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Sustainable energy Technology and Research Centre Annual Report 2011



SeTAR sustainable
energy technology
and research centre

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Cover picture: SeTAR Centre stove museum, a collection of stoves from across southern and eastern Africa, donated to UJ by the GTZ BECAPP Programme.	



School awareness campaign on fire safety & solar energy

Training on stove testing



Energy supply in downtown Johannesburg (left) and in an informal settlement (below)



About the SeTAR Centre



Testing an *imbaula* stove at the SeTAR Centre

The Sustainable energy Technology and Research (SeTAR) Centre is a multi-disciplinary research facility that operates under the aegis of the Faculty of Science at the University of Johannesburg. The SeTAR Centre was formally launched in March 2010. The centre is housed in a cottage within the University of Johannesburg Research Village on the Bunting Road Campus, with dedicated office space and a testing laboratory in the basement of the Faculty of Art, Design and Architecture (FADA) building.

The SeTAR Centre is engaged on research programmes that focus on energy poverty in both rural and urban areas of South Africa; the role that energy has to play in climate protection in the sustainability of a megacity (Gauteng); the public understanding of science; and networking on energy issues in the Africa region. The SeTAR Centre provides research facilities for energy studies for masters and doctoral students through its affiliation with the Department of Geography, Environmental Management and Energy Studies (GEMES) in the Faculty of Science.

Mission

To be a leader in the research and promotion of sustainable energy technologies, in South Africa and Africa, particularly with respect to addressing the energy needs of the lower economic sectors of society, and to contribute to energy efficiency and climate protection policies and applications.

Vision

Develop, promote and implement the research of sustainable energy technologies with a mandate to innovate, evaluate, communicate and engage with government and industry.

Message from the Executive Dean of the Faculty of Science

Professor Kinta Burger



Congratulations to the SeTAR Centre on its first annual report.

The Faculty of Science strives to conduct relevant research which benefits government, industry and the community. The SeTAR Centre demonstrates the importance of applied research through the various projects and activities that it undertakes. The centre is conducting research in clean and safe basic energy which seeks to develop energy technologies that are affordable to the low income section of our society. It also provides testing facilities for such technologies and is working in collaboration with the South

African Bureau of Standards (SABS). The EnerKey Sustainable Mega-cities project, a collaborative partnership between the University of Johannesburg and Stuttgart University in Germany, is researching in energy-related technical, economic, ecological and social challenges of the Gauteng city-region. The outputs from the EnerKey Sustainable Mega-cities project have been included in policy documents such as the Gauteng Integrated Energy Strategy (GIES, 2010) and the Gauteng Climate Change Response Strategy (GCCRS) and Action Plan (2011).

Since it was established in 2008, the SeTAR Centre continues to demonstrate that it is founded in scholarship, applied research and community engagement. The work of the SeTAR Centre is being published in renowned journals. Furthermore, the staff is invited to present at various conferences, workshops and seminars in South Africa, regionally and internationally, which is a clear indication of the relevant research that the SeTAR Centre is undertaking.

I would like to thank the Director and the staff, as well as the various research partners nationally and internationally, for their contribution to the SeTAR Centre in the first instance, and by extension to the Faculty of Science and the University of Johannesburg. I wish them continued success.

Message from the Director

Professor Harold Annegarn



The Sustainable energy Technology and Research Centre (SeTAR) Centre was established in 2008 as a specially funded programme supported by the University of Johannesburg's *Quick Wins* initiative. The Centre was formally launched in March 2010.

The SeTAR Centre Charter stipulates that our overall goal is to promote research, development and implementation of sustainable energy technologies through technology, social and policy research, public engagement, promotion of entrepreneurship, and partnership with all tiers of government. The SeTAR Centre is the University's focal point for energy, sustainability and climate protection research activities. The specific areas of research are as follows:

- development, testing and certification procedures for renewable and alternative energy technologies
- safe and efficient domestic energy from combustion fuels
- energy efficiency in low cost housing
- smart technologies for energy efficiency in buildings and cities
- spatial planning, energy efficiency and sustainability
- transportation energy
- solar and renewable energy applications for poverty relief
- rural biomass energy use
- energy and water
- public understanding of science and technology
- knowledge exchange of energy and sustainability between researchers and government.

The Centre is also coordinating the University of Johannesburg's internal energy efficiency and climate protection activities. An alliance of administrative and technical facilities management, academics and students are making the University of Johannesburg's four campuses leading exemplars of Green institutional buildings and practices.

The SeTAR Centre laboratory includes a museum collection of a variety of fuel/stove combinations collected from across southern and eastern Africa. This collection, assembled over a decade by the GTZ (now GIZ) Basic Energy and Climate Change

Adaptation Programme (BECAPP), was entrusted to the Centre. Several new items have been added in the past year. The collection, housed in the basement of the Faculty of Art, Design and Architecture (FADA) building, is used as design inspiration for the Industrial Design students.

The centre brings together a multidisciplinary team of researchers and experts within South Africa, the African continent and internationally. It recognises that for research to be relevant to society, it has to integrate the natural sciences, social sciences, arts and humanities. Furthermore, the staff of the SeTAR Centre and students who are studying for their post-graduate degrees in energy and climate protection are required to engage with government, community and industry as an integral part of their research.

The scope of this SeTAR Centre annual report is confined to reporting on energy related research. Research activities in other disciplines within the Department of Geography, Environmental Management and Energy Studies (GEMES), such as atmospheric emissions from mining, mining and sustainability and remote sensing, are reported separately.

We gratefully acknowledge the support of the University of Johannesburg's Vice Chancellor, Prof. Irhon Rensburg, the Deputy Vice-Chancellor of Research, Innovation and Advancement, Prof. Adam Habib, and the Executive Dean of the Faculty of Science, Prof. Kinta Burger who all played a key role innovating the *Quick Wins* programme, and the transformation of this programme into a formal Research Centre within the Faculty of Science. The German GTZ (now GIZ) played an important part in the establishment of the Centre, and also provided the core funding to establish the stove testing laboratory. The National Research Foundation, SANERI and Eskom have been sustaining partners. We thank our research partners from various faculties of the University of Johannesburg, other universities and research institutes, various organizations that have provided funding, and government departments and municipalities - the latter being the recipients and beneficiaries of our research work. We look forward to continuing with and consolidating these relationships.

SeTAR Centre Staff



Prof. Harold Annegarn (PhD) is the Director and Principal Investigator at the SeTAR Centre. He has spent over forty years in academia, conducting research in nuclear science, atmospheric pollution, energy efficient housing and household energy poverty. He was employed at the University of Witwatersrand for over thirty years, where he supervised numerous doctoral and masters students. He joined the then Rand Afrikaans University (RAU), now the University of Johannesburg (Faculty of Science) in 2004, where he is supervising post-graduate students conducting research in atmospheric pollution, energy studies and climate protection. He is widely recognized in the field of atmospheric pollution research and has received several awards. He has published numerous journal articles, chapters in books and has presented papers at various conferences and research seminars. Prof. Annegarn was appointed to the Gauteng Planning Commission Advisory Council, chaired by the Premier in July 2011 and elected a member of the Academy of Science of South Africa (ASSA) in October 2011. Email: hannegarn@uj.ac.za or hannegarn@gmail.com



James Robinson is the SeTAR Centre Manager and the Basic Energy Programme Manager. He joined the SeTAR Centre in 2009. He holds a MEng. in Aerospace Engineering and a MSc. in Renewable Energy Systems Technology and is pursuing a doctoral degree. He has experience in small-scale energy projects in Africa and Asia as well as renewable and fossil fuel electricity generation in the United Kingdom. James has worked in research, operation, engineering and development of various energy technologies including stoves. Email: jrobinson@uj.ac.za



Lyndall (Lynda) Mujakachi is the EnerKey Programme Manager. She joined the SeTAR Centre in 2009. She has a MSc. in Rural and Urban Planning. She has experience in policy development, environmental management, local economic development in rural and urban areas and disaster management and has worked in the SADC region. Her research interests include knowledge exchange between universities/research institutions and government, focusing on adoption and adaptation of research knowledge and the requisite policy development; sustainable energy in the built environment; and the political-economy of the transition to a low-carbon based economy. She is a member of South African Planning Institute (SAPI). She will be pursuing a doctoral degree as from 2012. Email: lyndam@uj.ac.za



David Kimemia holds a MSc. in Environmental Management. He is currently reading for a Doctorate in environmental management at the University of Johannesburg. His research interests interrogate the interface between society, environment, energy and economy. The current research pursuits are situated in the following themes: renewable energy; environmental management; waste management, water management, environmental impact assessments and air quality management.

