Kenya’s Geothermal Sector Development

CSI Energy Group

Delivering project solutions focused on our clients' needs, mitigating risk and enabling success

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Locations

Mauritius (Corporate Office)

Tanzania (Regional Office: East Africa)

Kenya

Burundi

Rwanda

Zambia

Ethiopia (Dormant)

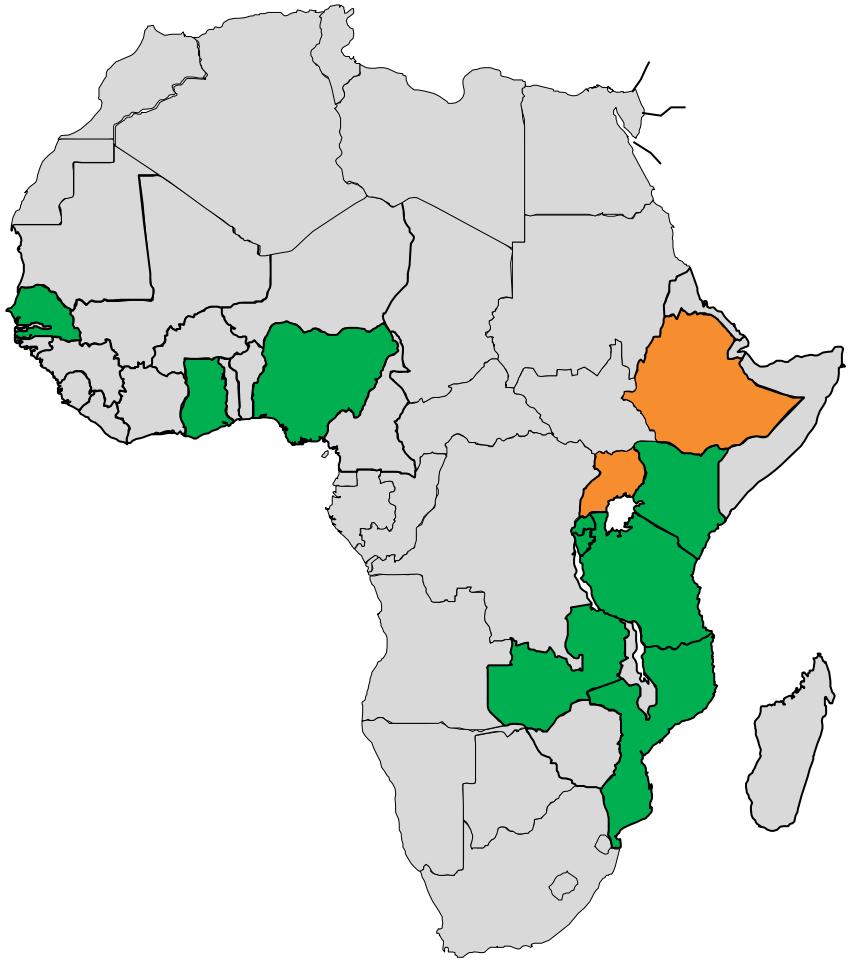
Mozambique

Uganda (Dormant)

Ghana (Regional Office: West Africa)

Nigeria

Senegal



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Geothermal Energy:
The World & African Context

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- To give a few numbers the World Geothermal installed capacity as of 2020 was 15.61GW with Kenya coming in 7th with a potential capacity to be number 3 in the world.

USA	3714 MW
Indonesia	2133 MW
Philipines	1918 MW
Turkey	1688 MW
New Zealand	1008 MW
Italy	944 MW
Kenya	865 MW

- Currently Kenya is producing 865MW and the next and only country in Africa producing Geothermal power is Ethiopia with 2.5MW
- In Africa Kenya has the largest estimated potential for Geothermal capacity with 4 other potential countries following.

Kenya	10000 MW
Ethiopia	5000 MW
Rwanda	700 MW
Tanzania	650 MW
Uganda	450 MW

- Africa’s renewable energy mix has gradually shifted from traditional hydropower and thermal plants to renewable solutions to both accelerate energy access and support sustainable economic growth.

- A renewables-based energy transition promises to deliver vast socio-economic benefits to countries across Africa, improving energy access, creating jobs and boosting energy security.

- African countries have an opportunity to leapfrog fossil fuel technologies to a more sustainable, climate-friendly power strategy aligned with the Paris Agreement and low-carbon growth.

- Despite the challenges emerging from the COVID-19 pandemic, the fundamentals of renewable energy expansion have not changed. Renewable energy in Africa is set to surge and make up almost half of power generation growth in the sub-Saharan parts of the continent by 2040.

