



Science: real and relevant

17 and 18 November 2008

CSIR International Convention Centre

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CSIR
our future through science

A message from the CSIR President and CEO



The science, engineering and technology outcomes presented at this CSIR Conference – Science: real and relevant – provides the opportunity for decision-makers in government and in the private sector to fully acquaint themselves with the possibilities of the science, engineering and technology disciplines in contributing to service delivery, industrial and commercial competitiveness and social benefit through access to knowledge.

Scientific research is not just conducted for the development of the science knowledge base; it can and will continue to make a constructive difference to the upliftment of society. We welcome the opportunity to showcase our real and relevant research outcomes and interact with those of you who share this objective with us.

Dr Sibusiso Sibisi
CSIR PRESIDENT AND CEO

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Science: real and relevant



CSIR – Science: real and relevant

The conference at a glance

Day 1

Session 1

09:00 – 11:15	Venue 1
12:00 – 12:15	Opening addresses
12:15 – 13:00	Tea break
13:00 – 14:00	Plenary: A competitive SA
	Lunch and poster session

Session 2

14:00 – 17:00	Venue 1
17:00 – 19:00	Global environment change
	Cocktail function

Venue 2

A digitally-inclusive SA

Venue 3

Improved infrastructure for SA

Day 2

Session 1

09:00 – 12:00	Venue 1
12:00 – 13:00	A clean SA
	Lunch and poster session

Venue 2

A healthy SA

Venue 3

A safe and secure SA

Session 2

13:00 – 16:00	Venue 1
16:00 – 17:00	An energy-secure SA
	Poster session

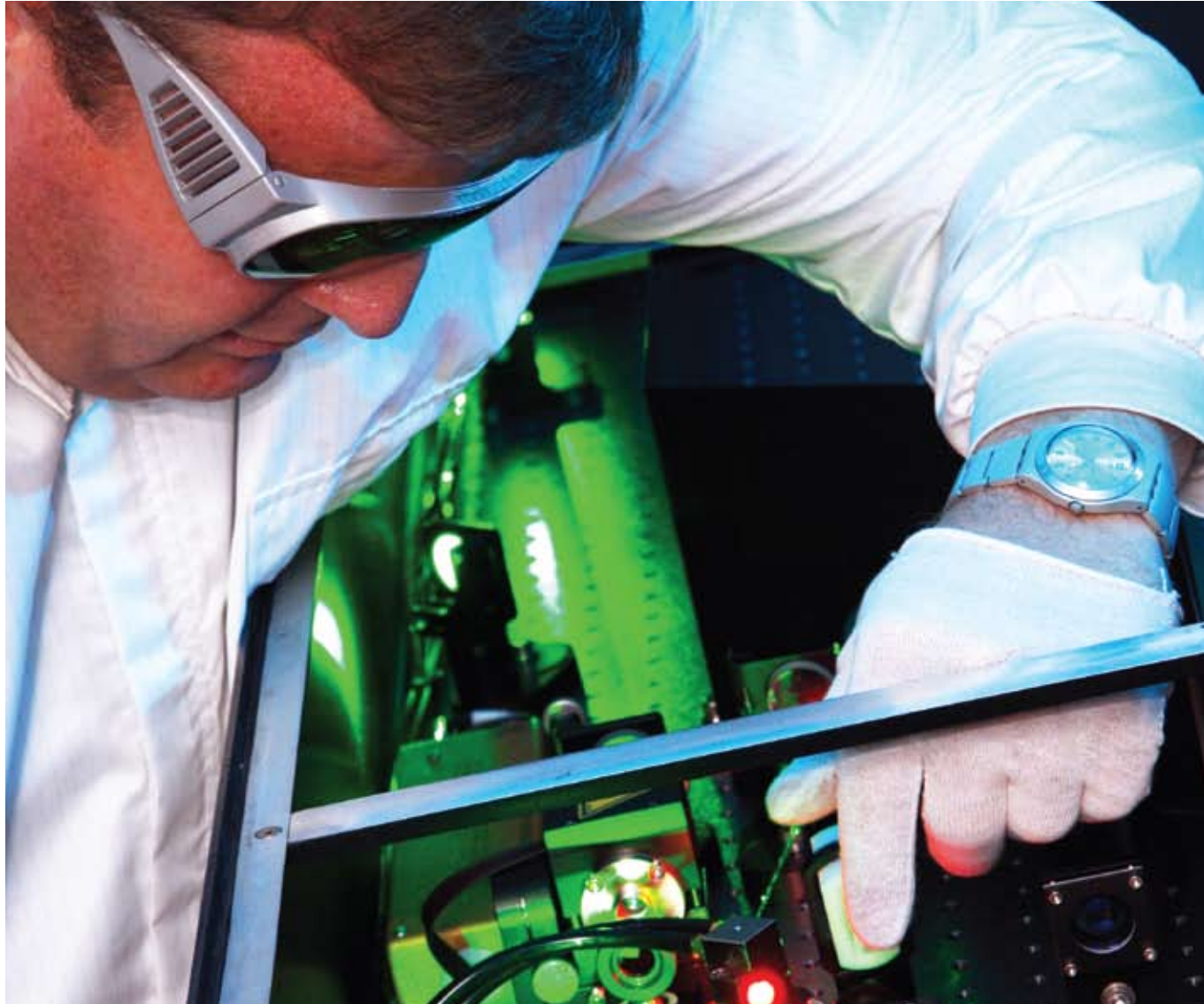
Venue 2

Making the most of SA's natural resources

A prospering rural SA

Session 3

17:00 – 18:00	Venue 1
18:00 – 20:00	Greatness in science awards function and conference closure
	Cocktail function



Day One

Day 1

SESSION 1

VENUE 1

08:00 – 09:00

Conference registration

09:00 – 13:00

A competitive South Africa

09:00 – 09:15

Session chair: Dr Thulani Dlamini, CSIR Interim Group Executive: R&D

Welcome: Dr Sibusiso Sibisi, CSIR President and CEO

09:15 – 09:45

Opening keynote

DR M MANGENA, MINISTER OF SCIENCE AND TECHNOLOGY

09:45 – 10:05

How does the public sector expect SET research to contribute to South Africa's competitiveness?