Email: dkimemia@gmail.com



Tafadzwa Makonese holds an *MPhil* in Energy Studies degree (*cum laude*). He is a PhD candidate in the area of energy studies, with special focus on domestic energy systems. Key areas of his research include the development and documentation of novel and robust experimental protocols, and standard operating procedures for domestic fuel/stove combinations. He has taken interest in researching the formation, characterisation, and quantification of particulate matter from domestic coal combustion technologies.

Email: taffywandi@gmail.com



Tshwenyana Vincent (Vinny) Molapo has a Mechanical Engineering Diploma and is the Laboratory Technician involved in basic energy research at the SeTAR Centre. He joined the SeTAR Centre in 2009. He has worked as a junior tooling engineer and as a mechanical designer prior to joining the SeTAR Centre.

Email: molapotv@gmail.com



Thoko Sithole joined the SeTAR Centre as an Administrator in September 2011. She has previously worked at GIZ (TRANSFORM and ProBEC), John Snow Inc. and South African Regional Poverty Network (SARPN). She has a diploma in Mechanical Engineering (Fitter and Turner) and plans to study for a degree in Business Administration.

Email: setar@uj.ac.za or setarcentre@gmail.com



Dr. Hester du Plessis holds a *DLitt et Phil* in Philosophy degree. She joined the SeTAR Centre as a Research Associate in September 2011. She was previously a Senior Researcher at the Faculty of Art, Design and Architecture (FADA) and facilitated research between the Department of Industrial Design and the SeTAR Centre in clean stove design and sustainable energy

development. She is doing research in the field of Public Understanding of Science (PUS) in collaboration with the National Institute for Science Communication and Information Resources (NISCAIR), CSIR, India. She joins the Human Sciences Research Council (HSRC) as a Senior Research Specialist in December 2011. She is a Fellow at the Mapungubwe Institute for Strategic Reflection (MISTRA) and a member of the Knowledge Economy and Scientific Advancement (KESA) faculty.

Email: hesterdup@gmail.com



Crispin Pemberton-Pigott has worked with dozens of Appropriate Technologies for more than 30 years, largely designing labour-based manufacturing equipment. A stove maker for 25 years, he won the DISA Chairman's Award 2004 for the Vesto Stove made by his company, New Dawn Engineering. He is a co-founder of the Eastern Cape Appropriate Technology Unit, the Renewable Energy Association of Swaziland and the Industrial Designers Association of South Africa. Presently he advises two Mongolian clean air projects and is the senior technical advisor at the SeTAR Centre.

He volunteers at ETHOS and SABS co-writing stove standards and test protocols.

Email: crispinpigott@gmail.com or Website: www.newdawnengineering.com

Associates of SeTAR Centre

John Ledger – PhD in Environmental Management and Associate Professor in the Department of Geography, Environmental Management and Energy Studies (GEMES), Faculty of Science at the University of Johannesburg. He lectures the Honours degree in Energy Studies.

Charles Mbohwa – PhD in Engineering (Production Systems). Associate Professor in the Department of Quality and Operations Management, Faculty of Management at the University of Johannesburg. He has designed a short course in energy efficiency that is targeted at government and industry personnel.

Edison Muzenda – PhD in Chemical Engineering. He is the Head of Environmental and Process Systems Engineering Research Unit and Postgraduate and Projects Coordinator in the Department of Chemical Engineering in the Faculty of Engineering and the Built Environment at the University of Johannesburg. His research interest is in energy, environment, waste utilization, phase equilibrium measurement and computation, separation processes, and mineral processing and crystallization.

Alan Nurick – DSc. in Mechanical Engineering and Head of Department of Mechanical Engineering Science in the Faculty of Engineering and the Built Environment at the University of Johannesburg. He will be participating in the South Africa-Germany research programme on *Solar Power Plants for South Africa – Managing Energy and Water Scarcity with Solar Energy* as part of the EnerKey research programme.

Harmut Winkler – PhD in Astronomy and Professor in the Department of Physics, Faculty of Science at the University of Johannesburg. His research areas include atmospheric physics focussing on solar irradiation, aerosols, interaction between radiation and aerosols, solar energy and biofuels. His particular focus in the EnerKey research programme is the evaluation and quantification of solar energy potential in Gauteng and is working closely with the German partners at Stuttgart University. He is presently developing a solar atlas for Gauteng. He is also part of the planning of a future large project to study the nexus between solar power generation and associated water requirements, as well as use of solar power for desalination.

Sereeter Lodoysamba – PhD in Physics and main research areas are in nuclear instrumentation, nucleonic gauging and electronics. He worked at the Joint Institute for Nuclear Research, in Dubna, Russia, with the team that discovered Dubnium, Element 105. He is currently a professor and department head at the National University of Mongolia, researching on air pollution, analysing particle composition, pollution source identification and apportionment. He is also conducting research in stove testing and emission measurement and is working on the establishment of SEET Laboratory as a national consultant to the Asian Development Bank.

Douglas ‘Mothusi’ Guy – holds an MBA and has more than 25 years of international technical project management and business development experience. He is the Director of PEER Africa (Pty) Ltd., an NGO that is working with universities and local government in promoting and implementing research in renewable energy technologies in low-income housing development. Peer Africa has privately funded numerous domestic energy and environmental research projects in a quest to establish an informed “grass roots” awareness movement, focussing on generating demand for integrated energy, environment, and empowerment human settlement projects.

Research Projects

Basic Energy Programme

The programme focuses on energy poverty and acts as an innovation hub for the development of basic energy solutions for cooking, heating, lighting and productive use for the low income communities. Services and research streams include:

Testing Laboratory: SeTAR centre has a fully equipped basic energy testing laboratory for use as part of research activities or on a fee-for-service basis. The centre has advanced equipment and automated systems to ensure all tests are carried out satisfactorily and competently. The SeTAR centre was commissioned to characterize thermal efficiency and gaseous emissions of a variety of fuel/stove combinations. In the process of evaluating these stoves, the research staff have also been engaged in the development of written procedures, leading to the Heterogeneous stove Testing Protocol (HTP).

Energy Poverty Research: Focussing on energy access, socio-economics and user needs and aspirations. This assists in designing sector-specific intervention.

Energy Design Innovation: Involved with the design and innovation of safe, clean and affordable basic energy technologies.

Networking and Information: Coordinating a regional (Africa) university-based People's Energy Network (PEN) and also developing a South African network and industry association.



Part of the SeTAR Centre laboratory testing equipment

Energy for a Sustainable Megacity Programme (EnerKey)

The EnerKey research programme is a South Africa-German collaboration conducting applied research and knowledge exchange in energy and climate protection strategies in Gauteng Province.

The EnerKey programme conducts scenario development on energy and climate protection, technical and economic analyses of renewable energy technologies and links into on-going energy policy, planning and strategy processes in Gauteng; provides information and advice for political decision makers and government officials; and supports government towards the transformation to a low carbon province. The governance relationship is oriented towards joint application and continual experiential learning processes between the University of Johannesburg, other universities and research institutions, and government.

The programme carries out multi-disciplinary and multi-institutional research about how a city and its inhabitants derive, transform, transport and use energy. The EnerKey programme research is being conducted through: (i) strategic collaboration of research institutes, the Gauteng provincial government and municipalities, industry and commerce, and implementing NGOs active in the field of energy; (ii) the development and use of adapted decision support tools, using long-term scenario planning; (iii) the implementation, monitoring and iterative improvement of pilot projects and applications to develop and apply an effective concept for a sustainable energy and climate protection structure.



EnerKey Symposium, 8 October 2010, University of Johannesburg

The EnerKey research programme made contributions into the development of the Gauteng Integrated Energy Strategy (GIES) in 2009. In 2010/2011, through collaboration between the Faculty of Management and the Faculty of Science of the University of Johannesburg, together with the Gauteng Department of Agriculture and

Rural Development (GDARD), the EnerKey Programme assisted in developing the Gauteng Climate Change Response Strategy and Action Plan.

Public Understanding of Science and Technology (PUST)

Science communication under PUST serves as a key responsibility and integral part of the activities of the SeTAR Centre. The research is taking place in collaboration with international research institutes in India (National Institute of Science Communication and Information Resources of the Council for Scientific and Industrial Research, in New Delhi) and is currently working on forming a partnership with the China Research Institute for Science Popularization and the China Association for Science and Technology in Beijing for conducting comparative surveys in public understanding of science. It is also the intent of PUST to provide South African researchers with the opportunity to participate in global incentives such as the development of a global Science Culture Index (SCI). The PUST programme underpins the transdisciplinary research approach of the energy and climate protection research programmes of the SeTAR Centre.

