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South African Wind Energy Centre (SAWEC) A Renewable Energy Training, Research, and Education Centre

Centre for Renewable and Sustainable Energy Studies
Prof Wikus van Niekerk
Dr Matt Heun (Calvin College)

29 November 2010

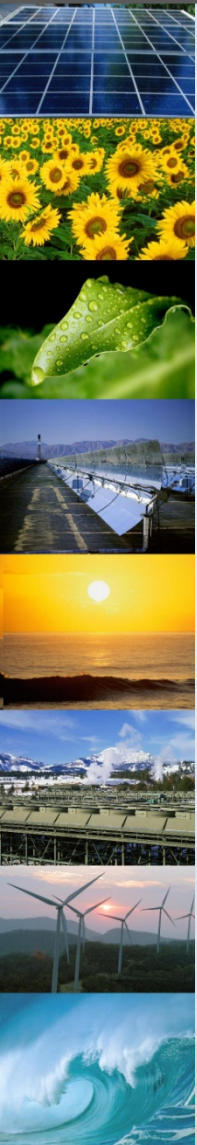




Why are we here?



RENEWABLE & SUSTAINABLE
ENERGY STUDIES



Efforts to meet the energy efficiency target of 12% by 2015 and our renewable energy targets will be enhanced by creating an enabling environment for renewable energy.

As a country we need to improve our capacity to develop and use such technology.

Renewable energy projects can make an impact on our use of electricity. It's important for government to direct more time and resources to this aspect of (the) green economy.

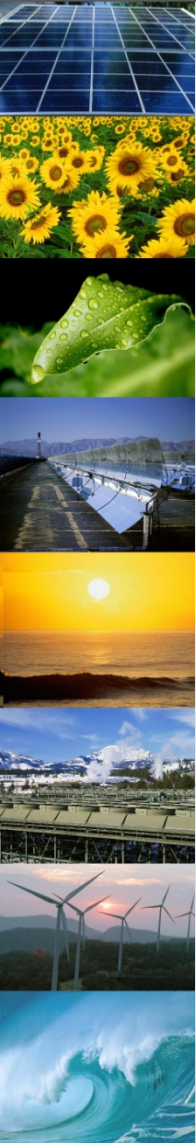
We need foresight studies. We need to know how to expand our current capacity and what we want it to be in three years time. We need to know how much to invest to be able to reach that capacity.



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President Jacob Zuma at the Green Economy Summit, 18 May 2010

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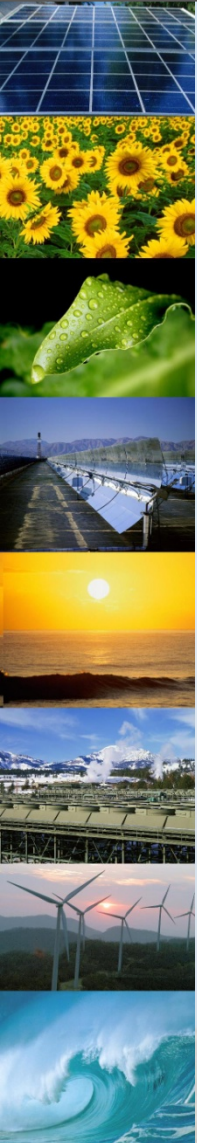
Minister Naledi Pandor MP, Minister of Science and Technology at the Green Economy Summit, 18 May 2010



Klipheuvel Wind Energy Demonstration Facility*



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- Location: ~30 km north of Stellenbosch on R304
- Three wind turbines
 - Vestas V47 660 kW, commissioned Aug 02
 - Vestas V66 1.75 MW, commissioned Dec 02
 - Jeumont J48 750 kW, commissioned Feb 03
- Original Eskom purposes for site:
 - Gain experience with wind technology
 - Ongoing research and education facility



* KWEDF



Summary of Proposal



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- Establish the South African Wind Energy Centre (SAWEC) where the consortium partners:
 - A **renewable energy information and demonstration centre** that includes wind and other RE technologies such as solar-PV, solar water heaters, biomass to energy conversion, etc.
 - A **training facility for artisans and technicians** for the wind energy sector in particular and all RE technologies in general as they are developed on site
 - A **teaching facility** for Western Cape universities/colleges
 - Courses held on-site
 - Analysis of RE production data and efficiencies in courses
 - A **research facility** for universities and private companies
 - Install and test small-scale prototype systems (wind, solar, biomass)
 - Investigate RE/grid interactions
 - An **operating independent power producer (IPP)**



Summary of Proposal (2)



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- Operations and maintenance costs could be paid from income generated by the IPP
 - SAWEK has significant incentive for excellent and efficient operation of the turbines (it is a significant source of income for the consortium)
 - Low wind regime at KWEDF is offset by fact that up-front capital costs have already been sunk into the facility
 - REFIT or willing buyer/willing seller will provide sufficient income for IPP O&M costs
- Resources for curriculum development could be provided by outside partners (e.g. GTZ and BZEE), turbine manufacturers, SAWEK, and/or consortium partners
- Training could be supported with funding from Sector Education and Training Authorities (SETAs), National Skills Fund, manufacturers, or other sources
- Capital for new buildings and training facilities could be obtained from a variety of sources: a loan (to be repaid by IPP), wind turbine suppliers, SA Government, donors, consortium partners, etc.