G OLIPHANT: CHAIRPERSON OF THE PARLIAMENTARY PORTFOLIO COMMITTEE FOR S&T

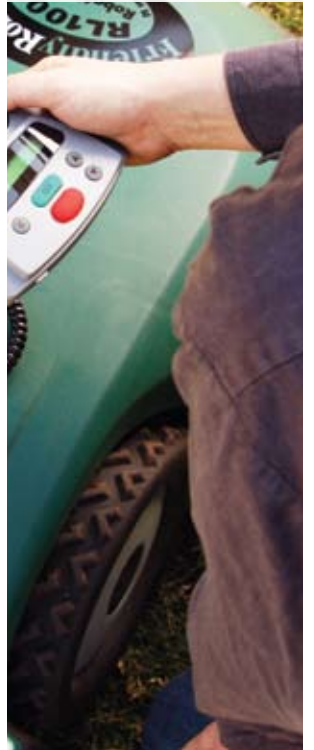
10:05 – 10:25

How does South African industry expect SET research to contribute to South Africa's competitiveness?

T MATONA, DG OF the dti

10:25 – 10:45

The impact of the National Biotechnology Strategy on the South African biopharma industry – DR N MSOMI, NACI



10:50 – 12:00 **Panel discussion:** *How can the CSIR as an R&D institution, strengthen its contribution towards improving South Africa's competitiveness?*

Chair: Dr HOFFIE MAREE, CSIR Group Executive: Operations

Panel:

Godfrey Oliphant, Chairperson of the Parliamentary Portfolio Committee for S&T

Dr Nhlanhla Msomi, NACI

Dr Liesbeth Botha, CSIR

Dr Tracy Bromfield, SASOL

Geofrey Qhena, IDC

Dr Francis Petersen, University of Cape Town

12:00 – 12:15 **Tea break**

Session chair: Dr Willie du Preez, Manager: Metals and Metals Processes, CSIR

12:15 – 12:30 **Mining research for enhanced competitiveness – D VOGT, CSIR**

Summary: Mining is facing significant challenges: Too many people are killed in our mines; an even larger number of people contract occupational diseases from working in mines; there is a shortage of human capital at all levels – from labourers to professionals; and as costs rise, operations are threatened. The challenge for competitiveness is where the greatest impacts can be made.

12:30 – 12:45 **Advanced materials for application in the aerospace and automotive industries**

O DAMM, W DU PREEZ, N TROLLIP AND MJ JOHN, CSIR

Summary: The CSIR conducts research and development into advanced materials with applications in the local automotive and aerospace industries. This is highly relevant in the context of key industry trends and drivers and South Africa's ability to respond. Research includes significant progress into the development on light metals and advanced composite materials.

12:45 – 13:00 **Advanced manufacturing technologies for improved competitiveness of the South African manufacturing industry**

DR N TLALE, CSIR

Summary: Discussions on advanced technology in the manufacturing environment. This includes both South African and global views, including technology management strategies. Research into value-added products has been identified as an important factor in the competitive manufacturing industry.

13:00 – 14:00 **Lunch break and poster session**



Poster session

A competitive South Africa

- **S Dlungwana** – Implementation of the integrated emerging contractor development model: Towards enhanced competition for small contractors
- **K Maweja, M Phasha, HK Chikwanda, Y Yamabe-Mitarai and LA Cornish** – Application of powder metallurgy in manufacturing of TiPt alloys
- **R Stewart, SJ Donovan and J Haarhoff** – AziSA: An architecture for underground measurement and control networks
- **T Nyareli, M Mafiri, BNgwenya and D Vogt** – Borehole radar as a tool to optimise mine layouts and production
- **H Ittmann, M Botha and D King** – The state of logistics in South Africa: A review of the past five years
- **K Land and M Mbanjwa** – The promise of microfluidics research networks in South Africa: Establishment of the base within the CSIR
- **MJ Phasha, M Kasonde, PE Ngoepe** – Pressure induced metastable phase formation of equilibrium immiscible Ti-Mg system studied by Ab Initio techniques and mechanical milling
- **A Malan** – A modern South African high performance multi-physics modeller

Day 1

SESSION 2

VENUE 1

14:00 – 17:00

Global environmental change

14:00 – 14:10 **Session chair:** CSIR Fellow, Dr Bob Scholes

14:10 – 14:40 **Keynote address**

The carbon cycle and South Africa

**B SCHOLES, P MONTEIRO, S WOODBORNE AND
S ARCHIBALD, CSIR**

Summary: Understanding the pathways by which the biosphere processes carbon, and especially how those pools and flows will evolve over the next century, is of critical practical importance. The CSIR has commenced a programme of monitoring the processes and rates of carbon cycling in the Southern Ocean, coupled with a sophisticated modelling effort to help understand and predict the consequences of circulation changes in the regional oceans for the climate and ocean-dependent livelihoods in South Africa.

14:40 – 15:00

What climate system models can and cannot tell us about global change

B KGOPE, SANBI

15:00 – 15:30

A risk-based approach to assessing climate impacts

S DAS, S KHULUSE AND C ELPHINSTONE, CSIR

Summary: Risk assessment methods within the context of climate change in five selected southern African domains – coastal infrastructure, west coast fisheries, ground water recharge, wildfires and climate regulation services provided by terrestrial ecosystems.

15:30 – 15:45

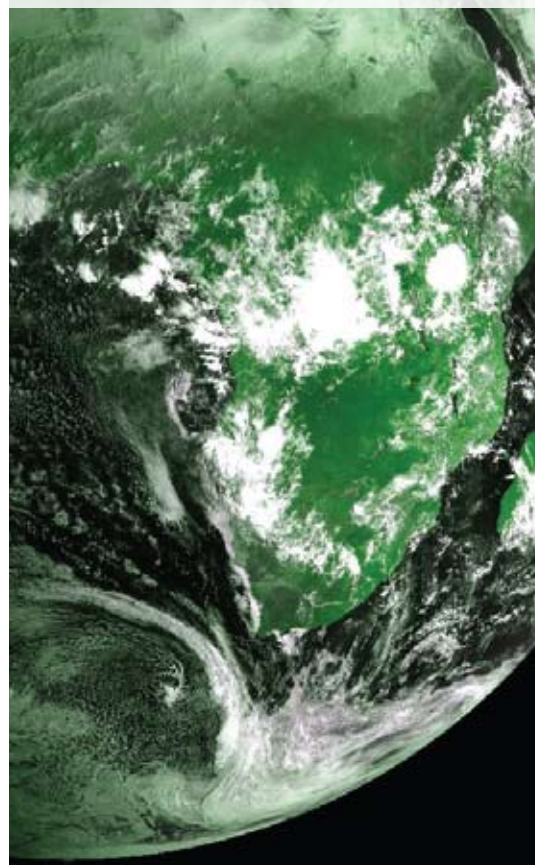
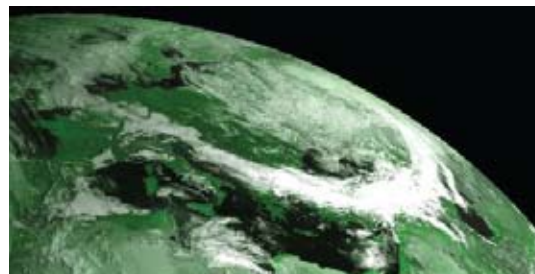
Tea break

15:45 – 16:00

Assessing the biofuel options for southern Africa

G VON MALTITZ AND A BRENT, CSIR

Summary: The authors recommend an interplay of research, policy and controls to ensure that a viable biofuels industry can be established in the southern African countries with net positive socio-economic and environmental impacts.



