Department of Energy

OVERVIEW - WIND ATLAS FOR SOUTH AFRICA
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Presentation Outline

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Introduction

- South Africa's energy mix is dominated by coal which plays a major role in electricity generation
- Increasing energy demand, aging electricity infrastructure and the load shedding experienced a few years back necessitated a re-look at how South Africa can address the growing demand and provide comfort in energy security
- The drive for increased focus on renewable energy was also influenced by the need to diversify energy sources, utilize natural resources optimally, comply with global pressure to reduce GHG emissions, socio-economic considerations
- The RE White Paper (2003), IRP 2010 and the current RE procurement are evidence that the GoSA is committed to the development of the renewable energy sector and the deployment of RETs

Policy and Regulatory Framework in Support of RE Deployment

- The REWP (2003) set a target of 10 000GWh to be produced from RE sources by 2013.
- In August 2011, GoSA invited IPP to participate in a procurement programme for the generation of 3275 MW of electricity from renewable energy sources by 2016.
- The above-mentioned initiative, (Renewable Energy Independent Power Producers Procurement Programme), is one of the first procurement processes which will contribute towards achieving the targeted 42% renewable energy in the national energy mix by 2030 in line with the Integrated Resource Plan (IRP 2010).
- Power generation from wind is allocated a share of 1850 MW in the REIPPPP and 8400 MW from the IRP 2010.
- So far the bidding process has seen 634 MW and 533 MW of wind power projects being shortlisted, with the first round having reached financial close in October 2012

The Importance of Wind Resource Assessment

- Wind resource assessment is very crucial in the development of wind farms as it will guide where a wind farm can be best-sited.
- The power that can be derived from wind is calculated from the formula "$P=1/2\rho Av^3$". According to this formula, the power of wind is directly proportional to the area swept by the rotor blades and directly proportional to the cube of the wind speed.
- Therefore, a small change in the wind speed will have a 3-fold change in the power produced by the wind turbine or doubling of the wind speed results in an *8 fold* increase in power (P) output.

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Areas of wind energy resource assessment application by stakeholders

- State of the Art, transparent Wind Atlas methodology and traceable data
- Data + tools + analysis
- Freely available to the public – level playing field.
- Formulation of policies, regulations and plans by authorities and decision-makers (e.g. IRP, Wind SEA studies, Provincial Sustainable Energy Strategies etc) .
- Resource and development planning by developers.
- Financial planning, risk assessment and decision-making by financiers and owners.
- Project design and implementation, wind turbine design and by industry.
- Power system planning, development an operation by the power sector.
- Research, methods and tools development by the academic community.
- Tools development and independent expertise by the consultants

Support for the Development of the Wind Energy Sector in South Africa

- In the build-up to the deployment of wind-based power, the Department of Minerals & Energy (now Department of Energy), initiated the Wind Atlas for South Africa (WASA) which is co-funded by the UNDP-GEF through the South African Wind Energy Programme (SAWEP) and the Danish Government.
- WASA was initiated as a response to a 2003 review of previous wind resource assessment studies which concluded that:
  - South Africa has good wind energy resources along the coast and in some inland areas.
  - The true potential of wind energy was underestimated because weather measurement stations at 10 meters were used and obstacles were not taken into consideration.
- The review recommended that a dedicated wind energy measurement programme needs to be undertaken to confirm the true wind energy potential in SA

Purpose of WASA

The purpose of WASA is:

- To improve knowledge and quality of resource assessment methods and tools,
- To make available this knowledge and tools free of charge for planning and development of wind farms and off-grid electrification.
- To build capacity in local institutions.

WASA project duration and partners

- WASA commenced in 30 June 2009 and will end in 1 March 2014.
- The project covers selected areas in the Northern Cape, Western Cape and Eastern Cape areas.

<u>The WASA Project Team is made up of:</u>

- SANEDI (South African National Energy Development Institute) which is responsible for management, coordination, contracting ;
- UCT CSAG (Climate System Analysis Group, University of Cape Town) in mesoscale modeling;
- CSIR (Built Environment, Council for Scientific and Industrial Research) for measurements, microscale modeling and application
- SAWS (South African Weather Service) for extreme wind assessment;
- Risø DTU Wind Energy* (Dept of Wind Energy, Technical University of Denmark) - partner in all activities

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WASA Progress to date

- July/August 2010 – 10 erected measurement masts (at a 60 meter height) erected are operational;
- September 2010 - Minister Dipuo Peters and Danish Ambassador Mr. Dan E. Frederiksen launched the wind energy measurement package of the WASA project;
- March 2012 – Deputy Minister Barbara Thompson launches the 1st Verified Numerical Wind Atlas for South Africa;
- WASA is participating, sharing knowledge and experience with SADC partners interested in pursuing wind energy development in their respective countries.
- WASA is supporting the DoE and DoE Minister with the Clean Energy Ministerial (CEM) IRENA Global Solar and Wind Atlas initiative.

Challenges and Way Forward

- Theft and vandalism of equipment at measurement sites.
- Buy-in and commitment by authorities where the project is;
- Expansion of WASA to other provinces