Potential Consortium Partners



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- Stellenbosch University (SU)
- University of Cape Town (UCT)
- Cape Peninsula University of Technology (CPUT)
- University of the Western Cape (UWC)
- North-Link College
- West Coast College
- False Bay College
- Western Cape Provincial Government
- DST/DoE/DHE&T
- City of Cape Town
- SETAs
- Eskom
- Vestas/Suzlon/Siemens
- MainstreamRenewables/WindlabSystems/Macquarie/Red-Cap
- SAWEA

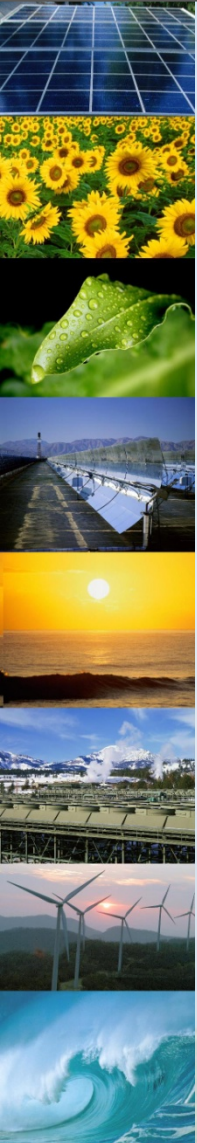
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- Currently the DST Renewable Energy Hub and a DST Wind Energy Spoke
 - National leader in RE teaching and research
 - Centre for Renewable and Sustainable Energy Studies (CRSES)
 - Wind turbine R&D with industry partners (Palm Tree Power)
 - Leadership in CSP and Biofuels research
 - Variety of postgraduate RE courses including Wind & Hydro Energy
 - Potential responsibilities
 - Facilitate SAWEC development
 - SAWEC management
 - Faculty-led research projects focused on national capacity-building
 - Secure funding for and disburse (via competitive process) small-size grants for new technology to be tested at the SAWEC site
 - RE industry interactions
 - Establish Industrial Advisory Board for SAWEC
 - Ensure responsiveness to RE industry needs

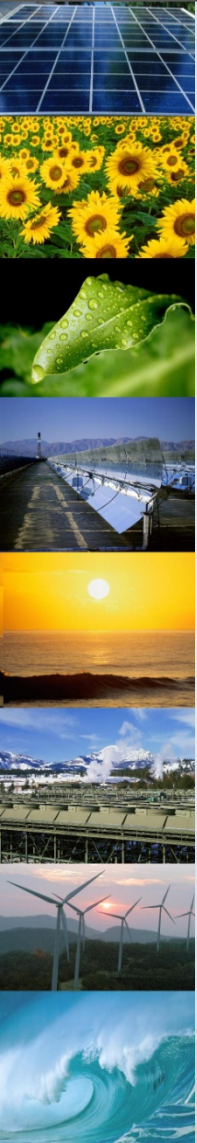


- National leader in technical capacity building through education
- Home of the Energy Institute which is focused on energy efficiency and energy monitoring
- Potential responsibilities
 - Develop and implement technician and technologist education and training plan, including facility requirements
 - Incorporate RE into curriculum for Diploma and BTech students
 - Develop and nurture relationships with other South African universities of technology
 - Faculty-led technology research projects focused on national capacity-building
 - Assess performance of SAWEC graduates in industry



- Currently a DST Wind Energy Spoke
- Host the Energy Research Centre (ERC)
- Potential responsibilities
 - Develop and implement a research plan for SAWEC, including infrastructure requirements
 - Identify and pursue sources of funding for research infrastructure development
 - Identify and pursue sources of funding for research program
 - Faculty-led research projects focused on national capacity-building via technology development





- FET Colleges
 - Northlink College
 - West Coast College
 - False Bay College
- Potential responsibilities
 - Develop and implement training programmes for wind turbine technical support and maintenance staff
 - Identify and pursue sources of funding for teaching infrastructure development
 - Identify and pursue sources of funding for education programmes, including SETA learnerships
 - Training of artisans in other fields, e.g. plumbers to install SWHs, electricians to install PV systems, etc.