16:00 – 16:15

Mitigation potential and costs of non-energy greenhouse gas emissions in South Africa

R TAVIV ET AL, CSIR

Summary: An understanding of the mitigation potential and some quantitative assessment of the costs for South Africa's non-energy sector.

16:15 – 17:00

Panel discussion: *What is the appropriate response by an industrialised developing country to the challenge of climate change?*

Chair: Dr Pat Manders, CSIR Natural Resources and the Environment: Acting Executive Director

Panel:

Richard Worthington, WWF
Dr Trevor Phillips, SASOL
Peter Lukey, DEAT

17:00 – 19:00

Cocktail function

Poster session

Global environmental change

- **B van Wilgen, S Archibald and P Frost** – Managing the changing risk of fire in the South African landscape
- **R Maserumule, C Colvin and S Woodborne** – How will climate change affects groundwater resources in South Africa?
- **A Theron and M Rossouw** – Climate-proofing the coastline
- **S Hietkamp** – Carbon capture and storage
- **S Venkataraman** – Lidar for atmosphere research over Africa: A trilateral research programme
- **K Steenkamp, K Wessels, S Archibald and G von Maltitz** – Time-series analyses of vegetation phenology for Southern Africa
- **C Nhemachena** – Climate change and agriculture in Southern Africa: Managing climate related stresses
- **D Hohls and S Verryn** – Developing a national and international research community in tree breeding through a web-based information system
- **WF Strydom, KJ Esler and M Kidd** – Evidence of environmental education effectiveness



14:00 – 17:00

A digitally-inclusive South Africa



14:00 – 14:10

Session chair: Hina Patel, Strategic Research Manager: Meraka Institute, CSIR

Welcome: Kagiso Chikane, Centre Manager: Meraka Institute, CSIR

14:10 – 14:40

Keynote address: Steve Song, Shuttleworth Foundation

14:40 – 15:05

Evaluating an interactive voice response system for persons with disabilities – M GREEF, CSIR

Summary: An interactive voice response engine has enabled people to access information on a portal via a telephone. The usability evaluation, as well as lessons learned through the usability evaluation by users, are highlighted.

15:05 – 15:30

Web standards facilitating accessibility in a digitally-inclusive South Africa – perspectives from developing the South African National Accessibility Portal

L COETZEE AND I VIVIERS, CSIR

Summary: The importance of web standards (especially those associated with accessibility) in the creation of an inclusive society using experiences gathered from the development of the South African National Accessibility Portal are analysed.

15:30 – 15:45

Tea break

15:45 – 16:10

Design, testing and use of a tangible electronic test instrument for use in quantifying the spatial perception skills of pre-school learners from different socio-economic and cultural backgrounds – A SMITH, T FOKO AND A VAN DEVENTER, CSIR

Summary: A study was undertaken to ascertain whether there is any difference in cognitive skills, particularly spatial perception, between pre-school children from the different socio-economic backgrounds (township and suburban). An assessment instrument that directly measures pre-school children's spatial perception skills, which form part of literacy, was designed and evaluated to provide information that could contribute to the design of appropriate game-based learning tools.

16:10 – 17:00

Panel discussion: *What does a "digitally-inclusive South Africa" mean and what can be done to achieve it?*

Chair: Laurens Cloete, CSIR

Panel:

Marjorie Pyoos, Department of Science and Technology

Petronella Linders, Department of Communications

Helena Tapper, Counsellor: Information Society for Development, Science and Technology, Embassy of Finland

Robert Hawkins, World Bank (South African Resident Mission)

17:00 – 19:00

Cocktail function



Poster session

A digitally-inclusive South Africa

- **G Olivrin** – Signing along the road: A technology roadmap to a multilingual and inclusive society
- **G Cambridge** – The Digital Doorway – Deploying ICT in rural areas; a South African case study
- **T Meyer, A Gerber, A Britz, K Halland, L Pretorius and R Alberts** – Technologies for conceptual modelling and intelligent query formulation
- **P van Zyl and T Fogwill** – Empowering South African scientists: An investigation into a CD-based installer of scibuntu
- **J Ndwe, A Sharma, M Kgampe and C Kuun** – Dialogue design for the Open Phone system
- **D Pillay** – Assessing post-apartheid settlement growth patterns using remote sensing and GIS



Day 1

SESSION 2

VENUE 3

14:00 – 17:00

Improved infrastructure for South Africa

14:00 – 14:05

Session chair: Chris Rust, CSIR Built Environment: Strategic Research Manager

14:05 – 14:30

Keynote address: Deputy Minister of Science and Technology, Derek Hanekom

14:30 – 14:50

Achieving focused infrastructure investment in South Africa: Technical advances in provincial spatial planning

C MEIKLEJOHN, H GOSS AND J WHISKEN, CSIR

Summary: Technical advances in the approach to provincial spatial planning in South Africa: The CSIR was involved in conducting the national provincial growth and development strategies assessment for The Presidency; and in making a contribution towards addressing some of the weaknesses of provincial-level spatial planning.

14:50 – 15:10

Improved performance evaluation of road pavements by using measured tyre loading

J MAINA AND M DE BEER, CSIR

Summary: South Africa is experiencing considerable growth in both passenger and freight traffic volumes because of increased economic activities. The effects of tyre-road pavement contact stresses from two main types of truck tyres are compared – the recently introduced single tyre (wide base) and the conventional dual truck tyres.

