JRB Consulting:

Investigating the Potential for Geothermal Energy in Kampala, Uganda

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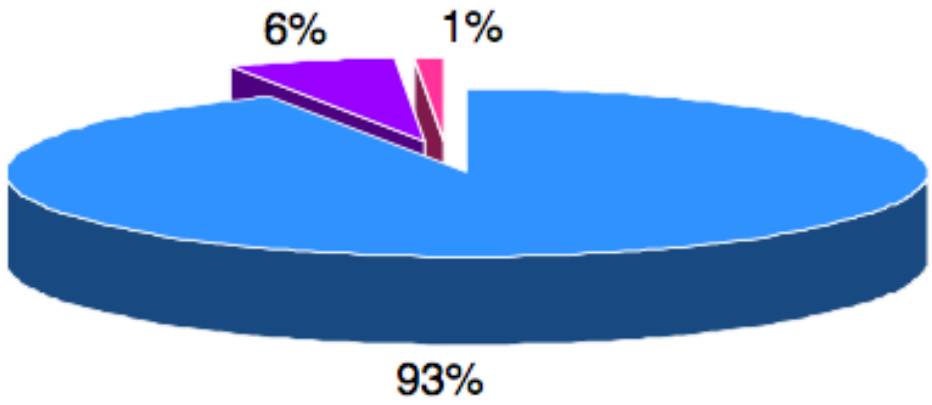
Background

- Biomass= 93%
  - Causing large amounts of deforestation
- Hydropower= 1%=400-450MW
- Fossil fuels= 6%, all imported
- Geothermal=None yet