Other Potential Stakeholders



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- Department of Energy, Department of Science and Technology and Department of Higher Education and Training: could help to establish SAWEC by providing infrastructure and operating funding
- SAWEA: Industry association could play a role to obtain industry support and funding
- SAWEP: could facilitate capacity building for RE training.
- RE equipment manufacturers (Vestas, Suzlon, Siemens, etc.):
 - Could guide curriculum development
 - Could provide funding for student bursaries and upper-level educational activities
 - Could provide technical support and training staff
 - Could be contracted for O&M at the site
 - Could provide equipment and components to train on
- Other universities of technology: could use the facility for artisan training through partnering relationships with the consortium
- Eastern Cape: Walter Sisulu University (WSU) and Nelson Mandela Metropolitan University (NMMU)

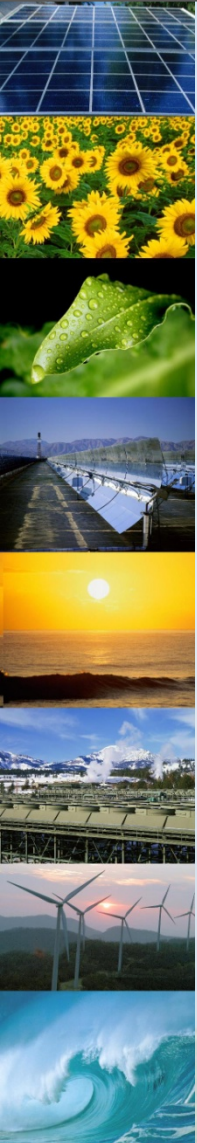


Advantages to South African RE Industry



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- Future IPPs will require skilled engineers and technicians for development and operations. SAWEK could help build national capacity and provide a pool of talented individuals for the RE industry.
- RE IPP operators will have the opportunity to observe SAWEK graduates well before hiring decisions are made, allowing them to employ the highest-quality graduates for their sites.
- Ongoing training provided by RE OEMs is expensive. RE industry will reduce training costs through SAWEK.
- SAWEK will provide *local* training and education, with full awareness of peculiarities in the South African situation.



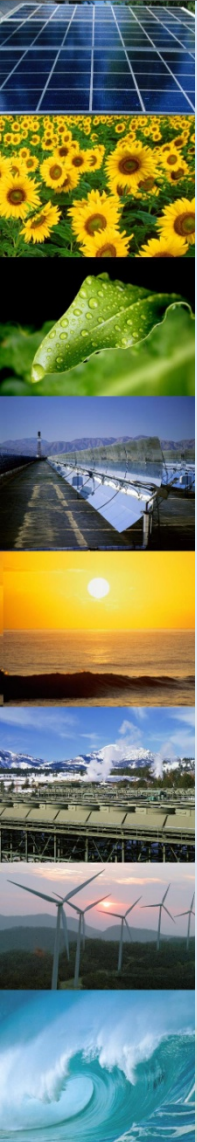


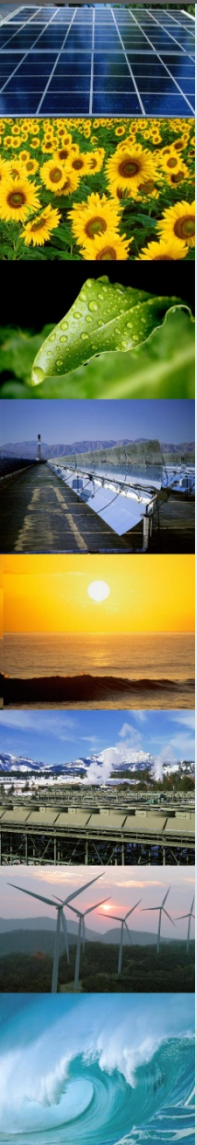
Advantages to Eskom



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- The Koekenaap facility (Sera and other future Eskom RE sites) will require skilled engineers and technicians for development and operations. SAWEC could help build national capacity and provide a pool of talented individuals for Eskom.
- Eskom (the grid operator) will need to ensure that future IPPs are well-operated and well-maintained. SAWEC could help build national capacity and provide a pool of qualified individuals for IPPs.
- Repurposing KWEDF for *education* and *training* (as opposed to dismantling it or selling it to a wind farm developer) will provide significant and positive PR for Eskom. Both RE and skills development/capacity building are covered in this concept.
- Fulfill original purposes for the Klipheuwel site.





- A *training facility for wind turbine technicians and artisans* with the associated lecturing and demonstration facilities to present both theoretical and practical training.
- *Training on full-scale, operational wind turbines* for wind-turbine technicians and artisans.
- *Certification* of level 1, 2, and 3 wind turbine technicians and artisans.
- A venue for *specialist training courses*, such a wind turbine blade rappelling and inspection.
- A *research and development facility* for wind turbines and associated power electronics in the range 1 kW to 2 MW that is connected to the national grid.
- *Technology development* projects by consortium partners with local producers/ manufacturers.