15:10 – 15:30

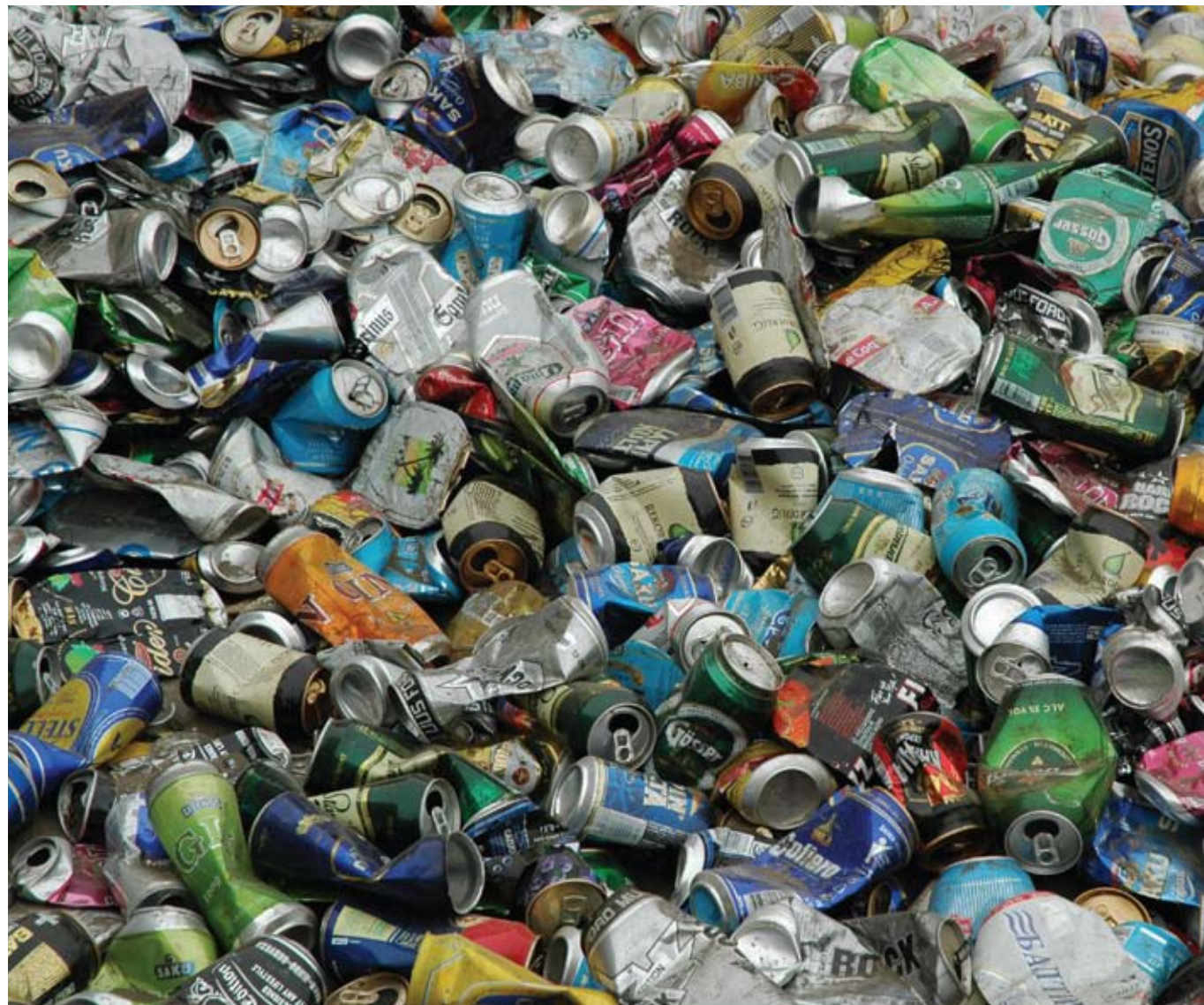
Multidrug-resistant and extensively drug-resistant tuberculosis: Revolutionising our approach to facility design for long-term care

S PARSONS, G ABBOTT AND P DE JAGER, CSIR

Summary: South Africa has a high and increasing burden of tuberculosis, both drug-susceptible and drug-resistant strains. Drug-resistant strains remain infectious for longer, are more time-consuming and costly to diagnose and result in significantly higher death rates. Research aimed at determining best-practice guidance for the provision of appropriate building infrastructure for MDR and XDR-TB sufferers has been conducted.

15:30 – 15:45

Tea break



Day 2

SESSION 1

VENUE 1

08:00 – 09:00

Conference registration

09:00 – 12:00

A clean South Africa

09:00 – 09:05

Session chair: Linda Godfrey, CSIR Natural Resources and the Environment:
Waste and pollution research manager

09:05 – 09:40

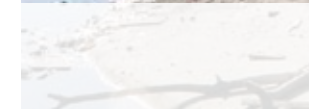
Keynote address: Dr Anthony Turton, CSIR

The national pollution problem facing South Africa's water resources and ecosystems: Three strategic water quality issues to consider

09:40 – 10:00

Grass-cellulose as energy source for biological sulphate removal from acid mine effluents – H GREBEN AND J SIGAMA, CSIR

Summary: Research to find a cost-effective, environmentally-friendly treatment system to reduce the salinity and to neutralise the acidity of acid mine drainage is ongoing. The study presented here showed that high sulphate removal efficiencies were achieved applying the biological treatment technology, thereby using the degradation products of grass-cellulose as the carbon and energy sources.



Day Two



10:00 – 10:20

Chemical treatment of acid mine drainage to recover drinking water and other products – J WILSENACH, J MAREE, M DE BEER, L BOLOGO, S MOTAUNG AND V RADEBE, CSIR

Summary: The CSIR chemical desalination process was designed to neutralise acid mine drainage and to recover metals and sulphate. The water treatment is integrated with a thermal sludge treatment process to recover alkali, barium and calcium from the chemical sludge.

10:20 – 10:40

Tea break

10:40 – 11:00

Waste management in South Africa: Institutional and legal discords; a call for constitutional reform – G NHAMO, CSIR

Summary: Despite great efforts made towards environmental and/or waste management law reform and harmonisation in South Africa, the Constitution and other environmental laws fail to separate distinctively the powers, roles and responsibilities of the three spheres of government in terms of waste management.



11:00 – 11:20

Supporting improved waste management service delivery by local government: A waste governance perspective – S OELOFSE, L GODFREY AND J WILSENACH, CSIR

Summary: Research undertaken at local government level identified the governance challenges facing municipal waste management service delivery. Research findings towards supporting the creation of an enabling environment for sustainable waste management service delivery will be discussed.