Publications

Bold – UJ staff, fellows, students and/or affiliates

Journal Articles

Goyns PH and **ED Özdemir** (2011). Characterizing emissions from private passenger vehicles using engine operating patterns. *International Journal of Environmental Engineering*, 3(1):83-99.

Josipovic M, **HJ Annegarn** and **MA Kneen**, JJ Pienaar, SJ Piketh (2011). Atmospheric dry and wet deposition of sulphur and nitrogen species and assessment of critical loads of acidic deposition exceedance in South Africa. *South African Journal of Science*, 107(3/4):126-134.

Kimemia DK and **HJ Annegarn** (2011). Perceptions of biomass users in Alexandra Township, Johannesburg. *Journal of Biomass and Bioenergy*, 15:382-387.

Journal Articles Submitted and in Preparation

du Plessis H (submitted 2011). Ideology, politics and policy – science journalism in South Africa; in a special edition under the theme: The future of science journalism: knowledge and power. *Journal of Science Communication*.

Kimemia DK and **HJ Annegarn** (submitted 2011). An urban biomass energy economy in Johannesburg, South Africa. *Journal of Energy for Sustainable Development*.

Makonese T, **J Robinson**, **C Pemberton-Pigott**, **DK Kimemia** and **HJ Annegarn** (in review). Characterisation and performance evaluation of selected kerosene stoves using the Heterogeneous stove Testing Protocol. *Journal of Energy for Sustainable Development*.

Mubiwa B¹ and **HJ Annegarn**, T Jenssen and **L Eltrop** (in progress). Land-use/cover change detection in Gauteng: urbanization and urban sprawl trends.

Mubiwa B and **HJ Annegarn**, T Jenssen, M Mokonyama, **L Eltrop**, **J Tomascheck** (in progress). Urban growth and transport correlation in Gauteng: the impact of transport corridors.

Mubiwa B and **HJ Annegarn**, T Jenssen, M Mokonyama, **L Eltrop**, **J Tomascheck** and **ED Özdemir** (in progress). Urban growth trends in Gauteng: impact on transport energy consumption.

Mujakachi L and **HJ Annegarn** (in progress). Energy, climate protection and sustainability for effective service delivery – A preliminary assessment of knowledge exchange in the EnerKey Programme.

¹ GEMES Department PhD candidate.

Oguntoke O, T Adebulehin and **HJ Annegarn** (submitted). Biomass energy utilization, air quality and the health of rural women and children in Ido LGA, Southwestern Nigeria. *Journal of Indoor and Built Environment*.

Yang, Y et al. (in progress). Sustainable Urban Transformation Paths of Cities in Emerging Economies.

Books and Book Chapters

du Plessis H (forthcoming). What science? Whose knowledge? An African perspective. In M Claessens, B Schiele and S Sunke (eds). *The Development of Public Communication of Science and Technology Studies: A Comparative Approach*. Springer Publishers.

Gotz G, **B Mubiwa** and C Wray (in progress). Johannesburg in a City-Region Frame; in G. Gotz, P. Harrison and C. Wray (eds), *Changing Space: Johannesburg within its City-Region* Wits University Press, Johannesburg.

Mokonyama M and **B Mubiwa** (in progress). Shaping the out-of-shape transport system; in G. Gotz, P. Harrison and C. Wray (eds), *Changing Space: Johannesburg within its City-Region*, Wits University Press, Johannesburg.

Yang Y et al. (in progress). Implication of policy shift towards sustainability on urban infrastructure in Shanghai: Renewable Energy and Green Building. In E Pieterse and M Swilling (eds).

Refereed International Conference Proceedings

Guy D and **HJ Annegarn** (2011). Big windows facing the street in government human settlements: passive surveillance vs. passive solar. *Proceedings of the 19th International Conference on the Domestic Use of Energy*, 12-13 April 2011, Cape Town, ISBN 978-0-9814311-4-7, pp. 93-100.

Kimemia DK, **V Molapo**, **HJ Annegarn**, **J Robinson** and **T Makonese** (2011). Optimising the imbuala stove. *Proceedings of the 19th International Conference on the Domestic Use of Energy*, 12-13 April 2011, Cape Town, ISBN 978-0-9814311-4-7, pp. 21-27.

Lodoyasamba S and **C Pemberton-Pigott** (2011). Mitigation of Ulaanbaatar city's air pollution – from source apportionment to ultra-low emission lignite burning stoves. *Proceedings of the 19th International Conference Domestic Use of Energy*, 12-13 April, Cape Town. ISBN 978-0-9814311-4-7, pp. 27-30.

Makonese T, **G Chikowore** and **HJ Annegarn** (2011). The potential and prospects of improved cookstoves (ICS) in Zimbabwe. *Proceedings of the 19th International Conference on the Domestic Use of Energy*, 12-13 April 2011, Cape Town, ISBN 978-0-9814311-4-7, pp. 33-40

Makonese T, J Robinson, C Pemberton-Pigott and HJ Annegarn (2011). A preliminary comparison of stove testing methods between the water boiling test and the heterogeneous testing protocol. *Proceedings of the 19th International Conference on the Domestic Use of Energy*, 11-13 April 2011, Cape Town. ISBN 978-0-9814311-4-7, pp. 41-48.

Matinga MN, HJ Annegarn and J Robinson (2011). The global alliance for clean cookstoves: Implications for South Africa. *Proceedings of the 19th International Conference Domestic Use of Energy*, 12-13 April, Cape Town. ISBN 978-0-9814311-4-7, pp. 55-60.

Pemberton-Pigott C (2011). Development of a low smoke Mongolian coal stove using a heterogeneous testing protocol. *Proceedings of the 19th International Conference Domestic Use of Energy*, 12-13 April, Cape Town. ISBN 978-0-9814311-4-7, pp. 65-70. Awarded prize for Best Paper at Conference.

Robinson J, M Ibraimo² and C Pemberton-Pigott (2011). The uncontrolled cooking test: Measuring three-stone fire performance in northern Mozambique. *Proceedings of the 19th International Conference Domestic Use of Energy*, 12-13 April, Cape Town. ISBN 978-0-9814311-4-7, pp. 71-78.

Technical Reports

Gauteng Department of Agriculture and Rural Development (GDARD): *Gauteng Climate Change Adaptation*, February 2011. Workshop proceedings written by University of Johannesburg project team (**Lynda Mujakachi**, Nonhlanhla Myaka, **Charles Mbohwa**, Janet Duma, Junior Mabiza, **Ntombifuthi Ntuli³** and **Harold Annegarn**), in collaboration with GDARD as part of the process to develop the Gauteng Climate Change Strategy and Action Plan. Workshop organized by GDARD and University of Johannesburg and held at the University of Johannesburg, 27 January 2011.

Gauteng Department of Agriculture and Rural Development (GDARD): *Gauteng Climate Change Response: Mitigation and Adaptation Strategies Status Quo Report*, May 2011. Report written by University of Johannesburg project team (**Lynda Mujakachi**, **Ntombifuthi Ntuli**, **Harold Annegarn** and **Charles Mbohwa**), in collaboration with GDARD in developing the Gauteng Climate Change Response Strategy and Action Plan. Submitted May 2011.

Gauteng Department of Agriculture and Rural Development (GDARD): *Gauteng Climate Change Response Strategy and Action Plan*, July 2011. Report written by University of Johannesburg project team (**Lynda Mujakachi**, **Harold Annegarn**, **Ntombifuthi**

² GEMES Department PhD candidate.

³ GEMES Department masters student.

Ntuli and Charles Mbohwa), in collaboration with GDARD in developing the Gauteng Climate Change Response Strategy and Action Plan. Submitted July 2011.

Knoll M, J Rupp, T Eckhardt, U Fahl, E Heyden and J Lambauer: *Final Report of the Definition Project - Development of GEECA – Gauteng Energy Efficiency and Climate Agency for Industry and Commerce*. BMBF Programme. Institute for Futures Studies and Technology Assessment (IZT) and Institute of Energy Economics and the Rationale Use of Energy (IER), University of Stuttgart.

Mubiwa B and HJ Annegarn: *Spatial Change within the Gauteng City-region: Land-use/cover mapping; trends and possible impacts*. Technical Report commissioned by the Gauteng City-Region Observatory (GCRO). Submitted 15 June 2011.

