

Opportunities for CSP in SA

- A well developed technology globally, since the mid-90s in the US;
- Technology has matured greatly, as costs have also become grid competitive;
- Tower and parabolic trough technology have become the favoured choice, parabolic being the more dominant;
- South Africa has 5 operational CSP plants and 2 major ones under construction, with several ones in planning stages;
- The REIPPPP has been the entry point for most of these projects

Project name	Technology	Capacity (MW)	REIPPPP Window	Nearest town	Status
Bokpoort CSP	Parabolic trough	50	2	Groblershoop	Operational
Eskom CSP	Tower	100	other	Upington	Construction
Ilanga CSP 1	Parabolic trough	100	3	Kimberley	Construction
Kathu Solar Park	Parabolic trough	100	3	Kuruman	Operational
Kaxu solar 1	Parabolic trough	100	1	Pofadder	Operational
Khi solar 1	Tower	50	1	Upington	Operational
Redstone CSP	Tower	100	3	Postmasburg	Planning
Xina CSP	Parabolic trough	100	3	Pofadder	Operational
Totals	8	700			

REIPPPP Structure and CSP Evolution in SA

- A public procurement programme allowing Independent Power Producers to submit competitive bids to design, develop and operate large scale energy plants across South Africa (**R**enewable **E**nergy **I**ndependent **P**ower **P**roducer **P**rocurement **P**rogramme);
- Rounds 1 to 4 have been concluded, with the latest REIPPPP having no CSP plants;
- Round 5 planned due to excessive load shedding experienced last 12 months, therefore CSP has a chance to catch up;
- CSP based on central tower technology experiencing a rebirth;
- The REIPPPP has had various problems with tariffs awarded being negotiated downwards, some projects have yielded less energy than expected or promised, the fossil-fuel lobby and ESKOM have also resisted the programme.

Challenges of CSP adoption in South Africa

1. Cost and Funding;
2. Market and Political Will;
3. Technology;
4. Different Rules needed for PV and CSP.

5. Cost and funding

Wide gap between design stage and manufacturing stage (due to learning curve).

Private financial institutions rarely finance developing technologies, as they have not been tested over time: investment seen as high risk.

Example is the syndication that had to be done for the KaXU Solar One and Khi Solar between Abengoa, the Industrial Development Corporation and the local SA Community Trust Fund.

2. Market and Political Will

The production cost of electricity by KaXU is about US\$0.22/kWh, while the average Eskom price is US\$0.08/kWh. Thus, the CSP production has to be subsidized to be absorbed competitively. The clean energy comes at a cost, and thus has to be subsidized to nurture it to market penetration.

Two-tier tariff system has had to be enacted through the REIPPPP to make CSP competitive; base tariff which is about US\$0.14/kWh, and the peak tariff of roughly US\$0.38/kWh.

3. Technological Challenges

No local capacity of companies to develop CSP technologies, therefore strong technology transfer embeded to develop local capacity.

Another technological challenge is storage: more hours beyond sunshine are needed to make plants truly base load, and this increases the production cost/kWh. Thus more R&D is needed to solve this issue.

4. Need to differentiate between Solar PV and CSP

The REIPPPP programme bunched all renewable energy technologies (RET) together (solar PV, CSP, Wind etc), which put CSP at a disadvantage. There is a need to analyse and develop each RET individually, in order to maximise its potential.

4. (cont'd) There is need to have a different adoption framework for CSP in SA, and the first step is to develop a comprehensive roadmap; each solar RET has different deployment strategies, market dynamics.

One size fits all approach is detrimental to CSP growth.

Need to streamline policy issues to nurture development of CSP.

Identify the most important factors limiting CSP adoption in South Africa.

A successful adoption model to be developed from countering the limiting factors.



REQUEST FOR INFORMATION: RISK MITIGATION POWER PURCHASE PROCUREMENT (GENERATION) DECEMBER 2019

1

**The Republic of South Africa
Department of Mineral Resources and Energy**

**REQUEST FOR INFORMATION
IN RESPECT OF THE DESIGN OF A
RISK MITIGATION POWER PROCUREMENT PROGRAMME**



**Energy
Mineral Resources**

REQUEST FOR INFORMATION: RISK MITIGATION POWER PURCHASE PROCUREMENT (GENERATION) DECEMBER 2019

2

TABLE OF CONTENTS

Power Supply Gap in South Africa

ESKOM has been implementing severe load shedding in the past year, and the DMRE has created a special IRP to cover the current short-term supply gap of 3,000MW through a RFI for a Risk Mitigation Procurement Programme (Screenshot on previous slide).