Geothermal Energy: Kenya Focus

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- Geothermal exploration in Kenya began in 1952. Within 4 years, two wells of 950m depth had been drilled – X1, and X2 – neither of which yielded feasible results
- The exploration was abandoned for ~10 years until in 1967-1970, GoK and UNDP agreed to undertake extensive geothermal exploration via geophysical and geological studies
- In 1972, interest was rehashed with more urgency and spurred on by the impending oil embargo led by Saudi Arabia against the western world and large parts of Africa.
- Between 1971 and 1976 six successful wells were drilled within the 80km2 of Olkaria.
- By 1974 oil prices had risen by 300%. Much like today, alternative and varying energy sources were needed.

- Between 1976 and 1985, finance from world bank facilitated the drilling of a further 23 wells, and the construction of the three units that make up Olkaria 1
- Since 2010 Kenya has increased its Geothermal capacity 6 times from 198MW to 865MW in 2020 with a combination of technologies from Flash, Well head and Binary.
- Geothermal energy helps provide 25% of Kenyans with access to electricity. This represents a significant increase from previous years.
- Kenya is one of the fastest growing economies in Sub-Saharan Africa, with high anticipated economic growth rates and ambitious flagship infrastructure projects.

Geothermal Energy: Olkaria Case Study

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83.3 MW Olkaria 1 Additional Unit 6 Geothermal Power Development Project (Olkaria AU6) – Mechanical & Piping Installation Works

Project Summary

CLIENT:	KENYA ELECTRICITY GENERATING COMPANY (KENGEN)
ENGINEER/CONTRACTOR:	FICHTNER GMBH / MARUBENI CORPORATION FUJI ELECTRIC
SUB CONTRACTOR:	CSI ENERGY GROUP – KENYA
VALUE:	USD 4.0 MIL
CONSTRUCTION PERIOD:	JAN 2020 TO JAN 2021, ON-GOING

As a continuation with civil contract for Olkaria,CSI Energy Group has been awarded the mechanical & piping works contract on July 2020. Indeed the additional contract promotes CEG stake in Kenyan government Vision 2030.

Scope of works includes overall power plant mechanical equipment installations, more than 1000 metric tons including 4 heavy lifts amounts to 600 metric tons, carbon steel and stainless steel piping works for more than 50000 Dia inches inclusive of both large & small bore.

Through this mechanical contract, CEG continues to be a responsible construction sector organisation and also towards the local community growth in the rift valley region.

- Kenya Electricity Generating Company (KenGen) recognizes the need to implement geothermal energy in sustainability efforts. Two-thirds of the power in Kenya came from dams in 2010. With the rise of geothermal energy, innovative companies like KenGen have reduced that number to less than 50% and are aiming for 28% by 2024.

- The Olkaria Geothermal Project, which is located in the Hell’s Gate National Park, takes up less space than other sources that produce the same amount of energy. This allows more of the surrounding natural landscapes and ecosystems to thrive without interruption.

- Olkaria generates about a quarter of Kenya's power, transmitting some of it nearly 500km (310 miles) south-east to Kenya's port city of Mombasa, and a few hundred kilometers west toward the border with Uganda.

Geothermal Projects

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Olkaria 3 Expansion Project
15 MW Geothermal Power Plant

Project Summary

CLIENT :	ORMAT TECHNOLOGIES INC
ENGINEER :	ORMAT TECHNOLOGIES INC
CONTRACTOR :	CSI ENERGY GROUP
VALUE :	US $2.5 MILLION
START DATE :	November 2017
COMPLETION DATE :	April 2018

CSI is proud to support Kenya's ambitious goals for electrification and energy mix where the country is aiming to expand its geothermal power production capacity to 5,000 MW by 2030.

Upon completion, the Olkaria 3 Expansion Project will render 154 MW, bringing the country's total installed geothermal capacity to 651 MW and the overall installed capacity to a little over 2,500 MW.

CSI's scope covers mechanical and piping installations including air cooler condenser, turbine and generator, motive fluid tank, firefighting systems, steam gathering piping installations, insulation works and modification of early generation plant and existing plant tie-ins.

Aluto Langano

Project Summary

CLIENT :	ETHIOPIA ELECTRIC UTILITY
CONTRACTOR :	ORMAT TECHNOLOGIES
VALUE :	US $2.5 MILLION
START DATE :	1998
COMPLETION DATE :	1998

The Aluto Langano Geothermal 9MW Power Plant was the first geothermal power plant in Ethiopia. It was established in 1998 as a pilot plant to test the geothermal resources and to identify any resources or issues that could affect future power plant development as well as to provide much-needed power to the national grid.

CSI was extremely honoured to complete such a groundbreaking project providing much-needed energy to support development and basic social welfare. Working in partnership with Ormat Technologies (Israel) this project was CSI's first venture outside of Tanzania's border. This plant facilitated the first use of natural resources in Ethiopia and consisted of two Ormat generating units, one an OEC (Ormat EnergyConverter) and the other a GCCU (Geothermal Combined Cycle Unit) consisting of a backpressure steam turbine exhausting to an OEC bottoming cycle unit) - each designed to have similar power outputs.

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