Eltrop L, T Telsnig and D Özdemir (eds) (2011): *EnerKey Technology Handbook – A guide of technologies to mitigate greenhouse gases towards 2040 in South Africa*. Institute for Energy Economics and the Rational Use of Energy (IER), Stuttgart University and University of Johannesburg.

Presentations

Presenting author underlined in papers with multiple authors

Conferences, workshops, seminars (invited presentations):

Ntombifuthi Ntuli, Ludger Eltrop and Harold Annegarn. *Barriers and Opportunities of implementing Clean Development Mechanism (CDM) in South Africa: A Perspective of European CER Buyers*. International Conference on Carbon Markets and Climate Finance Africa. Sandton, 4 January 2011.

Hester du Plessis. *Science and Society: Public Understanding of Science (PUS) in South Africa and other collaborations*. Human Sciences Research Council (HSRC) Seminar series. Pretoria, 25 January 2011.

Lynda Mujakachi. *Climate Change Adaptation Response in Gauteng*. Gauteng Climate Change Adaptation Workshop. Organized by and held at University of Johannesburg, 27 January 2011.

Bram Büscher. *The Political Economy of the EU Energy/Development Nexus and its Contradiction*. Briefing Session for Parliamentarians and Policy Makers on 'Post Lisbon: How to achieve coherence between energy security and development policies'. Brussels, Belgium, 9 February 2011.

Magi Matinga. *Non-economic hindrances to clean energy transitions in the context of indoor air pollution in rural Eastern Cape, South Africa*. 5th Biennial Partnership for Clean Indoor Air (PCIA) Forum. Lima, Peru, 21- 26 February 2011.

David Kimemia, Harold Annegarn and James Robinson. Presented a poster on the activities of SeTAR Centre. 5th Biennial Partnership for Clean Indoor Air (PCIA) Forum. Lima, Peru, 21-26 February 2011.

Hester du Plessis. *The concept and application of transdisciplinarity in intellectual discourse and research - Introduction to the project.* Mapungubwe Institute for Strategic Reflection (MISTRA). Public Launch: an idea whose time has come. Kyalami, Midrand, 18 March 2011.

Hester du Plessis. *The concept and application of transdisciplinarity in intellectual discourse and research.* Inaugural Conference of Mapungubwe Institute for Strategic Reflection (MISTRA). Kyalami, Midrand, 19 March 2011.

Lynda Mujakachi and Harold Annegarn. *Energy as key element of a sustainable mega-city.* Power and Electricity World Africa 2011 Conference. Sandton Convention Centre, Johannesburg (28 March – 1 April), 31 March 2011.

David Kimemia, Harold Annegarn, James Robinson, Crispin Pemberton-Pigott and Vincent Molapo. *Optimising the Imbaula Stove.* 19th Domestic Use of Energy Conference (DUE). Cape Peninsular University of Technology (CPUT), Cape Town, 11-13 April 2011. Paper (peer reviewed) appears in conference proceedings.

Magi Matinga, James Robinson and Harold Annegarn. *The global alliance for clean cookstoves: Implications for South Africa.* 19th Domestic Use of Energy (DUE) Conference. Cape Peninsula University of Technology (CPUT), Cape Town, 11-13 April 2011. Paper (peer reviewed) appears in conference proceedings.

Tafadzwa Makonese, Godfrey Chikowore and Harold Annegarn. *Potential and prospects of improved cookstoves (ICS) in Zimbabwe.* 19th Domestic Use of Energy (DUE) Conference. Cape Peninsula University of Technology (CPUT), Cape Town, 11-13 April 2011. Paper (peer reviewed) appears in conference proceedings.

Tafadzwa Makonese, James Robinson, Crispin Pemberton-Pigott and Harold Annegarn. *A preliminary comparison of stove testing methods between the water boiling test and the heterogeneous testing protocol.* 19th Domestic Use of Energy (DUE) Conference. Cape Peninsula University of Technology (CPUT), Cape Town, 11-13 April 2011. Paper (peer reviewed) appears in conference proceedings.

James Robinson, Momade Ibraimo and Crispin Pemberton-Pigott. *The uncontrolled cooking test: measuring three-stone fire performance in northern Mozambique.* 19th Domestic Use of Energy (DUE) Conference. Cape Peninsula University of Technology (CPUT), Cape Town, 11-13 April 2011. Paper (peer reviewed) appears in conference proceedings.

Lynda Mujakachi and Harold Annegarn. *Energy efficiency in the built environment.* West Rand District Municipality (WRDM) Green IQ workshop. Krugersdorp, 15 April 2011.

Magi Matinga. *Women's role in family decision-making regarding stove purchase and use.* NIH workshop on indoor air pollution. Virginia, USA, 9-12 May 2011.

Hester du Plessis, Leonard Martin and Jeffrey Sehume. *The concept and application of transdisciplinarity in intellectual discourse and research – thought paper 1.* Mapungubwe Institute for Strategic Reflection (MISTRA). UNISA Philosophy Seminar series. Pretoria, 11 May 2011.

Harold Annegarn, Douglas Guy and **Lynda Mujakachi.** *Green housing: integrated Energy Efficiency Empowerment and Cost Optimization (iEEECO™) in housing delivery.* West Rand District Municipality (WRDM) Green IQ Summit, to launch the WRDM Green IQ Programme. Muldersdrift, 16 May 2011.

Magi Matinga. *An energy and gender perspective of rural culture and environment of the Eastern Cape.* Seminar on the People, Culture and Environment of Southern Africa (PECSA) for University of Virginia Study Abroad Programme. Organised by GEMES Department. University of Johannesburg, 25 May 2011.

Harold Annegarn, SJ Piketh, JK Kanyanga, D Nyanganyura and RJ Swap. *Insights from the SAFARI 2000 and Ongoing Challenges in Atmospheric Transport over Southern Africa; Changing Chemistry in a Changing Climate: Human and natural Impacts over Southern Africa.* C4-SAR, Midrand, 31 May – 2 June 2011.

Harold Annegarn, L Eltrop, U Fahl and **J Tomaschek.** *Innovative Projects in Urban Energy Supply and Use to improve sustainability in Gauteng.* ENERGEX Africa: Going Green with Sustainable Energy Technology. Midrand, 7-8 June 2011.

James Robinson. *An overview of stove testing at the SeTAR Centre.* Presented at the Biomass Energy Foundation (BEF) Stove Workshop, Centre for Research in Energy and Energy Conservation (CREEC). Makerere University, Uganda, 23 June 2011.

Hester du Plessis. *The development of Public Understanding of Science (PUS) to inform policy, ensure fair practice and promote social justice.* Conference: Gender in question: rights, representation and substantive freedom, XVII South African Sociological Association (SASA) Congress. University of Pretoria, 10–13 July 2011.

Brian Mubiwa, Harold Annegarn and Mathetha Mokonyama. *Looking back, looking forward: land-use/cover trends, transport and energy implications in Gauteng.* Doctoral dissertation work-in-progress presentation. SEE Department Seminar Series, Institute of Energy Economics and Rational Use of Energy (IER), University of Stuttgart, Germany, 12 July 2011.

Hester du Plessis. *The methodology of Public Understanding of Science.* By invitation from the NRF/SAASTA to the South African Sociological Association (SASA), in collaboration with Gauhar Raza, NISCAIR, CSIR, New Delhi. PUSA Campus, 14 July 2011.

Lynda Mujakachi. *Energy Supply, Climate Protection and Sustainability*; organized by the South African Research Chair in Social Change, Faculty of Humanities, University of Johannesburg to discuss how climate protection is being addressed within academia. University of Johannesburg, 29 July 2011.

Hester du Plessis. *Transdisciplinarity*. MISTRA Triumvate workshop. Mapungubwe Institute for Strategic Reflection (MISTRA), 2 August 2011.

James Robinson. *Renewable energy in South Africa*. Netherlands Embassy. Pretoria, 16 September 2011.

Magi Matinga and **James Robinson.** Energy poverty in South Africa: Towards a new agenda. Presentation made at the Mapungubwe Institute for Strategic reflection (MISTRA), 3 October 2011.

Zola Exquidolence Languza, Vusi Enoch Mtshali and **Harold Annegarn.** *Role of CDW's In Spreading The Clean Air Message*; Annual Conference of the National Association of Clean Air (NACA). East London, South Africa, 12-14 October 2011.

