

Workshop: The Role and Value of CSP in the South African Power System

Monday 16 January 2016
Onyx Room CSIR Convention Centre

CONSENSUS STATEMENT

A high-level delegation from academia, the research community, industry and civil society met in Pretoria to discuss “The Role and Value of Concentrating Solar Power (CSP) in the South African Power System.” This workshop was partly in reaction to the fact that in the recently released Draft Integrated Resource Plan 20016 (Draft IRP2016) there was no allocation made for CSP in the SA electricity generation mix up to 2050. This seems to have been based on modelling assumptions that are outdated, do not reflect the current market reality, and do not acknowledge the dispatchability and operational flexibility of CSP power stations. The aim of the workshop was to discuss and debate the value of CSP technology and the contribution it could make to the SA Power System.

At the workshop the results of a number of studies completed in South Africa, the United States and Germany, some specifically for the South African power system, were shared that highlighted the value of CSP in the SA power system. The presentations can be found here (web address).

After robust debate the participants agreed on the following:

CSP technology can play a significant role in a cost optimised South African power system based on technical merits, with the added value that CSP provides. The following points support an appropriate allocation of CSP in the IRP 2016.

- CSP, with integrated thermal energy storage, provides locally resourced **dispatchable and flexible electricity** that complements other variable electricity generation allowing higher penetration of low cost electricity from wind farms and PV plants.
- The **price of CSP electricity** is coming down globally and could reach 90c/kWh (6US\$cents/kWh) by 2030. Similar cost reductions could be expected in SA with a sufficiently large allocation in the SA IRP.
- The current **cost assumptions** for CSP in the IRP modelling is not aligned with the actual price in the RE IPP *Bid Window 4 Expedited* round. The input for the IRP modelling assumed a cost of R 2.34/kWh and only reduces to ~R 2.20/kWh by 2030 while the average price in BW 4 Expedited for CSP was already ~R 2.00/kWh (based on a base tariff of R 1.25/kWh).



- The **South African CSP industry** has advanced to a stage of maturity with demonstrated increases in local content of CSP plants beyond the REIPPP programme goals. An appropriate allocation of CSP is required to sustain the local industry.
- **LCOE is an incomplete measure** when comparing technologies with different flexibility attributes as it does not capture the full value of flexibility to the power system.
- CSP must be **modelled as a flexible electricity generator**, as is the case of most other system-dispatch technologies (OCGT, CCGT, coal, etc.), to capture the full value that it could provide to the SA power system.
- CSP will **reduce the exposure to the risk of cost escalation** of imported diesel, natural gas, and/or locally sourced shale gas. The price of imported diesel and natural gas may be volatile due to the fluctuation of the international price of gas/oil as well as the Rand/Dollar exchange rate.
- A number of studies were presented at the meeting which investigated the South African power system, using different methodologies and parameter assumptions. The outcomes independently indicate that in all cost-optimised scenarios there is **no requirement to build new coal or nuclear plants** in South Africa.
- There are additional **macro-economic benefits of CSP** such as foreign direct investment, local industrialisation of the technology, reduction of CO₂ emissions, local economic development and job creation which are not included in the system value of CSP. The REIPPP has attracted an investment of R192 billion for energy infrastructure in Bid Windows 1, 2, 3, 3.5 and 4. Of the R192 billion invested to date as much as R53 billion came from the 7 CSP projects (600 MW) approved to date. (The overall benefits of CSP should be quantified in more detailed macro-economic studies.)

The participants trust that the points raised in this consensus statement will be carefully considered by the Department of Energy as well as Eskom in the current process to finalise the IRP 2016 as well as any further decisions on the composition of the future South African generation mix.



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PROGRAMME

	<u>Topic</u>	<u>Presenter/s</u>
08h30	<u>Arrival and Coffee</u>	
09h00	Welcome and Introductions	Wikus van Niekerk – Stellenbosch University
09h10	CSP Cost Reduction: How to Achieve SUNSHOT Goals	Mark Mehos – NREL (USA)
09h40	What is the Role of CSP in the Future South African Electricity System with CO₂ Emission Targets?	Julia Badeda – RWTH Aachen University
	The System and Marginal Value of CSP in the SA IRP Time Horizon: The WWF SA Scenarios and NamPower Macroeconomic Study	Paul Gauche – Stellenbosch University
11h00	<u>Tea Break</u>	
11h00	Least Cost Capacity Expansion of the South African Power System and Resulting Cost Tipping Point for CSP	Tobias Bischof-Niemz – CSIR
12h20	Operations of a CSP Plant in South Africa	Nandu Bhula – ACWA Power
12h40	The value of CSP in the context of economic development and job creation in SA	Julian Lopez – Abengoa Solar
13h00	<u>Lunch Break</u>	
14h00	Current Status of CSP in the South Africa RE IPP Procurement Programme	Gary Loyd – DoE's IPP Office
14h20	Solar energy in the electricity System of South Africa: Linking Detailed Technology Modelling with a Large-scale Energy System Model	Christoph Kost et al. – Fraunhofer ISE (Summary presented by Paul Gauché)
14h30	The Case for Solar Augmentation South Africa	Warrick Pierce – Stellenbosch University
15h00	General Discussion	
16h00	<u>Coffee Break</u>	
16h20	Workshop Wrap-Up and Way Forward	
16h30	Closure and Departure	
17h00	Cocktails	



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LIST OF PARTICIPANTS

Organisation	Delegates who attended
<u>Stellenbosch University</u> <ul style="list-style-type: none"> • Centre for Renewable and Sustainable Energy Studies • Solar Thermal Energy Research Group • Eskom Power Plant Engineering Institute – Specialisation Centre in Renewable Energy 	Prof Wikus van Niekerk Dr Paul Gauche Warrick Pierce Prof Frank Dinter Oelof de Meyer
<u>National Renewable Energy Laboratory (NREL)</u> <ul style="list-style-type: none"> • Thermal Systems R&D <u>DLR (German Aerospace Center)</u> <ul style="list-style-type: none"> • Institute of Solar Research <u>RWTH Aachen University</u>	Mark Mehos Prof Dr Robert Pitz-Paal Julia Badeda
<u>CSIR</u> <ul style="list-style-type: none"> • Energy Centre 	Prof Dr Tobias Bischof-Niemz Crescent Mushwana Jarrad Wright Shanley Lutchman Robbie van Heerden
<u>Abengoa Solar</u>	Julian Lopez
<u>ACWA Power</u>	Nandu Bhula
<u>DoE's IPP Office</u>	Gary Lloyd
<u>SASTELA</u>	Pancho Ndebele
<u>TSK</u>	Rafael Lapique
<u>WWF</u>	Ellen Davies
<u>Cobra</u>	Luis Pascual Escudero