11:20 – 12:00

Panel discussion

Chair: Linda Godfrey, CSIR

Panel:

Dr Anthony Turton, CSIR
 Connie September, Parliamentary Committee Chair on Water Affairs and Forestry
 Martin Ginster, Water and Cleaner Production

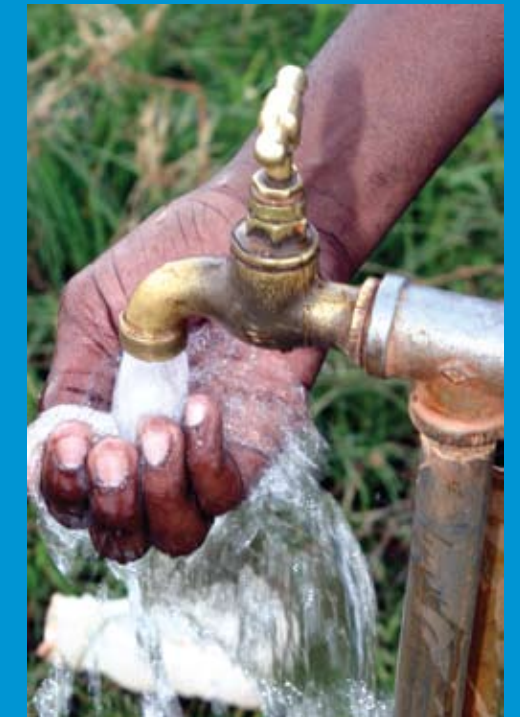
12:00 – 13:00

Lunch and poster session

Poster session

A clean South Africa

- **JJ Leaner, et al** – Assessing the mercury footprint in selected rivers of the Gauteng and Mpumalanga provinces in South Africa
- **H Greben and J Sigama** – Grass-cellulose as energy source for biological sulphate removal from acid mine effluents
- **L Boguslavsky and C Tshloane** – Spunlaced and chemically bonded nonwovens for filtration application: Performance evaluation and comparison





Day 2

SESSION 1

VENUE 2

09:00 – 12:00

A healthy South Africa

08:00 – 09:00 **Conference registration**

09:00 – 09:10 **Session chair and welcome:** Dr Gatsha Mazithulela, CSIR Biosciences: Executive Director

09:10 – 09:40 **Keynote address:**
The challenges facing the manufacturing and R&D functions of the South African and African healthcare sectors – C WHITFIELD, CEO BATSWADI PHARMACEUTICALS

09:40 – 10:00 **Novel approach for the treatment of tuberculosis** – B SEMETE, I KALOMBO, P CHELULE, Y BENADIE, L BOOYSEN, I KATATA AND H SWAI, CSIR


Summary: The development of a nanotechnology drug delivery system whereby anti-TB drugs can be administered in a single dose that maintains an active level of the drug for at least a week. It is envisaged that using nano-based delivery systems can prolong drug release, thus minimising dose and dosage frequency of anti-TB drugs.

10:00 – 10:20 **A unique particle-based soft tissue bulking system** – L KOTZE, CSIR

Summary: There exists a need for third generation resorbable biopolymeric particles that provide a protected microenvironment for tissue harbouring while enhancing cell growth and function. These particles would provide temporary bulking and it is proposed that they will also allow for tissue regeneration in the injected area with applications such as facial soft tissue reconstruction and the bulking of sphincter muscles.

10:20 – 10:40 **Aptamers: A new frontier in diagnostics and therapeutics** – W CAMPOS, D COOPUSAMY, L MORRIS, B MAYOSI, W JAMES AND M KHATI, CSIR

Summary: ARVs' cytotoxicity is one of the greatest challenges in managing HIV/Aids patients, as all have intrinsic side-effects that range from clinically-silent to life-threatening. A study compared the cytotoxic effects of a potent, cross-clade neutralising RNA aptamer, against two non-nucleoside reverse transcriptase inhibitors, six nucleoside reverse transcriptase inhibitors, eight protease inhibitors and one entry inhibitor (T20) in human cord blood stem-cell derived cardiomyocytes and human peripheral blood mononuclear cells.



10:40 – 11:00

Mitigating future impacts of cholera epidemics – M PIENAAR, S WOODBORNE AND**M VAN DER MERWE, CSIR**

Summary: Human exposure to cholera has previously been analysed using epidemiological models that depend on human-to-environment-to-human spread of the bacteria. CSIR research in central Mozambique demonstrated the presence of cholera bacteria in the rivers at the onset of the rainy season while no cholera cases were reported among the local population.

11:00 – 11:20

Novel cost-effective process for the manufacture of Thymidine: Key intermediate to**AZT and d4T – G GORDON, D FINSCH VISSER, D BRADY, M LEANNE BODE AND J ZEEVAART, CSIR**

Summary: The CSIR has developed a novel cost-effective chemo-enzymatic process to produce active pharmaceutical ingredients (APIs) such as stavudine (d4T) and zidovudine (AZT). Compared to conventional chemical synthesis, such methods have the advantage of milder reaction conditions such as low temperature, ambient pressure and pH.

11:20 – 12:00

Panel discussion:

The emerging South African bio-economy: A panel discussion around opportunities and challenges in establishing a SA biotechnology industry

Chair: Dr Gatsha Mazithulela, CSIR Biosciences: Executive Director

12:00 – 13:00

Lunch and poster session**Panel:**

Dr Bonny Mehlomakulu, Department of Science and Technology
 Prof Michael Pepper, University of Pretoria
 Adv Donrich Jordaan, Sylvean
 Dr Heather Sherwin, Bioventures
 Dr Iqbal Servè, Sekunjalo Capital
 Dr Shaun Cochrane, Sekunjalo Capital
 Fuzlin Levy-Hassen, Venture Capital SBU
 Hans Itmann, CSIR