Harold Annegarn. *University's Response to Climate Change*. University of Johannesburg Public Forum on the UNFCCC COP17 that will be held in Durban, 29 November to 9 December 2011. Forum also had presentations from the Minister of Department of Environment and Water Affairs (DWEA), the Hon. BEE Molewa; and Prof. Bheki Mamba of the Faculty of Engineering and the Built Environment. University of Johannesburg, 20 October 2011.

Nandarani Maistry⁴. *Going Green: A case study of making an energy efficient campus: Auckland Park Kingsway Campus, University of Johannesburg*. UJ Postgraduate Symposium. University of Johannesburg, 26 October 2011.

Ntombifuthi Ntuli, Ludger Eltrop and **Harold Annegarn.** *Barriers and Opportunities of implementing Clean Development Mechanism (CDM) in South Africa: Building Energy Efficiency Projects*". South African Energy Efficiency Convention (SAEEC) 2011. Kempton Park, Ekurhuleni, 15 November 2011.

Harold Annegarn and **U Fahl.** *Taking the pulse of the Megacity: energy and carbon opportunities for Gauteng*. South African Cities Network (SACN) and Development Bank of Southern Africa (DBSA) Infrastructure Dialogue: Infrastructure and Greening the Future. Midrand, 16 November 2011.

Harold Annegarn and **U Fahl.** *Challenges and opportunities in implementing energy efficiency measures in local government*. South African Energy Efficiency Convention (SAEEC) 2011. Kempton Park, 16-17 November 2011.

Ntombifuthi Ntuli, Ludger Eltrop and **Harold Annegarn.** *Barriers and Opportunities of implementing Clean Development Mechanism (CDM) in South Africa: Building*

⁴ GEMES Department masters student.

Energy Efficiency Projects. South African Energy Efficiency Convention (SAEEEC) 2011. Kempton Park, 16-17 November 2011.

Conferences, workshops and seminars attended (no presentations made):

Harold Annegarn, Fatima Ferraz and Lynda Mujakachi. Workshop: Challenges for SA as host of a multilateral climate negotiation in 2011. Organised by the South African National Energy Association (SANEA) and WWF-South Africa. Sasol Auditorium, Rosebank, 18 January 2011.

Harold Annegarn and Lynda Mujakachi. Workshop: National Climate Change Response Strategy – Gauteng Province Consultation Workshop on the Green Paper. Organised by Department of Water and Environmental Affairs (DWEA). Participant comments submitted prepared and submitted to GDARD by the University of Johannesburg as part of GCCRS project. Lynda Mujakachi prepared a report on participants' comments. Fourways, Johannesburg, 4 February 2011.

Lynda Mujakachi. Workshop: Gauteng Department of Economic Development (GDED) Green Strategic Programme: Local and Provincial Government. Organized by GDED and Gauteng City-Region Observatory (GCRO). Johannesburg, 17 February 2011.

Harold Annegarn and Lynda Mujakachi. Workshop: Energy supply systems for a low carbon future for Gauteng – EnerKey Research dissemination. Organised by SeTAR Centre and University of Stuttgart (Germany). University of Johannesburg, 8 March 2011.

Harold Annegarn and Lynda Mujakachi. Workshop: The role of spatial planning in the transition to low carbon city and city region economies. Organised by Council for Scientific and Industrial Research (CSIR), University of Johannesburg (EnerKey Programme) and University of Stuttgart (Germany). Workshop report prepared by CSIR. Pretoria, 10 March 2011.

Harold Annegarn, David Kimemia, Tafadzwa Makonese, Vincent Molapo and Lynda Mujakachi. Conference: Gauteng Department of Agriculture and Rural Development (GDARD) Climate Change Indaba. Organized by GDARD and University of Johannesburg. Stakeholder conference to input into the Gauteng Climate Change Strategy and Action Plan. Kempton Park, 15 March 2011.

Magi Matinga. Roundtable: Climate Justice, hosted by former President of Ireland and founder of the Mary Robinson Climate Justice Foundation. Sandton, Johannesburg, 16 March 2011.

Lynda Mujakachi. Workshop: Gauteng Department of Agriculture and Rural Development (GDARD) internal workshop on Climate Change Response Strategy: Agriculture and Land-use. Organized by GDARD. Johannesburg, 6 April 2011.

Hester du Plessis. Conference: 19th International Conference on the Domestic Use of Energy (DUE). Cape Peninsula University of Technology (CPUT), Cape Town, 11-13 April 2011.

Lynda Mujakachi and Yan Yang. Summit: West Rand District Municipality (WRDM) Green IQ Summit; to launch the WRDM Green IQ Programme. Muldersdrift, 16 May 2011.

Harold Annegarn and Lynda Mujakachi. Workshop: Gauteng Department of Economic Development Green Strategic Programme: Green Strategic Programme for Gauteng Phase II Workshop. Organized by the Gauteng of Department of Economic Development (GDED) and Gauteng City-Region Observatory (GCRO). The final Gauteng Green Strategic Programme is available. Johannesburg, 20 May 2011.

Harold Annegarn, Lynda Mujakachi, James Robinson and GEMES Department postgraduate students. Seminar: The People, Culture and Environment of Southern Africa (PECSA): (i) *The Coloured People of Gauteng*, presentation by Prof. Debra Meyer of the Biochemistry Department, University of Pretoria; (ii) *An energy and gender perspective of rural culture and environment of the Eastern Cape*, presentation by Dr. Magi Matinga (post-doctoral fellow at the SeTAR Centre; and (iii) *Strangers in a Strange Land*, presentations on insights and experiences of studying and living in South Africa by international students of the Department of Geography, Environmental Management and Energy Studies (GEMES), Faculty of Science, University of Johannesburg. PECSA is an international exchange programme between the University of Virginia (USA) and University of Johannesburg. Organised by GEMES Department. University of Johannesburg, 25 May 2011.

SeTAR Centre staff and GEMES Department postgraduate students. Seminar: *Biofuels: Doing bad or doing good?* Presentation by Dr. Joy Clancy, Associate Professor and Reader in Development Studies specializing in Technology Transfer at the University of Twente, Netherlands. Organised by Dr. Magi Matinga (Post-doctoral Fellow). University of Johannesburg, 15 June 2011.

SeTAR Centre staff and GEMES Department postgraduate students. Seminar: *Engagement with science: a necessary condition for the survival of democracy* – the guest speaker was Gauhar Raza from the National Institute of Science Communication and Information Resources (NISCAIR), CSIR, New Delhi, India. Organized by Dr. Hester du Plessis of the SeTAR Centre and a Fellow of the Mapungubwe Institute for Strategic Reflection (MISTRA). Auckland Park, Johannesburg, 19 July 2011.

Hester du Plessis, Magi Matinga, Lynda Mujakachi and James Robinson. Colloquium: *Poverty – The threat facing South Africa*. Organized and hosted by the Centre for

Small Business Development (CSBD) in the Faculty of Management, and Faculty of Economic and Financial Sciences of the University of Johannesburg, in collaboration with Business Leadership South Africa (BLSA) and Mapungubwe Institute for Strategic Reflection (MISTRA). The colloquium discussed labour market dynamics and poverty in the working classes – asking whether black economic empowerment (BEE), affirmative action (AA) and other interventions are making a difference in improving the quality of life of the poor and if social protection is having any effect. Presentations were made by, *inter alia*, the Minister of Social Development, the Hon. Bethabile Dlamini; Mr. Joel Netshitenzhe of MISTRA (and former Economic and Political Advisor to former President Thabo Mbeki); and the MEC for Gauteng Department of Economic Development (GDED), Ms. Qedani Mahlangu. University of Johannesburg, 21 July 2011.

Hester du Plessis. Seminar: Presentation by Gauhar Raza at the Human Science Research Council (HSRC) Seminar Series: *Gender and the Public Understanding of Science*. HSRC, Pretoria, 21 July 2011.

Lynda Mujakachi. Launch of Consortium for Research on Educational Access Transitions and Equity in Education (CREATE) Policy Dialogue Conference themed: *“Getting to 2025: Meeting the twin imperatives of Equity and Quality in Education* Conference launched by Deputy Minister of Basic Education, the Hon. Enver Surty. Overall conference was held 25-27 July 2011, to disseminate research findings conducted in Ghana, India, Bangladesh and South Africa. CREATE is a multi-year international research programme addressing access issues in schooling. University of Johannesburg, 25 July 2011.

