

## **Kalahari GeoEnergy Ltd**

(“Kalahari”, “KGE” or the “Company”)

### **Geothermal Resource Statement and identification of Helium at Bweengwa River Geothermal Resource Area**

**Kalahari GeoEnergy Ltd**, the Zambian geothermal exploration company whose objective is to be a regional producer of sustainable baseload power, is pleased to announce that the ongoing Feasibility Study (FS) has modelled an initial power capacity of 5-7 Megawatt gross *electrical* (MWe,g) on the shallow outflow reservoir within the Bwanda section of the Bweengwa River Geothermal Resource Area.

Further capacity in the order of 10-12 MWe can conceivably be expected from ongoing exploration work at other selected targets.

Gas sampling and subsequent analysis have also detected high levels of helium in the geothermal fluids.

#### **Highlights:**

- Systematic exploration has identified six geothermal energy targets in the Kafue Rift, which forms part of the southwestern extensions to the East African Rift Valley, in southwest Zambia with an estimated resource of 12-15 MWe of constant renewable base-load power.
- The Bwanda system comprises a shallow reservoir at a depth of ca. 200-500m with a temperature of 108-110<sup>o</sup>C. This is fed by deeper 130-150<sup>o</sup>C upflow in faults within the basement rocks.
- Concentrations of up to 2.3% helium have been identified in gasses released by the geothermal fluid, as assayed by Oxford University Earth Sciences Department in the UK.
- Project work thus far includes geology, geophysics, hydrochemistry, LiDAR, and the drilling and testing of 21 temperature gradient holes and slim wells totalling 6,156m. Further drilling and testing is to be undertaken to de-risk the reservoir boundaries.
- Ongoing FS funded by the United States Trade and Development Agency (USTDA) and conducted by Geologica Geothermal Group (Geologica) is due for completion in Q4 2021.
- Direct application of thermal energy for aquaculture, horticulture, dairy and crop processing, to generate social uplift and food security for the communities in and around Monze town are integral to the project.
- The project thus far has been funded by Kalahari GeoEnergy shareholders, the Renewable Energy Performance Platform (REPP) and USTDA.

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## **Kalahari Chief Executive, Peter Vivian-Neal commented:**

*“These preliminary figures and current model of a 5-7MWe gross initial geothermal power within the project are hugely exciting for Kalahari and represent a significant step towards the Company’s objective of producing geothermal power through binary technology.*

*“We are working with a team, including our FS partners Geologica in the USA and REPP in the UK, that have significant expertise both in-country and internationally. Our collaborative work means that ultimately, geothermal power may provide a valuable component in Zambia’s drive to diversify sources of energy, increase generation capacity and the distribution of productive power, as well as the ‘power to empower’ the community.*

*“Kalahari wants to advance not only the generation of electricity, but the development and social uplift in our communities in and around the Bweengwa project through the agricultural and industrial uses of the residual thermal energy.”*

## **Bweengwa Geothermal Resource**

Bweengwa River is situated in the Kafue Rift (colloquially known as the Kafue Flats), a sedimentary basin filled by the Permian-aged Karoo sequence, overlying metamorphic basement rocks. The project area is 35km north of the Southern Province town of Monze and 200km from Lusaka. The Company has to-date identified six geothermal energy targets, including Bweengwa River, on all of which it is conducting geothermal exploration.

The surface manifestations of the Bweengwa River Geothermal Resource Area include three groups of geothermal springs, Bwanda, Gwisho and Namulula, which extend over 9km and lie on the southern bounding fault of the Kafue Trough.

Systematic exploration has to-date included geology, geophysics, hydrochemistry, and the drilling of 21 temperature gradient holes and slim wells totalling 6,156m. This work identified an estimated resource 12-15 MWe geothermal (green) base-load power. Exploration is ongoing along the lateral extensions of the reservoir to confirm the continuity of the geothermal system.

## **Feasibility Study**

The first formal Feasibility Study, funded by the USTDA is currently being conducted by Geologica, USA, on the shallow tabular outflow reservoir located at the contact between the top of the Proterozoic basement and the Karoo (Permian) sediments, in the Bwanda section of Bweengwa River Geothermal Resource Area. The numeric model defined in the study estimates that this tabular reservoir which, is at a depth of 200m to >500m and has a temperature of 108-110°C, may be able to supply fluid capable of supporting a 5-7 MWe, g power plant. This shallow aquifer is fed by deeper 130-150°C upflow in faults within the basement rocks. The deeper upflow and lateral extensions of the shallow tabular reservoir have not yet been constrained.

The full Feasibility Study is due in Q4 this year and it is the Company’s intention to develop the initial resource using Organic Rankine Cycle (heat exchange) technology, while continuing advanced

exploration to increase the Bweengwa Resource, in addition to work on other targets within the mandated Kafue Trough exploration area.

### **Helium and Hydrogen**

Gas sampling of both the Bweengwa hot springs and gases from the drilled slim wells has identified up to 2.3% Helium as determined using a high-precision multicollector mass spectrometer at the University of Oxford (see <https://agu.confex.com/agu/fm20/meetingapp.cgi/Paper/662364>). This is in part associated with regional crustal-scale faults and the geothermal system.

The system has also been confirmed to be suitable for the production of hydrogen.

### **Direct applications**

The Company is engaging Prospero Zambia to conduct studies of suitable direct application of the thermal energy, these include aquaculture, horticulture, dairy processing and crop processing, which will in addition to commercial activity also generate social uplift and provide food security through climate mitigation, and indirectly boost tourism to the contiguous Lochinvar National Park.

### **Funding and Management**

Exploration at Bweengwa has been underway for nine years and has been funded by the KGE principal shareholders, and more recently REPP and USTDA.

The Company is led by Peter Vivian-Neal who is a well-known resource explorer in Zambia with a track record of successfully bringing major projects to fruition and practical understanding of working in the Country.

### **Geothermal Energy**

Geothermal energy is the heat contained in sub-surface materials of the earth. It is contained in the rocks and fluids beneath the earth's surface, heated by hot molten rock, magma, deeper in the earth's crust and mantle. To produce electrical power from geothermal energy, wells are drilled to access underground reservoirs of steam and hot water where geologic conditions bring the subsurface heat nearer to the surface. In addition to producing hot springs, this hot fluid can then be used to drive turbines connected to electricity generators. Kalahari intends to use binary technology to produce power, wherein the geothermal fluid heats a secondary liquid with a lower boiling point and is then pumped back into the reservoir feed zone, ensuring a closed system. The secondary liquid flashes to vapour to drive the turbine and produce electricity. The hotter and more pressurised the geothermal fluid, the greater the electricity generated.

Zambia hosts a number of geological structures that are recognised as being prospective for geothermal energy, including non-volcanic extensional basins, hot granites and, in the north and southwest, extensions to the East African Rift System. Historic work identified a number of potential targets; a Zambian-Italian joint venture built a geothermal pilot plant on the Lake Tanganyika Rift structure in the 1980s.

Geothermal power is sustainable, operates at a high capacity and is environmentally benign. In addition to this, the direct application of heat for agro-industrial processes may have a significant impact in strengthening food security at a time of uncertainty as to the effects of climate change.

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**About Kalahari GeoEnergy Ltd:**

Formed in 2010, Kalahari GeoEnergy is a privately owned, Zambian-registered exploration company whose objective is to be an Independent Renewable Energy Power Producer. The management and their consultants have wide-ranging experience in exploration, development, and energy utilisation.



Geologica team Setting up down hole pressure monitoring



Drilling at Bweengwa River 2020