SAWEC Activities (2)



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- *Test and certification facility* for wind turbines in the range of 1 kW to 1 MW in real-world operational conditions for South African operational conditions.
- *International certification* of locally developed wind turbines for overseas distribution.
- *Consulting services* for the wind energy sector.
- *An operating independent power producer (IPP)* that generates electricity from the wind and supplies it into the national grid for revenue.
- *Wind energy public awareness, education and demonstration facility* for school, college and university groups as well as the public at large.
- *Other renewable energy technologies demonstration and training facilities*

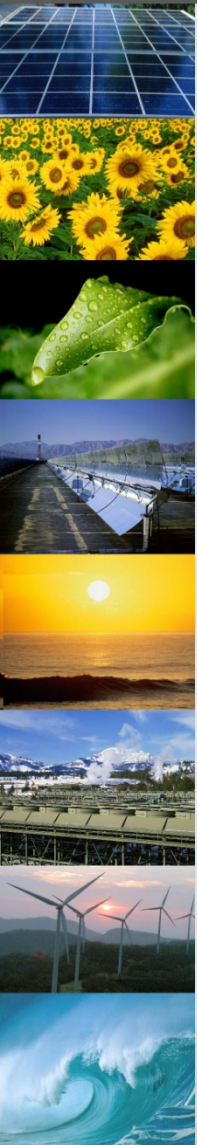
* Only A if the site is Klipheuwel, else it becomes a low priority.



Summary



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The Klipheuwel Wind Energy Demonstration Facility (KWEDF) could become a national resource for renewable energy training research, and education. By incorporating a working wind generation facility, operated as an IPP, the facility could generate sufficient income to operate and maintain the facility and employ a full-time core staff. Additional funding for training programs could be sought from the government (National Skills Fund), industry, and donor agencies.

Partners and donors can obtain significant benefits from SAWEK by participating in the development of RE skills capacity in South Africa.

For further discussions, please contact:

Wikus van Niekerk (wikus@sun.ac.za)



Why are we here?



GTZ facilitated a team of German and Chinese specialists to visit South Africa to share their experience and develop an implementation plan for SAWEC

Delegation:

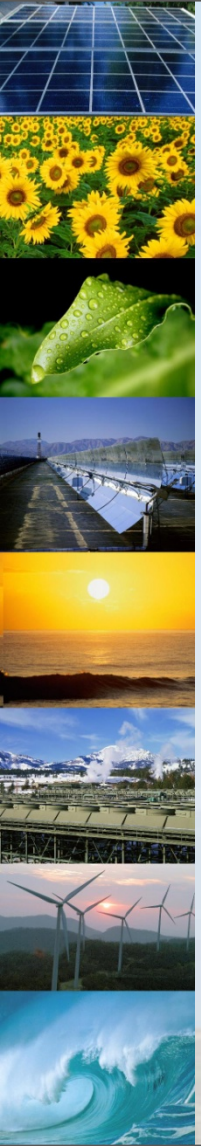
- *Dr. Kurt Wiesegart*: German Team Leader, Economist, expert on project appraisal and wind power cooperation.
- *Andreas DuBois*: German director of the China Wind Power Project - CWPP,
- *Prof. Wang Weisheng*: Director China Electric Power Research Institute RE-Department, expert on wind power grid integration and director “National Wind Power Research & Testing Center”.
- *Wang Yang*, Vice President Repower-North, China, wind power expert in the fields of project development and wind turbine technology
- *Dieter Sommer*, Vice Director of Suzhou Wind Power Training Centre, China
- *Daniel Werner*, Project Manager, GTZ
- *Martin Reisinger*, Intern GTZ



Programme for the Day



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Monday, 29 November			
08h30	Registration		
09h00	Welcome and Introduction of the SAWEC: Prof Wikus van Niekerk		
09h30	Lessons Learnt from wind centres in China and Germany <i>Dr. Kurt Wiesegart, Economist</i> <i>Prof. Wang Weisheng, Director China Electric Power Research Institute</i> <i>Andreas DuBois, German director of the China Wind Power Project</i> <i>Dieter Sommer, Vice Director of Suzhou Wind Power Training Centre</i> <i>Wang Yang, Vice President Repower-North, China</i>		
11h45	Tea Break		
12h00	Training & Education Prof Wikus van Niekerk Limpopo Room	Policy & Awareness Daniel Werner Tugela Room	Research & Testing TBC Kei Room
13h00	Plenary Session for Feedback and Discussion		
13h30	Networking Lunch		



Topics:

- ***Education & Training*** (Prof Wikus van Niekerk)
- ***Policy & Awareness*** (Daniel Werner)
- ***Research & Testing*** (TBC)

Key Questions:

- Which are the primary activities? Prioritise!
- Who are the key role-players?
- How can it be funded?