Harold Annegarn, Godfrey Chikowore, Brian Mubiwa and Lynda Mujakachi. Launch of the Gauteng City-Region Observatory (GCRO) *State of the Gauteng City-Region Review 2011*. Guest speakers were Prof. Loyiso Nongxa, Vice-Chancellor of the University of Witwatersrand, Prof. Adam Habib, Deputy Vice-Chancellor of the University of Johannesburg (and Chairman of the GCRO), and Mr. Rashid Seedat, Head of the Gauteng Planning Commission. University of Witwatersrand, 17 October 2011.

Harold Annegarn, Vincent Molapo, Lynda Mujakachi and James Robinson. Celebrating Green Women. Organized by University of Johannesburg Student Green Lifestyle and SeTAR Centre, Event attended by, *inter alia*, the Deputy Minister of Energy, the Hon. Ms. Barbara Thompson; UJ Deputy Vice-Chancellor for Strategic Services, Dr. Zola Njongwe; and United Nations Environment Programme (UNEP) Youth Ambassador, Ms. Ella Bella. SeTAR Centre demonstrated energy efficient stoves for low-income households. University of Johannesburg Doornfontein Campus, 12 August 2011.

Harold Annegarn and Lynda Mujakachi. Workshop: City of Johannesburg (CoJ) Growth and Development Strategy 2055, Resource Sustainability Week, 15-19 August 2011. Stakeholder engagements on green economy and sustainable development in the City of Johannesburg. Johannesburg, 15 August 2011.

Hester du Plessis. Workshop: *Standing up for science*. Organised by Southern Science. Agricultural Research Council (ARC), Pretoria, 31 August 2011.

Harold Annegarn and Lynda Mujakachi. Summit: Gauteng Province Water and Climate Change Summit, 8-9 September 2011. The summit was convened to provide input for the UNFCCC COP17, create awareness and mobilization on climate change, and identify solutions to address water security and economic development in Gauteng. Organized by the Department of Water and Environmental Affairs (DWEA), Gauteng Department of Agriculture and Rural Development (GDARD) in association with SALGA and GIZ. Gallagher Estate Conference Centre, Midrand, 9 September 2011.

Lynda Mujakachi. Public Lecture: *Advocates for Change – How to overcome Africa’s Challenges*. Keynote speaker was Moeletsi Mbeki (ed). Organised by the Department of Politics in the Faculty of Humanities. University of Johannesburg, 20 September 2011.

Fatima Ferraz⁵. Workshop: Limpopo Climate Change Summit. Organised by the Limpopo Province Department of Economic Development, Environment and Tourism. Bolivia Lodge, Polokwane, 4 October 2011.

SeTAR Centre staff and GEMES Department postgraduate students. Conference: Energy and Climate Protection conference and co-hosted by the Gauteng Department of Local Government & Housing (GDLG&H), SALGA, the University of Stuttgart (Germany) and the SeTAR Centre (EnerKey Programme). Conference held to disseminate EnerKey research results and discuss know ledge exchange between research institutions and government. Organised by the SeTAR Centre. Johannesburg, 5-6 October 2011.

⁵ GEMES Department PhD candidates.



The Energy and Climate Protection Conference, Johannesburg, 5-6 October 2011

Hanlie Liebenberg-Enslin⁵. Conference: National Association for Clean Air (NACA) Annual Conference. East London, South Africa, 12–13 October 2011.

Hester du Plessis. Workshop: The development of a national strategy and framework for the public engagement of science. Hosted by SAASTA/National Research Foundation and Totem Media. SAASTA. Pretoria, 14 October 2011.

Hester du Plessis. Seminar: The road to COP17, presentation by Prof Steven Crow. National Research Foundation Science and Society lecture series. University of Pretoria, 27 October 2011.

Hester du Plessis. Seminar: Transdisciplinarity. Co-hosted by the National Research Foundation (NRF) and the Vrije Universiteit Amsterdam. Pretoria, 28 October 2011.

SeTAR Centre staff and GEMES Department postgraduate students. Public Forum: *South Africa's response to climate change*. Forum also had presentations from the Minister of Department of Environment and Water Affairs (DWEA), the Hon. BEE Molewa; Prof. Harold Annegarn of the Faculty of Science; and Prof. Bheki Mamba of the Faculty of Engineering and the Built Environment. University of Johannesburg, 20 October 2011.

Brian Mubiwa. *Environmental Systems Research Institute (ESRI) South Africa User Conference 2011*. Organized by ESRI South Africa. Champagne Sports Resort, Central Drakensberg, 1-4 November 2011.

EnerKey Seminars

EnerKey German partners and SeTAR Centre conducted various seminars in Johannesburg. The seminars were attended by postgraduate students, provincial and municipal government officials, other universities and research institutes and industry and NGOs.

March 7 – EnerKey Long-term Perspectives Group (ELPG)

March 8 – Energy supply technologies for a low carbon future for Gauteng province

March 16 – CDM workshop for municipalities

March 16-18 – Integrated Energy and Climate Protection modelling (TIMES) short course

18 March – Traffic modelling

18 March – GEECA workshop

4 October - EnerKey Long-term Perspectives Group (ELPG)

7 October – GEECA meeting.

Other Articles:

Shiza Manzi Geyzer, which uses small wood twigs to boil water, and designed by Jannie Schonken, was published on the Daily Sun newspaper on the 27 September 2011, at the time it was undergoing testing at the SeTAR Centre laboratory.

Awards:

Harold Annegarn was elected a member of the Academy of Science of South Africa (ASSA) in October 2011. The key objective of the academy is to promote and apply scientific thinking in the service of society, ultimately determining the quality and scope of the role the academy can play in the country's life and progress.

Academic

Teaching and Academic Studies Supervision:

SeTAR Centre staff and post-doctoral fellows assisted students conducting research relevant to the work of the Centre. Students were from the Faculty of Science and FADA.

Short Courses:

Harold Annegarn. NQF Certified Short Course (10 days) - Introduction to Air Quality Management. National Association for Clean Air (NACA) and University of Pretoria Short Course Centre, 21 February–4 March 2011.

Georgina Chauke⁶ {late} participated in a training course on Green Energy and Carbon Markets. The course was aimed at assisting participants on how to develop green energy and low carbon business plans. Copenhagen, Denmark. 23 July–13 August 2011.

Vincent Molapo and **James Robinson** attended the Biomass Stove Camp held at Makerere University in Uganda and organized by the Bio-Energy Foundation on 20–24 June 2011. The course participants represented different organizations that research on stoves, especially Biomass Gasifiers stoves. Dr Paul Anderson, Head of Bioenergy was the organiser and the instructor, working together with Christa Roth who was the course instructor and Karsten Bechtel of the Centre for Research in Energy and Energy Conservation (CREEC) who were the host of the stove camp. The course included the theory and practical work in the workshop: making small Top lit updraft (TLUD) stoves, testing stoves using CREEC Laboratory equipment and lighting up the existing TLUD Gasifier Stoves.

Getrude Mafusire⁷, C. Walsh, P.D. Waldhauserova, T. Khorola, M. Josipovic, V. Vakkari, M. Vana and M. Paramonov participated in a field course and data analysis workshop on the Effects of fires on atmospheric gas and aerosol composition in southern Africa - Physics and chemistry of air pollution and their effects. Helsinki, Finland, 31 October - 9 November, 2011.

Post-doctoral fellows:

There are five post-doctoral fellows in residence.

Dr Bram Buscher – holds a PhD (*cum laude*) in Political Science and Anthropology. His area of research includes energy politics of southern Africa; political economy of energy; green neoliberalism/capitalism; and eco-tourism. He is currently involved in a

⁶ GEMES Department masters student. Regrettably, Georgina Chauke passed away on 19 November 2011 in a motor vehicle accident in Johannesburg. M.H.S.R.I.P.

⁷ GEMES Department masters student.

research project on the politics of energy in Southern Africa through a postdoctoral fellowship with the Department of Geography, Environmental management and Energy Studies (GEMES) at the University of Johannesburg. He was recently awarded a Veni grant by the Dutch organisation for Scientific Research (NWO) for a research project entitled 'Nature 2.0: the political economy of conservation in online and Southern African environments'.

Dr. Godfrey Chikowore – has a PhD in Geography (Social and Economic Geography). His area of research is Transformative Regional Economic Cooperation and Integration. As a post-doctoral fellow, he is writing a book entitled "*Theory and practice of transformative regional economic cooperation and integration in the developing and developed nation – states in the new millennium*". He is the Director of the Institute of Development Studies at the University of Zimbabwe.

