



Renewable Energy Training Workshop

26 - 30 August 2013

**SKILPADVLEI CONFERENCE CENTRE,
Stellenbosch**

Stellenbosch University will present a five-day training workshop in renewable and sustainable energy technologies in Stellenbosch. The aim of the five day training workshop is to enhance the capacity in the country to implement projects in this field. Each day is also registered with the Engineering Council of South Africa (ECSA) so that participants from industry can earn Continuous Professional Development (CPD) points – 1 credit per course.

- All the modules will be presented in English by specialists in their field.
- The venue is the SKILPADVLEI CONFERENCE CENTRE based close to Stellenbosch.
- Study material will be made available on day of registration.

The workshop is structured in such a way that one can pay and attend for either one, two or all five days.

Day 1: Introduction to Renewable Energy Technologies

Description:

In this module the different technologies that are commonly used to harvest renewable energy (RE) resources for conversion to heat and electricity are addressed. The available resources in South Africa are briefly introduced; the basic principles of the conversion technologies explained and some indication of typical costs of both grid-connected and off-grid systems are reviewed. The course is aimed at both technical and non-technical staff and upon

completion they should have a clear, but basic understanding of the available renewable energy resources and technologies relevant to South Africa.

Content:

- A short background on conventional power stations and SA's current energy mix (coal, nuclear, gas turbines, etc). Overview of the Eskom grid, load patterns and how power stations feed into the grid.
- Wind Energy (wind resource of the world and South Africa, existing and proposed SA wind farms, wind turbine components, wind turbine costs, and wind capacity factor).
- Solar Energy (solar energy resource of the world and South Africa; solar resource measurement and assessment; concentrating solar power (CSP) plants: types, technology, balance of plant, and cost; Photovoltaic (PV) systems: types of cells and modules, system configuration and cost, current developments in SA; solar water heaters (SWH): different types of collectors and system configuration, cost and incentives).
- Biomass (biomass resource in SA, conversion technologies, costs, short introduction to biofuels)
- Biogas and Landfill-to-gas (potential in SA, conversion technologies, system configuration and costs).
- Hydro Energy (hydro potential in SA, typical system configuration, existing and future SA installations, costs).
- Ocean Energy (wave, tidal and ocean current resources in South Africa and available conversion technologies).
- Grid Connection (Grid integration of electricity from renewable energy resources, off-grid applications).

Presenter:

Mr Josh Reinecke

Day 2: Renewable Energy Policy and Finance

Renewable Energy Policy (REP)

REP Description:

This module provides participants with an overview of the policy context, which must be understood as the regulatory, institutional and market setting for renewable energy (RE) technologies. To understand the policy context the sustainability of RE technologies, from the perspectives of

policy-makers and other stakeholders, must be understood. The module is subsequently designed to address the following questions:

- What is a sustainable RE technology?
- How can sustainable RE technologies be assessed, identified and prioritised?
- How may appropriate RE technologies be managed as sustainable energy value chains in Africa?
- What tools can be used to promote appropriate and sustainable RE technologies?

REP Content:

- The different perspectives of the policy contexts in South Africa and the continent, in terms of the regulatory, institutional and market settings for RE technology systems.
- The meaning of technology and the importance of National Systems of Innovation to support emerging RE technology systems.
- How RE technology systems are embedded in national, continental and international energy and economic systems. How the sustainability of RE technology systems may be assessed and prioritised.

Renewable Energy Finance (REF)

REF Description:

This module enables participants to understand the parameters that influence the financial aspects and project design of renewable energy initiatives in Africa. The participant will get to be familiar with a range of instruments, the financial structuring tools needed to attract investors, and how to use alternative financial sources, like carbon finance, outside of the commercial financial institutions to ensure the financial viability of renewable energy projects. The module therefore aims to empower professionals to incorporate appropriate financing into their decision-making pertaining to renewable energy projects.

REF Content:

- A brief overview of some financial metrics such as IRR, NPV or DSCR.
- The background and drivers of environmental finance.
- The nature of typical environmental projects with specific focus on energy-related projects.

- The various financial instruments used in environmental projects and how these may impact on the feasibility of projects.

Presenter:

Prof Alan Brent

Day 3: Solar Energy Technologies

Description:

This day focusses on solar energy and technologies as well as solar resource assessment. The basic principles of various solar energy conversion technologies are explained. Case studies of existing systems are briefly covered. Solar projects and the Renewable Energy Independent Power Producer Programme (REIPPP) will be discussed. The course is aimed at both technical and non-technical staff and upon completion they should have a clear, but basic understanding of the potential that solar energy resource and technologies could play in South Africa.

Content:

- The solar resource and resource assessment will be covered in detail – the difference in various solar components applicable to different solar technologies will be explained
- Concentrating solar power (CSP) plants: types, technology, balance of plant, cost REIPPP awarded projects, other CSP projects under development, the long term potential and viability of CSP
- Photovoltaic (PV) and concentrating photovoltaic (CPV) systems: types of cells and modules, system design and cost, current developments in SA;
- Solar water heaters (SWH): different types of collectors and system configuration, cost and incentives
- Industrial solar process heat and cooling

Presenter:

Mr Riaan Meyer

Day 4: Wind and Hydro Technologies

Description:

This module is split into 4 sessions of which 3 sessions will be dedicated to the wind component and 1 session to hydro. For the wind component, a brief history of wind turbines will be presented along with market trends and future developments. Basic wind turbine theory will be presented focusing on general concepts of power

generation and efficiency. Wind turbine system components and design variations will be discussed according to current market trends. A brief overview of wind resource assessment methodologies will be presented focusing on key steps and common pitfalls to be aware of.