This window closed in February 2020, but because very few credible bids to cover the 3000MW (in power plants that can generate within 12 months of licensing) were received, the enquiry is still open for offers.

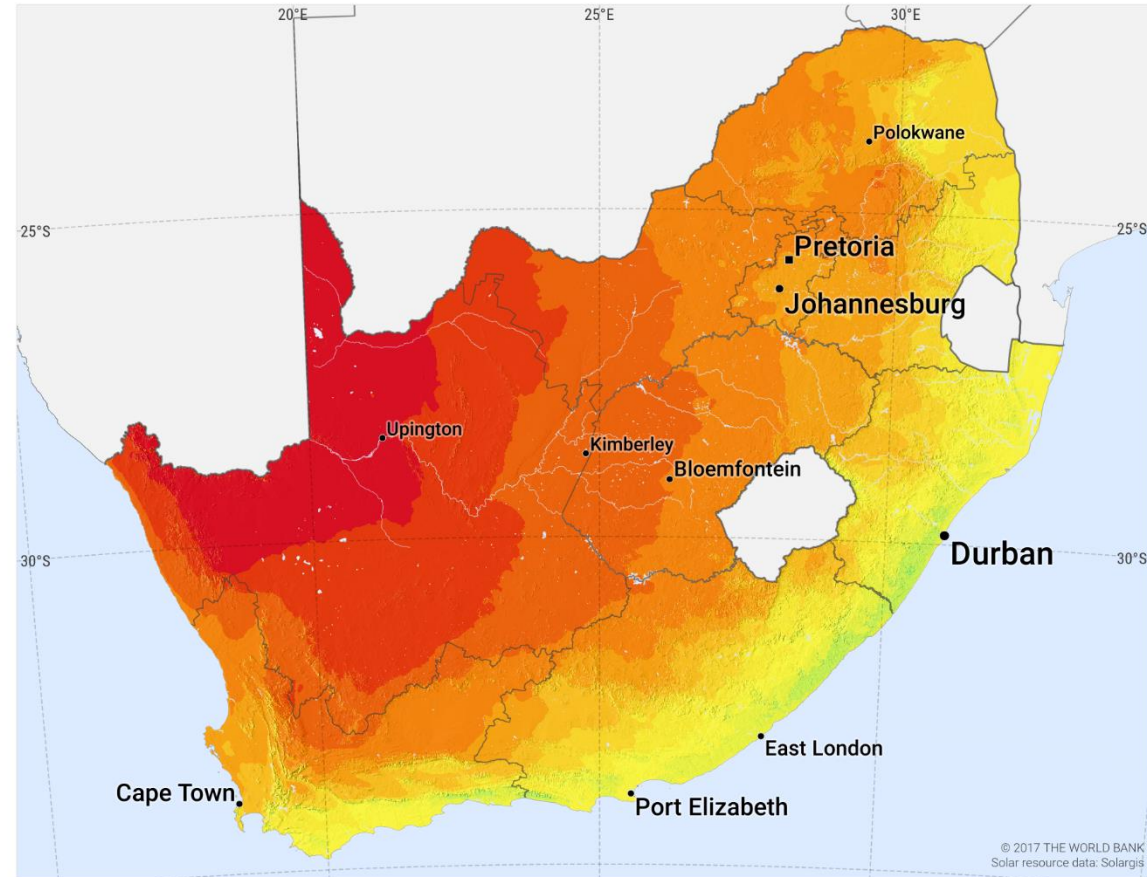
This clearly demonstrates significant opportunities for CSP power plants.

The map of South Africa on slide 10 clearly shows excellent solar irradiation potential for most of the country, particula

SOLAR RESOURCE MAP

GLOBAL HORIZONTAL IRRADIATION

SOUTH AFRICA



Long term average of GHI, period 1994-2015



This map is published by the World Bank Group, funded by ESMAP, and prepared by Solargis. For more information and terms of use, please visit <http://globalsolaratlas.info>.

CSP Opportunities in South Africa- Concluding Points

Operational Plants established in the last 5 years performing well, contributing to clean power in the country;

CSP has a critical role in adding to the renewable energy mix in the generation portfolio of South Africa;

Given its combination with energy storage (ES), and increasing the ES hours due to advances in technology, CSP offers stable, firm and dispatchable electrical energy;

Opportunities for South Africa to become the regional leader in CSP roll out exist, given the country's central role on the SAPP network.