Dr. Magi Matinga – holds a PhD in health aspects of use of domestic energy. During her post-doctoral fellowship, she is writing papers for peer reviewed journals. She has co-supervised two MSc and one PhD students. She is also brokering partnerships between UNDP South Africa and Mapungubwe Institute for Strategic Reflection (MISTRA). It is expected that the SeTAR Centre will undertake two round tables with each of these organizations in the first half of 2012.

Dr. Olusegun Oguntoke – with a PhD in Environment and Health Geography, his research activities focus on the impact of environment on health and well-being of humans, particularly the impact of particulate matters and gaseous pollutants on the health of rural and urban communities, as well as the health impact of noise pollution on exposed subjects in urban settings. During his post-doctoral fellowship period, he has joined a Research Group that is investigating the broad spectrum of the impact of wind-blown mine dust on the health of communities living within the area of influence of gold mine tailings in parts of Gauteng Province.

Dr Yan Yang – has a Dr.Sc. from the Swiss Federal Institute of Technology, Switzerland (ETH Zurich). She has worked in research and in projects in China and Europe in urban regeneration, urban design and sustainable development. She is conducting her post-doctoral fellowship at the University of Johannesburg and University of Witwatersrand. Her research during her post-doctoral fellowship is in urban sustainability in the global South.

Visits to other institutions:

Brian Mubiwa. Study visit to the Institute of Energy Economics and Rational Use of Energy (IER) University of Stuttgart, 15 March to 30 August 2011. The main purpose was to further enhance the doctoral research dissertation by being exposed to new technologies and expertise from colleagues at the University of Stuttgart. The focus

was on finding the correlation between land-use and transport energy changes. The visit was arranged by the EnerKey Research Programme and funded by the DAAD Fellowship Grant.

Tafadzwa Makonese. Global Atmospheric Watch (GAW), Cape Point, Cape Town, South Africa, 14 April 2011. The objective of the visit was to familiarise the SeTAR Centre team participating in the Domestic Use of Energy (DUE) 2011 conference on the current technological advancements in atmospheric science and quality control with regard to equipment calibration and data processing.

Olusegun Oguntoke. Participated with a delegation of the International Exchange programme from the University of Virginia in the USA that visited the University of Venda in Limpopo Province, Eduardo Mondlane University in Mozambique and the Centre for Sustainable Development (Ministry of Environment) in Mozambique. May 29-12 June 2011.

Hartmut Winkler received a DAAD visiting research fellowship and visited several institutions in Germany during May to July 2011. Several scientific outputs were completed during his visit and two scientific papers are in preparation.

Harold Annegarn led a delegation of twelve persons from Gauteng municipalities, the private sector and academia to Germany as part of an exchange visit on "*Biowaste utilization and biogas technologies for municipalities in South Africa*", 10-16 July 2011. The purpose of the exchange visit was to conduct site visits of German technologies for energy development from biowaste utilisation; identify the research focus of South African and German partners on the project; and identify funding opportunities and prepare the project proposal.

Harold Annegarn participated in an exchange visit to a partner Sustainable Megacity project to Urumqi in north-west China, 14-18 July 2011. The visit was facilitated by academic partners from the University of Heidelberg, Germany. The *RECAST* energy project in Urumqi is similar to the EnerKey Sustainable Megacity Gauteng project, examining strategies and tools for the sustainable development of a rapidly expanding metropolis in arid central Asia. A presentation was made on the EnerKey programme to the RECAST team.

Collaborative relationships

SeTAR Centre has established collaborative relationships with the following:

Local partnerships

- Council for Scientific and Industrial Research (CSIR)
- EcoVest
- Eskom
- Gauteng Provincial government
- Gauteng municipalities
- Human Sciences Research Council (HSRC)
- IBM
- Mapungubwe Institute for Strategic Reflection (MISTRA)
- NOVO Energy Ltd
- Peer Africa (Pty) Ltd
- South African Bureau of Standards (SABS)
- South African Local Government Association (SALGA)
- Sustainable Energy Society of Southern Africa (SESSA)
- Stellenbosch University
- University of Cape Town
- University of Pretoria
- University of Venda
- University of the North-West

Regional and International Partnerships

- Eduardo Mondlane University, Mozambique
- Fraunhofer Institute for Building Physics (IBP), Germany
- Institute for Future Studies and Technology Assessment (IZT), Germany
- National Institute of Science Communication and Information Resources (NISCAIR), CSIR, India
- National University of Mongolia
- Stuttgart University, Germany
- TÜV Rheinland Group (TIE), Germany

- University of Vienna, Austria
- University of Virginia, USA
- University of Zambia
- University of Zimbabwe

Community engagements

Vincent Molapo, Lynda Mujakachi and James Robinson. Europe Day Exhibition. SeTAR Centre exhibited fuel efficient stoves and posters on. CSIR Conference Centre, Pretoria, 11 May 2011.

Martin Baloyi, Vincent Molapo and Lynda Mujakachi. Workshop on “Safety in the Home”, held at Onverwacht Primary School in Metsweding in Pretoria. Workshop held for various local municipal departments dealing with safety issues, especially in the home. SeTAR Centre demonstrated safe stoves. Onverwacht Primary School is one of the six schools that are being researched on as regards energy efficiency in schools as part of Martin Baloyi’s masters research in Energy Studies. Metsweding, Tshwane Metro, 9 June 2011.

SeTAR Centre staff and GEMES Department postgraduate students. Shack fire simulation, which was organized by the Paraffin Safety Association of Southern Africa (PASASA). PASASA and the University of Johannesburg, in collaboration with West Rand District Municipality (WRDM), implemented a fire simulation exercise. Four shacks were built and a fire was started by knocking over a paraffin stove. The event was filmed in order to record how a fire starts, document the fire temperatures in the shacks, how long it took to destroy the shack and test the effectiveness of fire breaks that should be put around informal settlement dwellings/shacks. The SeTAR Centre team was responsible for monitoring the temperature inside the shacks. Afterwards, the WRDM and PASASA signed a formal working relationship agreement about Area Specific Safety Interventions in low-income communities in WRDM. Soul City informal settlement in Krugersdorp, West Rand, 28 June 2011.



Shack burning simulation in West Rand, 28 June 2011

Martin Baloyi⁸ and **Georgina Chauke {late}** – together with an exchange student, Joachim van'tHul from the University of Twente in the Netherlands, spent the period 1-30 July 2011 in Witsands, Atlantis, Cape Town with the PEER Africa team on a 'student-community exchange' programme. The student team participated in the iEEECO™ collaborative Monitoring and Verification Programme whereby they carried out system installation, data capturing, analysis and reporting to assess thermal efficiency in sampled households.



Georgina Chauke {late} (standing) and Martin Baloyi (extreme left) at a Witsands Human Settlement workshop, Atlantis, Cape Town, 20 July 2011

Tafadzwa Makonese, Vincent Molapo, James Robinson and the Young SESSA team went to Dr. Knak Primary School in Alexandra Township on an awareness campaign for Grade 7 pupils (150 school children) on fire safety and solar energy. There was a demonstration of some of the cooking and warming appliances, conducting fire experiments and TLUD stoves basic design lectures. The Young SESSA team brought their toys operated by the solar panel & demonstrated cooking on a solar cooker & solar geyser for warming water. Alexandra Township, Johannesburg, 28 July 2007 and 4 August 2011.

⁸ GEMES Department masters student.

David Kimemia. Facilitated a joint research partnership between the SeTAR Centre and Paraffin Safety Association of Southern Africa (PASASA), TEPRASM (a community based organization in Gauteng townships) and the Community Development Workers (CDWs) Unit of the Gauteng Department of Local Government and Housing (GDLG&H). Each of the partners will play a role in the forthcoming *Paraffin Fuel and Appliances Survey Project*, which will be carried out in the Gauteng townships of Alexandra, Tembisa and Atteridgeville.

Lynda Mujakachi. West Rand District Municipality (WRDM) Integrated Development Plan (IDP) stakeholder engagement meeting to discuss progress of implementation of 2011-2012 IDP in WRDM, 26 August 2011.

Olusegun Oguntoke. Participated in MHSC Mine Dust Health Impacts project meetings on 15 February; 29 April; 2 August; and 3 November 2011.

Lynda Mujakachi. Women in Community Engagement Leadership Convention. This is an annual convention featuring university women in community service with an emphasis on sustainable economic development. Organised by the Community Engagement Office, University of Johannesburg, 30 August 2011.