The hydro component will present a brief history of hydro power and scales of development. Typical technologies implemented and design constraints as informed from hydro theory will be presented. Development of hydro in South Africa will be highlighted with focus on future development ranging from micro to large hydro installations. Basic theory and resource calculation will be discussed.

Content:

- History of wind turbine development, basic components. 1-D turbine theory and Betz' law. General system components and efficiencies.
- Wind resource estimation methodologies; meso and micro scale modelling; wind characterisation. Typical EIA requirements and pitfalls. System variations and applications according to wind resource and client requirements.
- Grid impacts and mitigation and essential economics.
- Hydro theory and system variations. Typical resource estimation future technology implementation

Co-ordinator:

Mr Josh Reinecke

Day 5: Bio-energy Technologies

Description:

This day course will consider the practical and commercial application of the various technologies for biomass conversion into bio-energy. The production of bio-fuels and other forms of renewable energy, such as electricity, will be covered, with an emphasis on the critical issues of sustainability, energy efficiency and commercial feasibility.

Content:

The following technologies for biomass conversion will be overviewed:

- Bio-ethanol production

- Thermo-chemical conversions, including combustion, gasification and pyrolysis, and the use of these for green electricity production
- Biogas production, for example from landfill sites, animal dung and waste water treatment
- Biodiesel production, including process basics, product purification and waste treatment

The selection of the most appropriate technology from the demand side perspective will be a central thread through the course.

Presenter

Prof Johan Görgens

Background of the Presenters:

Alan Brent holds bachelor degrees in engineering (chemical) and philosophy (sustainable development); master degrees in science (environmental engineering), engineering (technology management), and philosophy (sustainable development); and a PhD in engineering management. Since 1995 he consulted to a variety of industry and public sectors in South Africa and other developing countries in the fields of environmental engineering and management; his research focus now revolves around sustainable technology management. Currently he is appointed as a professor in the Sustainable Development programme of the School of Public Leadership (SPL) of the Faculty of Economic and Management Sciences, and he is also the associate director of the Centre for Renewable and Sustainable Energy Studies (CRSES), which is based in the Faculty of Engineering, at Stellenbosch University.

Riaan Meyer holds a BEng in Electrical Engineering and an MScEng in Mechanical Engineering. He has worked for 18 months as site Electrical Engineer at a tin smelter in Rwanda. He started working for the CRSES (Centre for Renewable and Sustainable Energy Studies) in 2006 after completing his Masters with a focus on solar energy. His main research interests are solar energy with a focus on solar resource assessment.

Josh Reinecke holds a MscEng degree in Mechanical Engineering from Stellenbosch University. Former work

experience includes engineering in the defence and manufacturing industry. His focus includes sustainable energy solutions, optimisation techniques for use in engineering design and R&D of ocean current turbines (OCTs). He has been involved in model OCT investigations and tests for over three years in which an ultra-high efficiency diffuser was developed

Johan Görgens is a professor at the Department of Process Engineering at Stellenbosch University. He holds a PhD (Biochemical Engineering) and MBA degrees and has more than 15 years of research experience in biomass processing and bio-energy production. Projects include both with technical process development/optimisation and assessment of the commercial viability of various options for bio-energy production.

Who should attend:

Engineers, technologists and technicians active in the energy sector. Government and local authority officials. Architects, planners and developers. Project developers and investors of renewable energy projects.

Certification and Accreditation:

The modules have been registered with the Engineering Council of South Africa (ECSA) for Continuous Professional Development (CPD) points. A Certificate of Attendance with an indication of the CPD points and level will be awarded (on request) to participants who attend.

Venue and Time:

This workshop will be presented at the Skilpadvlei Conference Centre, Stellenbosch and will be from Monday to Friday 26-30 August 2013 from 09:00 – 17:00. Participants can attend one, two or all five days.

Registration:

The workshop is designed for a restricted number of attendees so as to personalise and maximize the learning experience. Bookings will be taken on a first come first served basis.

Bookings will only be considered as "confirmed" once the completed registration form as well as proof of payment have been received.

Registration forms can be obtained from Denielle Andrews at: Tel: 021-808 4069, Fax: 021-883 8513 or E mail: crses@sun.ac.za or visit: <http://crses.sun.ac.za/studies-short-courses.php>

Completed registration forms, with proof of payment, should be faxed/emailed to the above number/email address.

Registrations close on Monday 12 August 2013.

Workshop Fees:

Workshop fee includes notes, lunch and refreshments:

- **Cancellation of enrolment made up to and including 16 Augustus 2013. No refunds will be made after this date; however, substitutions will be accepted.**
- **Attendance without payment will not be permitted.**
- In the case of unforeseen circumstances Stellenbosch University reserves the right to cancel the workshop or change the lecturer, in which case all fees will be reimbursed in full on request.

Cost:	One Day:	R 2 500
	Two Days:	R 4 000
	Three Days:	R 6 000
	Four Days:	R 8 000
	Five Days:	R 10 000

Certificate of Attendance: R 200

Dates:

- 26 August 2013: Introduction to Renewable Energy Technologies
- 27 August 2013: Renewable Energy Policy & Finance
- 28 August 2013: Solar Energy Technologies
- 29 August 2013: Wind & Hydro Technologies
- 30 August 2013: Bio-energy Technologies

Directions to Skilpadvlei below



Centre for Renewable and Sustainable Energy Studies



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Directions to Skilpadvlei ●

SKILPADVLEI