Poster session

A healthy South Africa

- **A Karsten** – What is the effect of different skin types on the required dose for photodynamic therapy?
- **A Singh** – Determination of optical properties of tissue and other bio-materials
- **M Crampton** – To 'display' or not to 'display', that is the peptide
- **D Kahari, G Koorsen, S Stoychev, Z Chipeta, P van Zyl and B Nthangeni** – Glycoprofiling of N-linked glycans of the erythropoietin therapeutic protein expressed in *Yarrowia lipolytica*
- **M Baron and M Khati** – Three-dimensional molecular modelling of an anti-gp120 aptamer: A potential new HIV entry inhibitor drug
- **J John** – Vulnerability to air pollution: To intervene or not to intervene
- **L Gresh, N Ngubane, J Nhlapo, L Rotherham and M Khati** – New diagnostic and therapeutic tools for tuberculosis using anti-ESAT-6/CFP-10 aptamers
- **Y Benadie, B Semete, L Venter, C Driver, AT Jones, H Swai and JA Verschoor** – Nanoencapsulation of mycolic acids as a deliverable to macrophages
- **L Kotze** – Endoject for soft tissue augmentation
- **H vd Merwe** – The utilisation of processing by-products for the production of highly unsaturated fatty acids by fungal fermentation
- **J Becker, B Crampton and D Mancana** – Elucidating the mechanism of action of an antimalarial lead through transcriptomic analyses
- **T Meyer, C Seebregts, A Gerber, A Britz, L Pretorius, R Alberts and D Moodley** – The integration of SNOMED CT into the OpenMRS electronic medical record system framework
- **G Gordon** – Application of biocatalysts used in the preparation of API and ARV manufacturing
- **C Erasmus and A Jacobs** – The development of a novel whole egg pasteurisation system (and demonstrator)
- **K Naidoo** – A bio-artificial liver support system (and demonstrator)

08:00 – 09:00

Conference registration

09:00 – 12:00

A safe and secure South Africa

09:00 – 09:10

Session chair: Andre Nepgen, CSIR Defence, Peace, Safety and Security: Executive Director

09:10 – 09:40

Keynote address: Maj Gen (ret) Otto Shur, Group Executive: Operations, Denel (Pty) Ltd

An approach to maximising the benefit of SA's defence oriented SET base for its people

09:40 – 10:00

Does the CSIR have the sensor capabilities to put South Africa on the radar screen? – E PIENAAR, CSIR

Summary: Through many years of research and development into radar sensors, the CSIR has made a significant contribution to South Africa's strategic and industrial capabilities. The continued national investment into radar research and development enables a growing number of scientific and technological breakthroughs, as well as test and evaluation capabilities.

10:00 – 10:20

The CSIR's role in aerospace – B GERRYTS, K NAIDOO AND D BARKER, CSIR

Summary: A focused research approach in aeronautics can make it possible for South African to lead in this industry. This could help increase the global competitiveness of the industry, increase innovation and thereby create wealth and improve the quality of life of South African citizens.



10:20 – 10:40 **Tea break**

10:40 – 11:00 **Persistent, ubiquitous surveillance technologies and system concepts for enhanced national safety and security – F ANDERSON, CSIR**

Summary: A project aimed at developing and producing a series of South African innovations that can be used by departments and state agencies to enhance their real time situation awareness and achieve a force multiplication effect to overcome challenges. Radar has been identified as the primary sensor of this type of surveillance system.

11:00 – 11:20 **CSIR safety and security research: Looking forward from the past – B TAUTE, CSIR**

Summary: A review of research in the safety and security domain since the initiative was started in late 1996. This project was motivated by the high levels of crime and violence.

11:20 – 12:00 **Panel discussion:** *How to maximise the benefit of South Africa's defence oriented science, engineering and technology base for the nation*

Chair: Andre Nepgen, CSIR Defence, Peace, Safety and Security: Executive Director

Panel:

Antonie Visser, Department of Defence, Chief of Defence Materiel
Helmoed Romer Heitmann, international defence journalist
Maj Gen (ret) Otto Shur, Group Executive: Operations, Denel (Pty) Ltd
Dr P Potgieter, Group Managing Director, Aerosud Holdings (Pty) Ltd

12:00 – 13:00 **Lunch and poster session**



Poster session

A safe and secure South Africa

- **JP Venter and S Nare** – Fighting cybercrime through cyber forensics: First responder training
- **P Schmitz** – Using GIS as a forensic tool: 10 years of CSIR involvement
- **JD Reinecke, R Ahmed and IM Snyman** – Vehicle landmine validation testing
- **JD Reinecke, R Ahmed and IM Snyman** – Blast characterisation through impulse measurements
- **TN Whyte, IM Snyman and BL Meel** – Prediction of injuries caused by explosive events: A case study of a hand grenade incident in the Transkei region of South Africa
- **S Hattingh** – Results obtained during wall breaching research
- **T Kirsten** – Technical accident investigation support to the Army
- **H le Roux** – Modelling and simulation-based support for interoperability exercises in preparation of Soccer World Cup 2010
- **W Schreiber** – Health and safety of the underground workforce of paramount importance to the SA mining industry
- **A Peak** – The role of steel wire ropes in mine safety

13:00 – 16:00

An energy-secure South Africa

13:00 – 13:10

Session chair: Dr Mongameli Mehlwana,
CSIR National Resources and the Environment:
Competency area manager

13:10 – 13:40

Keynote address: Prof Rosemary Falcon, SANERI
chair of clean coal technology, WITS University
**Challenges in powering our future –
energy vs. the environment**

13:40 – 13:55

**Third generation photovoltaic cells:
Dye solar cells – L LE ROUX, CSIR**

Summary: An attractive and cheaper alternative to silicon-based photovoltaic (PV) cells for the conversion of solar light into electrical energy using dye solar cells that have a visible difference to conventional PV cell – they are semi-transparent and could be installed in place of glass windows in buildings and perform the dual tasks of providing shade for the occupants of the building and generating electricity.

13:55 – 14:15

Hybrid mini-grid systems: Electricity for communities not connected to the national electricity grid, based on renewable energy sources

S SZEWCZUK, CSIR

Summary: The CSIR's experience and knowledge are utilised in coordinating the development of an implementation plan for South Africa's first hybrid mini-grid energy system at the Hluleka Nature Reserve on the Wild Coast in the Eastern Cape.

A model to prioritise assessable sustainability performance indicators for rural renewable electricity technologies