Harold Annegarn, Edison Muzenda and Ludger Eltrop. Workshops on Biowaste utilisation and biogas technologies for municipalities and industry. Through the South African German Scientific and Technical Exchange Programme administered by the NRF, a grant was awarded to the Stuttgart University and University of Johannesburg to conduct exchange visits and develop proposals in the field of biowaste. The first activity was a visit to Stuttgart by a delegation of twelve people in July 2011. An outcome of this visit was a concept proposal submitted to the NRF. A full proposal has been requested from the NRF and the series of workshops that were conducted during the period 10-14 October 2011 were orientated towards the development of a full proposal that would include municipalities in Gauteng. Johannesburg and West Rand, 10-14 October 2011.

Lynda Mujakachi. Celebrating the International Day for Disaster Risk Reduction – making Cities Resilient. Invited to make a presentation: *The impact of climate change on service delivery processes*. City of Tshwane Council Chamber, 13 October 2011.

SeTAR Centre staff. Meeting with the delegation from the West Rand District Municipality (WRDM) led by the Executive Mayor, Cllr. Mpho Nawa. Meeting explored possible areas of collaborating on the implementation of the WRDM Green IQ Programme. Meeting also attended by representatives from SALGA, Novo Energy and PEER Africa. SeTAR Centre, 20 October 2011.

Harold Annegarn, David Kimemia, Magi Matinga, Vincent Molapo and James Robinson. Participated at the UNFCCC COP17. There was an exhibition on basic energy stoves and joint workshops were held with PEER Africa. Durban, 29 November to 9 December 2011.

Administration

Strategic Meetings:

Harold Annegarn, Hester du Plessis, Lynda Mujakachi and James Robinson. SeTAR Centre Strategic Planning Meeting, assisted by staff from GIZ (David Hancock and Marlett Balmer). The strategic planning workshop scoped the energy poverty landscape, explored potential roles for SeTAR Centre and the identification of a programme of activities. SeTAR Centre, 19 January 2011.

James Robinson. Represents SeTAR Centre on the South African Bureau of Standards (SABS) Paraffin Operated Appliances Committee. Attended meetings on 7 February and 14 June 2011.

Harold Annegarn and Lynda Mujakachi. Meeting with IBM staff. Sandton, 17 March 2011.

Harold Annegarn, Hester du Plessis, John Ledger and Lynda Mujakachi. Meeting with IBM staff on “*Smart City and Energy Efficient City*”. Auckland Park, Johannesburg, 23 March 2011.

Harold Annegarn, John Ledger, Lynda Mujakachi and James Robinson. Meeting with Mokomane Mekgoe and Rodgers Musiyarira from the Energy Office of the Gauteng Department of Local Government and Housing (GDLG&H) to discuss the production of a ‘State of Energy’ report for Gauteng as per the requirement of the Gauteng Integrated Energy Strategy (GIES). State of Energy report can be an important tool for providing regular/periodic (monitoring) information on energy use and energy developments for Gauteng. Minutes of the meeting and a proposal produced. SeTAR Centre, 4 April 2011.

Harold Annegarn and Lynda Mujakachi. Meeting with GDLG&H, GDARD and CSIR to discuss EnerKey and the Integrated Planning and Development Modelling (IPDM) Project. Initial meeting to discuss possible areas of collaboration with GDLG&H, CSIR and the EnerKey Programme/University of Johannesburg on the establishment of a “*living lab process*” or urban simulation platform for Gauteng. This was proposed at the workshop on “The role of spatial planning in the transition to low carbon city and city region economies” held on 10 March 2011 at CSIR. Organised by GDLG&H, CSIR and SeTAR Centre. University of Johannesburg, 10 June 2011.

Magi Matinga and James Robinson. Meeting with Gauteng City-Region Observatory (GCRO) team to provide a questionnaire on basic energy aspects for inclusion in the 2011 Gauteng quality of life survey. GCRO, 10 June 2011.

SeTAR Centre staff. Meeting with Limpopo Economic Development, Environment and Tourism Department (LEDET) on the proposal to conduct research on the potential for developing a Green Economy for Limpopo Province through target interventions in energy and resource utilization. LEDET has approached the SeTAR Centre to collaborate on the above-mentioned research and requested a proposal to the effect. SeTAR Centre duly prepared the proposal and submitted to LEDET. In attendance were representatives from SeTAR Centre, LEDET and Eskom. SeTAR Centre, 27 June 2011.

Harold Annegarn, Hester du Plessis, David Kimemia, John Ledger, Tafadzwa Makonese, Magi Matinga, Lynda Mujakachi and James Robinson held a meeting with Ecovest, an SME that is developing a range of renewable energy technologies for low-income households. Ecovest will be involved in the development of a safe and affordable paraffin stove as a sustainable alternative energy product suitable for use by rural communities as part of the NRF project title: *Affordable alternative energy as a key element for sustainable development*. SeTAR Centre, 25 August 2011.

Harold Annegarn, Hester du Plessis, David Kimemia, John Ledger, Magi Matinga, Lynda Mujakachi and James Robinson. Meeting with representatives from UNDP; to investigate possible areas of partnership for the United Nations Framework Convention on Climate Change (UNFCCC) COP17 that will be held in Durban on 28 November to 9 December 2011. SeTAR Centre prepared and submitted project concept notes 'legacy projects' to UNDP. SeTAR Centre, 25 August 2011.

James Robinson. Meeting with GIZ country director and energy programme manager. Pretoria, 13 September 2011.

Management Meetings:

SeTAR Centre staff held management and operational meetings during the year.

Financial support and resourcing in 2011

The SeTAR Centre has received financial support from the following:

- University of Johannesburg:
 - Graduate student bursaries from the Faculty of Science
 - Office of Innovation and Commercialisation
 - Post-doctoral Bursaries from the Faculty of Science and University Research Committee
 - University Research Committee grant to SeTAR Research Centre
- Department of Higher Education for publication subsidies
- Eskom Tertiary Education Support Programme
- Gauteng City-Region Observatory (GCRO)
- GIZ
- National Research Foundation (NRF) for the EnerKey Focus Area
- Stuttgart University

The SeTAR Centre has also generated income from the commercial testing of stoves and has conducted fee-paying work for government.

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Annex 1: Abbreviations and Acronyms

CDW	-	Community Development Worker
COP	-	Conference of the Parties
CSIR	-	Council for Scientific and Industrial Research
EnerKey	-	<u>E</u> nergy as a <u>K</u> ey element in a sustainable city-region and rural settlement
EU	-	European Union
FADA	-	Faculty of Art, Design and Architecture
GDARD	-	Gauteng Department of Agriculture and Rural Development
GDLG&H	-	Gauteng Department of Local Government and Housing
GEECA	-	Gauteng Energy Efficiency and Climate Agency for Industry and Commerce
GEMES	-	Geography, Environmental Management and Energy Studies (UJ)
GIZ	-	German International Development Agency
iEEECO™	-	integrated Energy Environment Empowerment Cost Optimization
NGO	-	Non-governmental Organization
NQF	-	National Qualifications Framework
NRF	-	National Research Foundation
PUST	-	Public Understanding of Science and Technology
SALGA	-	South African Local Government Association
SANEDI	-	South African National Energy Development Institute
SANERI	-	South African National Energy Research Institute (now SANEDI as of March 2011)
SeTAR	-	Sustainable energy Technology and Research
UJ	-	University of Johannesburg
UNFCCC	-	United Nations Framework Convention on Climate Change
USA	-	United States of America

Annex 2: Post-graduate students conducting research related to SeTAR Centre activities

Master's and Doctoral Graduates who received the degree in 2011

Name	Qualification	Year of Graduation	Race Indicated as A, C, I, W	Gender F / M	Nationality
Masters					
Tafadzwa Makonese	MPhil (Energy Studies)	2011	A	M	Zimbabwe
Doctoral					
None					

Masters and Doctoral candidates who submitted Dissertations / Theses in 2011

Name	Race Indicated as A, C, I, W	Gender F / M	Nationality	Status
Masters				
Ntuli, Ntombifuthi	A	F	RSA	To submit Dec 2011
Chikava, Winnie	A	F	Zimbabwe	To submit Dec 2011
Doctoral				
Paradzayi, Charles	A	M	Zimbabwe	Submitted August 2011
Mubiwa, Brian	A	M	Zimbabwe	To submit Dec 2011
Ntui, Charles	A	M	Cameroon	To submit Dec 2011
Scorgie, Yvonne	W	F	RSA	To submit Dec 2011

Notes: A = African; C = Coloured; I = Indian; and W = White. F = Female; M = Male

