



## **INFRASTRUCTURE SOUTH AFRICA**

### **05 OCTOBER 2022**

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## **BRIEFING NOTE: REDSTONE CONCENTRATED SOLAR POWER (CSP) THERMAL PLANT**

### **1. BACKGROUND**

- 1.1. The Redstone Concentrated Solar Power (CSP) Thermal Plant forms part of the South African Renewable Energy Independent Power Producer Programme (REIPPP). The 100MW Redstone CSP Project was awarded preferred bidder status in 2015 under Bid window 3.5.
- 1.2. The Renewable Energy Independent Power Producer Programme is aimed at bringing additional megawatts onto the country's electricity system through private sector investment in wind, biomass and small hydro, among others.
- 1.3. The REIPPP at a national level is comprised of 92 projects across the country with a collective generation capacity of 6296 MW. The Northern Cape contribution to this is 3563 MW, of which 3249 MW is already operational. The remaining 314 MW is under construction and the Redstone CSP Plant makes up 100 MW of this generation potential. First synchronization of the plant is expected Q4 2023.
- 1.4. The Redstone CSP Plant was presented at the Sustainable Infrastructure Development Symposium South Africa (SIDSA) in 2020 and forms part of the gazetted Strategic Integrated Project (SIP 8). The gazetted SIP projects and programmes enables the escalation of regulatory approvals and the unblocking of development challenges in line with the Infrastructure Development Act 23 of 2014.

## 2. PROJECT PROFILE

### *2.1 Locality*

- The project is located on the Humansrus Farm, approximately 5 km southeast of the Groenwater community and 30 km east of Postmasburg in the Northern Cape. The project falls within the ZG Mgcawu District Municipality, the Tsantsabane and Kgatelopele Local municipalities.

### *2.2 Size and Stakeholders involved in the implementation*

- The **R11.6 billion Redstone CSP project** is enabled by ACWA Power Redstone Holdings and strategic partnerships with South African co-investors including the Central Energy Fund, Pele Green Energy and the Humansrus Community Trust. Funders on the project include ABSA, AfDB, BII, DBSA, FMO, FutureGrowth, IDC, Investec, KFW DEG, Nedbank, Prescient and Sanlam.
- The project is being implemented by an EPC Consortium lead by SEPCO III in a joint and several agreements with Power China and a local BEE shareholder. Operation and maintenance will be performed by Nomac in partnership with a local partner.
- The project will operate for a period of 20 years under a Power Purchase Agreement with Eskom.

### *2.3 Clean Energy and Technology*

- The 100 MW Redstone CSP Thermal Plant will supply clean energy to more than 400 000 people per day and over 100 000 households per year.
- The project eliminates more than 480 Kilotons of Carbon dioxide emissions each year with no harmful emissions or liquid effluent discharge. The total Carbon dioxide reduction over the 20-year operations of the project amounts to 10.3 Million Tons.
- Furthermore, the project will use less than 200 000 m<sup>3</sup> of water per year.

- The technology used for the Redstone CSP can essentially be broken down into 4 key components. These are the Solar Field, the Molten Salt Receiver, Thermal Energy Storage and the Grid Connection.
- The Solar field consists of a circumferential field of sun tracking Heliostats. The Heliostats in the solar field collect solar radiation and concentrate it onto the solar receiver. The Molten Salt receiver is installed at the top of the 250m tower. The receiver assembly converts solar radiation reflected onto it into thermal energy. The receiver assembly consists of cylindrical tubes that act as a heat exchanger to heat up the molten salts flowing through it.
- The 30 500 tons of Molten salt (Potassium and Sodium Nitrate) are stored in two tanks. The hot tank stores the molten salt from the receiver at a temperature of 566°C. This molten salt is then used to propel steam turbines powering a generator supplying clean energy to the grid via a grid connection and switching station.
- The cold tank stores the molten salt that has been used for generation at 290°C. Molten salt from the cold tank are then circulated back to the receiver for reheating. In this way Solar energy generated during the day is banked and released at night or as needed.

The Technical Specifications of the plant are outlined in the table below:

TECHNICAL SPECIFICATIONS REDSTONE CSP THERMAL PLANT	
Net Plant Output	<b>100 MWe</b> (Contracted Capacity)
Water Consumption	<b>0.2 L/kWh</b> using an Air-Cooled Condenser (Less than 15% of national average for Power Generation)
Solar Plant Area	<b>622 hectares</b> (covering Solar Field and Power Block)
Solar Tower	Height <b>250m</b> (taller than Carlton Centre at 223m)
	Diameter <b>27m</b>
Solar Field Heliostats	<b>1.05 million m2</b> (reflective area)
	<b>25.6 m2</b> (area of each Heliostat)
	<b>41,260</b> (the number of Heliostats)
Solar Receiver	<b>600MWth</b> Molten Salt Receiver
Thermal Energy Storage	<b>12hrs</b> (at full rated capacity)
	<b>30,500 tonnes</b> of Salts (40% KNO <sub>3</sub> & 60% NaNO <sub>3</sub> )
	Hot Tank ( <b>566°C</b> ) and Cold Tank ( <b>290°C</b> )

#### 2.4 Socio Economic Impact and Localisation

- Direct benefits will accumulate from the Redstone CSP including job creation and localisation, both during the construction and operations phases and benefits will be realized through the Socio-Economic Development programme.
- The Socio-Economic Development Programme focussed on skills development, enterprise development and social infrastructure. Over the lifetime of the project **R 575 million will be spent toward socio-economic development programmes**. Critical and scarce skills have been mapped against a learning matrix for bursary and training opportunities.
- Preferential procurement policy is directed at the maximisation of opportunities for procurement from BEE, EME/QSE and women-owned businesses. Communities will benefit from infrastructure linked to energy, education and health. Redstone has set out the clear targets for localisation, employment creation and socio-economic development.

LOCALISATION, EMPLOYMENT AND SOCIO-ECONOMIC DEVELOPMENT TARGETS		
Value of Local content spend	37% (of total procurement spend during construction)	
Job Creation	Construction	1500 jobs to be created at Peak (excluding indirect jobs)
		400 Local Community jobs to be created at Peak (excluding indirect jobs)
	Operations	100 jobs to be created during O&M (excl. indirect jobs)
Socio-Economic Development Investment	Construction	R5 million for benefit to Local communities
	Operations	R575 million over life of the Project

### 3. PROJECT STATUS

- The Redstone CSP Thermal Plant is currently under construction.
- The construction is at 45.5% completion with operation of the plant expected for early 2024. To date 31% of procurement spent to date has been mobilised on local content. Employment created to date stands at 972 jobs with 1500 expected at the peak of construction.
- The 972 direct jobs created during the construction phase is comprised as follows:
  - 862 South African citizen jobs - 89% created to date vs 75% obligation
  - 811 Black South African jobs - 83% created to date vs 34% obligation
  - 314 Local Host Community jobs - 32% created to date vs 15% obligation
  - 105 Female jobs - 11% to date
  - 346 Youth jobs - 36% to date