectrophotometers had a rather limited sensitivity – in the range of 43 dB/km. Measurement was very difficult: even a minute contamination could cause a loss comparable to the attenuation itself, while surface effects could easily be ten times worse. So Charles and his team assembled a homemade single-beam spectrophotometer that achieved a sensitivity of 21,7 dB/km. Later improvements with a double-beam spectrophotometer yielded a sensitivity down to 4,3 dB/km.

The reflection effect was measured with a homemade ellipsometer.

To make it, they used fused quartz samples made by plasma deposition, in which the high temperature evaporated the impurity ions. With the sensitive instrument, the attenuation of a number of glass samples was measured and, eureka, the Infrasil sample from Schott Glass showed an attenuation as low as 5 dB/km at a window around 0,85 microns – at last proving that the removal of impurity would lower the absorption loss to useful levels.

In 1967, at Corning, Maurer's chemist colleague Schultz helped to purify the glass. In 1968, his colleagues Keck and Zimar helped to draw the fibres. By 1970, Corning had produced a fibre waveguide with a loss of 17 dB/km at 0,633 micron using a titanium-diffused core with silica cladding, using the Outside Vapour Deposition (OVD) method.

Since the deployment of the first-generation, 45-megabit-per-second fibre-optic communication system in 1976, the transmission capacity in a single fibre has rapidly increased a million-fold to tens of terabits per second. Data can be carried over millions of km of fibres without going through repeaters, thanks to the invention of the optical fibre amplifier and wavelength division multiplexing.

The world has been transformed because of optical fibre communication. The telephone system has been overhauled and new mega-industries in fibre optics have emerged and include cable manufacturing and equipment, optical devices, network system and equipment.

Hundreds of millions of kilometres of glass fibre cables have been laid, creating a web of connectivity that is the foundation of the world-wide web that today is more pervasive than the telephone used to be. The world-wide communication network based on optical fibres has truly shrunk the world and brought human beings closer together.

The next generation will learn and grow up differently; people will relate to one another in different ways. Manufacturing of all the bits and pieces of a single product can now take place over a dozen locations around the world, providing huge opportunities for people especially in developing countries. The wide accessibility of information has led to more equality and wider participation in public affairs.

Charles Kao planted the seed; Bob Maurer watered it and John MacChesney grew its roots.

Annual charity golf day on 23 April at PCC

It's the time of the year for fun, excitement and challenges as the SAIEE's annual charity golf competition comes around and aspirant and seasoned golfers test themselves against the layout of the Pretoria Country Club.

The purpose of the golf day is to raise funds for a charity nominated by the President of the SAIEE. Last year R23 000 was presented to the Maria Kloppers Child Care Home.

A host of prizes will be available for the winning fourball and manyother of the players as well who are not only playing to win but are playing for pride as well.

Prizes will include the best individual scores, the longest drive and nearest pin on the four par three holes and anyone interested in playing in this event, sponsoring any of the holes or donating prizes for the charity golf day should contact Gerda Geyer at the SAIEE.

TELECOMMUNICATIONS RESEARCH GROUP

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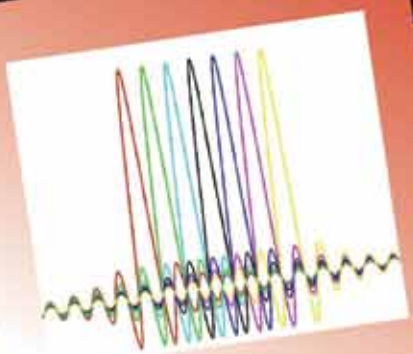
Coding Techniques
Information Theory
Video Communications
Networks



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