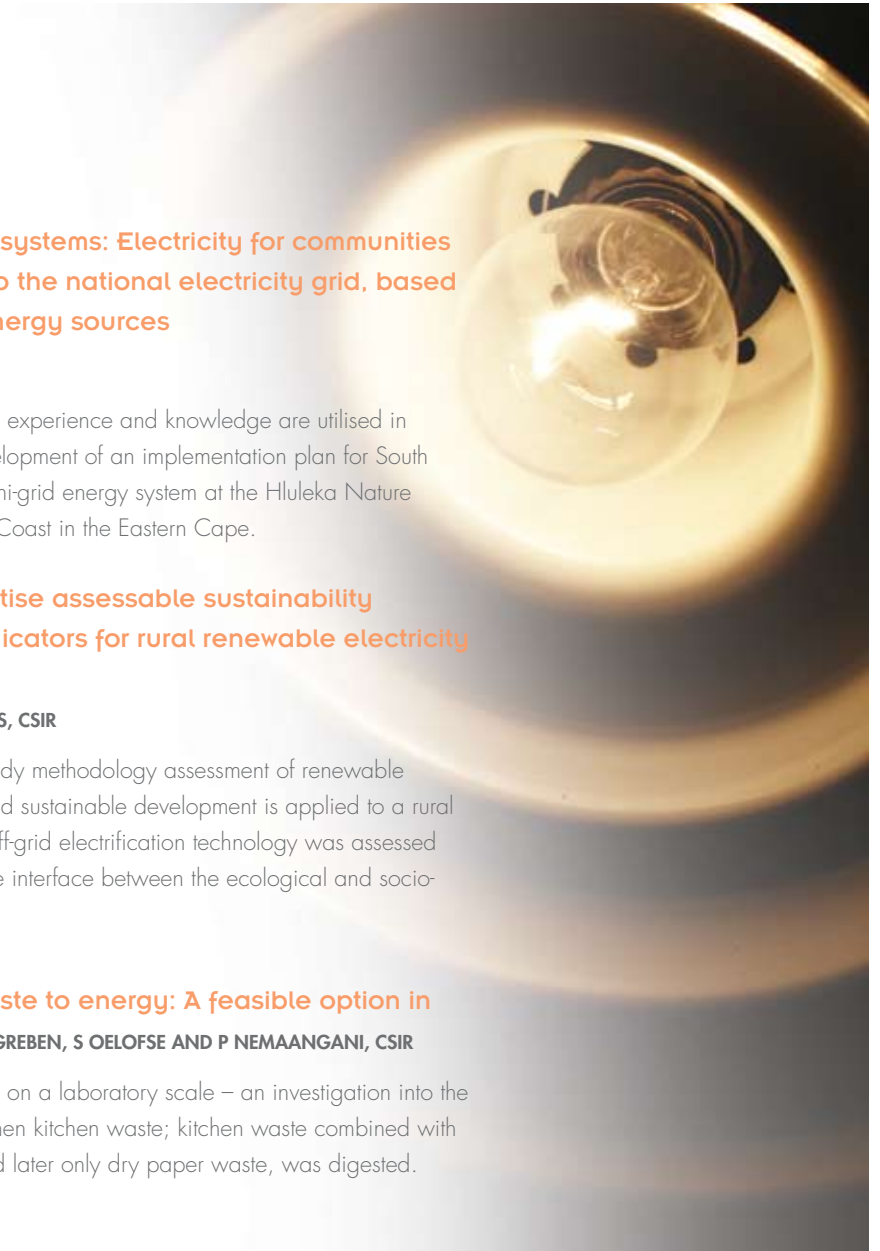
A BRENT AND D ROGERS, CSIR

Summary: A case study methodology assessment of renewable energy technology and sustainable development is applied to a rural village project. This off-grid electrification technology was assessed for sustainability at the interface between the ecological and socio-economic systems.

14:15 – 14:30

From organic waste to energy: A feasible option in South Africa – H GREBEN, S OELOFSE AND P NEMAANGANI, CSIR

Summary: Operating on a laboratory scale – an investigation into the biogas production when kitchen waste; kitchen waste combined with wet paper waste; and later only dry paper waste, was digested.



Indigenous algae: Potential factories for biodiesel production**D MAHARAJH AND R LALLOO, CSIR**

Summary: Current research indicates strong potential for the development and implementation of biodiesel production using indigenous algal isolates.

14:30 – 14:45**Tea break**

14:45 – 15:00

Fuel cell research: Towards efficient energy – M ROHWER, CSIR

Summary: Developing, evaluating and improving the key electrochemical components of fuel cells, i.e. membranes, catalysts, gas diffusion layers and electrodes. The results achieved to date in the fields of hydrogen fuel cells, direct methanol fuel cells, anionic membranes and other alcohols as fuels.

Catalysis in fuel cells using platinum group metals – M MATHE AND T MKWIZU, CSIR

Summary: The development of automated electrochemical deposition as a synthetic strategy for fabrication of catalytic thin films (or nanostructured) materials, composed of platinum group metals, with potential technological applications in fuel cell electrodes.

15:00 – 15:15

Clean coal technology: Gasification of South African coals – A ENGELBRECHT, B NORTH AND T HADLEY, CSIR

Summary: Four South African coals were identified as being possible fuels for power stations that would operate for three or four decades, towards the middle of this century. The results of coal characterisation, thermogravimetric analysis and pilot plant gasification tests to ascertain the performance of the selected coals under fluidised bed gasification conditions are presented.

15:15 – 16:00

Panel discussion: *Given the CSIR mandate of research in the national interest; and in the context of climate change and economic development; is the spread of energy research performed at CSIR appropriate?*

Chair: Thomas Roos, CSIR**Panel:**

Dr Mongameli Mehlwana, CSIR

Chris Rust, CSIR

Dr Adi Patterson, PMBR

Dr Thembakazi Mali, SANERI

16:00 – 17:00**Lunch and poster session**

Poster session

An energy-secure South Africa

- **N Cele** – Nafion based nanocomposite membranes for fuel cells
- **S Buddoo** – Why smaller is better: Advantages of microreactor technology using biodiesel as a case study
- **SJ Fourie, S du Plessis and G Henry** – New airborne geophysical data from the Waterberg Coalfield: South Africa's major future energy source
- **A Swartbooi** – Large-scale energy storage
- **T Roos, B North & S Szewczuk and S Hietkamp** – Techno-economic and environmental review of alternative energy resources and technologies for South Africa
- **S Szewczuk** – Distributed power generation using microturbines

13:00 – 16:00

Making the most of South Africa's natural resources

13:00 – 13:05

Session chair: Dr Vinesh Maharaj, CSIR Biosciences: Research group leader

13:05 – 13:40

Keynote address: Prof K Hostettman, University of Geneva, Switzerland

13:40 – 14:00

Making the most of South Africa's natural capital – B REYERS AND B VAN WILGEN, CSIR

Summary: Research and development concerning natural capital and current contributions by the CSIR and its partners. The directed, trans-disciplinary research, which the retention and restoration of natural capital requires, is central to the CSIR and its mandate of contributing to the quality of life of South Africans.

14:00 – 14:20

Hoodia, a case study at the CSIR – V MAHARAJ, JV SENABE AND M HORAK, CSIR

Summary: An appetite suppressant agent from Hoodia, developed by CSIR scientists, promises to become the first natural food ingredient for weight management based on a plant indigenous to the African continent.

14:20 – 14:40

South African plants as a source of drugs to treat infectious diseases: TB, malaria and HIV – P PILLAY AND D NAIDOO, CSIR

Summary: Based on South Africa's rich biodiversity and long tradition of medicinal plant use to treat infectious diseases, the CSIR is actively involved in identifying compounds of structural diversity from indigenous plants that can be used to develop new medicines effective against tuberculosis, malaria and HIV.

14:40 – 15:00

The fibre, yarn and fabric properties of South African indigenous goats

A BOTHA, S BLOUW, CSIR; AND

JA LE ROUX, KRADOCK RESEARCH STATION

Summary: Ten years ago a joint project was launched between the CSIR and the Eastern Cape Department of Agriculture involving the utilisation and promotion of fine down (cashmere) fibre production from indigenous goats.

15:00 – 15:20

Ten years of bioprospecting activities at the CSIR: BP4 as a model – G FOUCHE, N MOODLEY AND V MAHARAJ, CSIR

Summary: An insightful and strategic look at our results reveals a very interesting and valuable data set that immediately provides scientific evidence demonstrating efficacy required for the validation of the claims of traditional healers.



15:20 – 16:00

Panel discussion: *Despite our huge biodiversity and strong IK systems, the number of products on the market derived from these does not reflect maximum utilisation of these resources.*

Possible aspects to consider:

- Are we doing enough to get maximum benefit from our indigenous knowledge and biodiversity?
- Have we missed the opportunities and is the haystack too big?
- What are the obstacles in transforming the opportunities into value added products?
- Biodiversity act and regulations: An obstacle or enabler?
- Lack of models for sharing benefits with IK holders

Chair: Prof Quinton Johnson, South African Herbal Science and Medicine Institute

Panel:

TDr Kwelemthini, Traditional Healer

Prof Gqaleni, IKS Chair

Prof Yonah Seleti, Department of Science and Technology

TDr Seroka, Traditional Healer

16:00 – 17:00

Poster session

Poster session

Making the most of South Africa's natural resources

- **E Erasmus and R Anandjiwala** – Enhancement of mechanical properties and interfacial adhesion by chemical modification of natural fibre reinforced polypropylene composites
- **J Senabe** – High throughput screening of South African plants for anti-cancer properties
- **G Fouche and F Kotze** – Agro processing opportunities identified through a novel mosquito repellent from a medicinal plant



14:00 – 17:00

A prospering rural South Africa

13:00 – 13:10

Session chair: Clinton Heimann, Department of Provincial and Local Government

Welcome: Brian Marrian, CSIR

13:10 – 13:40

Keynote address: Prof Peggy Luswazi, Head of the Centre for Rural Development at Walter Sisulu University, and Peter Copley, Development Bank of South Africa

13:40 – 14:00

**Social entrepreneurship:
A foundation for 'creative capitalism'
in rural African communities**

JFJ VAN RENSBURG, CSIR

Summary: The creation of social enterprises to act as primary support mechanisms for Infopreneurs™ ('creative capitalists') in rural African communities to attract interest and cooperation from others grappling with the challenges of scalable and sustainable innovation (technological and business) in rural African contexts.



14:00 – 14:20

**Addressing rural health and poverty through water sanitation and hygiene:
Gender perspectives** – E NGORIMA, Z NKUNA AND G MANASE, CSIR

Summary: Factoring in gender perspectives in water and sanitation provision, by highlighting challenges women face in accessing water and sanitation, and how these can be improved to empower women to address rural health issues while also contributing towards poverty alleviation.

14:20 – 14:40

Selective solar absorbers: A cost-effective solution for access to clean energy in rural Africa – G KATUMBA, L OLUMEKOR AND A FORBES, CSIR

Summary: New results on a laboratory demonstration of a novel selective solar absorber material that is more than 30% efficient than the best alternative on the market. The sol-gel recipe that is used to manufacture the material has additional advantages of low production cost and environmental friendliness. A prototype development programme in this regard has been planned.

14:40 – 15:00

Tea break

15:00 – 15:20

Developing a sector by creating community-owned enterprises based on the cultivation and processing of essential oils and medicinal plants in South Africa

B BROWN, M HORAK AND E WADIWALA, CSIR

Summary: The production of essential oils and medicinal plant products by communities with access to arable land represents a promising new sector in the agroprocessing industry. The technology transfer developed by research institutes, universities and the private sector to communities with the aim of creating new community-based enterprises is conducted by the CSIR. New business opportunities are identified and evaluated; and the technical and economic feasibility is determined.

15:30 – 16:00

Panel chair: Clinton Heimann, DPLG

Panel discussion: *Rejecting the inevitability of poverty: Strengthening rural development interventions.*

Panel:

Brian Marrian, CSIR

Prof Peggy Luswazi, Centre for Rural Development at WSU

Counsellor Mtobele Mtogana, Amatole District Municipality

Mac Mashiri, CSIR

Prof Robin Crewe, University of Pretoria

16:00 – 17:00

Poster session



Poster session

A prospering rural South Africa

- **T Gumedede** – Evaluating the potential role of automated telephony services in rural communities
- **M Mashiri** – Empowering women for sustainable rural livelihoods through community based rural maintenance projects: Siyatentela case study
- **M Mapako and C Musvoto** – Sustainable access to modern energy services for South Africa's urban and rural poor: How can research contribute?
- **J Chakwizira** – Using the integrated rural mobility and access (IRMA) approach in prospering rural South Africa
- **A van Deventer** – Science and technology awareness for preschool children: a working model
- **C Colvin** – Integration goes underground: A review of groundwater research in support sustainable development in South Africa.



Day 2

SESSION 3

VENUE 1

17:00 – 19:00

Greatness in science awards function and conference closure

Session chair: Khungeka Njobe, CSIR Group Executive: R&D Outcomes and Strategic Human Capital Development

Keynote: Prof David Block, Director of Anglo American Dust Laboratory, Wits University

Science show

Awards ceremony

19:00

Cocktail function



Conference closure and awards function

CSIR Mandate

The CSIR's mandate is as stipulated in the Scientific Research Council Act (Act 46 of 1988, as amended by Act 71 of 1990), section 3:

Objects of CSIR:

“The objects of the CSIR are, through directed and particularly multi-disciplinary research and technological innovation, to foster, in the national interest and in fields which in its opinion should receive preference, industrial and scientific development, either by itself or in co-operation with principals from the private or public sectors, and thereby contribute to the improvement of the quality of life of the people of the Republic, and to perform any other functions that may be assigned to the CSIR by or under this Act.”