Energy Supply Pattern



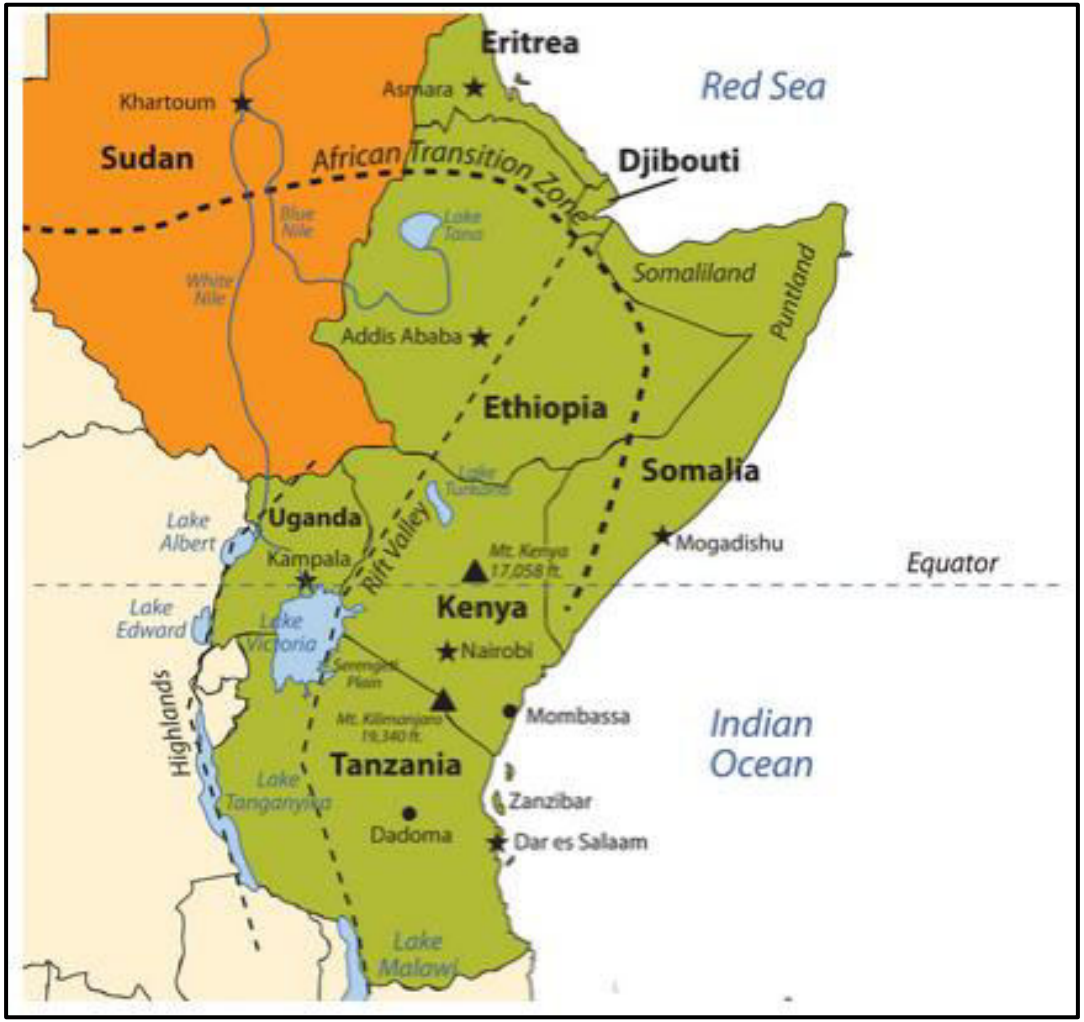
Mission Statement

Our goal as JRB Consulting Company is to develop a proposal for Kenya Electricity Generation Company to expand into Kampala, Uganda to provide a geothermal energy source that will help the community develop in a social, economic, and environmentally sustainable way.

Our plan will incorporate a two-step process:

1. Establish a relationship with Makerere University to educate the community about geothermal energy

1. Build a geothermal plant near Kampala, Uganda


Eritrea
Red Sea
Khartoum
Asmara
Sudan
African Transition Zone
Djibouti
Blue Nile
Lake Tana
White Nile
Somaliland
Puntland
Addis Ababa
Ethiopia
Somalia
Lake Turkana
Uganda
Lake Albert
Rift Valley
Mogadishu
Kampala
Mt. Kenya 17,058 ft.
Equator
Kenya
Lake Edward
Lake Victoria
Nairobi
Serengeti Plain
Highlands
Mombassa
Mt. Kilimanjaro 19,340 ft.
Indian Ocean
Tanzania
Lake Tanganyika
Zanzibar
Dadoma
Dar es Salaam
Lake Malawi

Introduction to Kampala

- Capital and largest city
- 2014 Population of 1,516,210
- 215 kWh per capita per year
- Currently pay $0.11-$0.19 per kWh
- GDP=$657.37 per capita
- Average annual income per household=$1,377.68
- Ideal for geothermal energy due to its close proximity to East African rift, high access to electricity, high population

Kenya Electricity Generating Company (KenGen)

- Produces approx. 80% energy in Kenya
- Established 1954 as Kenya Power Company (KPC)
  - First project involved establishing geothermal plant
  - Now produces hydroelectric, wind, thermal, and geothermal energy

KenGen
Energy for the nation

KenGen's Pathways to Success

- Partnerships
  - Provides scholarships to secondary schools and universities in nearby communities
- Corporate social responsibility
  - Education, provision of water, environmental conservation, sporting events, peacemaking, and natural disasters
- Focus on sustainability

Value Propositions

- Reduce environmental impacts of energy use
  - Save 200,000 tons of CO_2 emissions per year
- Allows for energy independence
  - Save 120,000 tons of imported oil per year
- Boosts economic and industrial growth
    - creates 2-4 jobs/MW installed
- Empowers people of Uganda

Key Partnerships

- Makerere University
  - Professionals from KenGen to work at university
  - Develop a geothermal energy educational program with scholarships, field trips to KenGen
- Internet and newspaper for advertising
  - The Daily Monitor Kampala
- Ugandan government
  - Presidential candidacy election in 2016

Customer Segments

- University
  - Over 40,000 students (41,000 estimate)
  - Over 4,000 faculty members (5,000 estimate)
- Average energy use in Uganda=215 kWh per capita per year (300 kWh estimate)
  - Population in Kampala=1,516,210
    - 1,516,210-46,000 = 1,470,210
- University energy use: 13,800 MWh per year
- Kampala energy use: 441,063 MWh per year

Barriers

- Violence and military incursions between two countries in the 1980s
  - However, currently partners in trade, security, infrastructure, agriculture, education, and energy
- Manpower recruitment and training
- Costs associated with establishing governmental policy
  - Environmental Impact Assessment and Feasibility Assessment (~$50,000,000 each study)
- Equipment and infrastructure

Our Expenses

- Advertising
  - Daily Monitor Kampala weekly advertisement
    - Front page 6cm x 6col. = 1,000,000 Shs.
    - Pg. 8 onwards full page 33cm x 6 col. = 9,470,000 Shs.
      - TOTAL= 10,470,000 Shs. = $3495.83 per article
      - $3495.83 per week x 52 weeks = $181,783.16 per year
- Annual Tuition= $500 per year
  - 100 Students per year
  - TOTAL= $50,000 in scholarships per year to grow the geothermal energy program

Cost for Geothermal Plant (KenGen)

- $2700 per installed kW
  - Begin with 50 MW plant
  - = $135 million to build, including drilling and exploration costs
- $0.007 per kWh for operation and maintenance ($0.007/kWh maintenance)(454,863 MWh/year) = $3,184,041

Revenue Streams for KenGen

- Sell for $0.07 per kWh
  ($0.07/kWh)(441,063 MWh/year) = $30,874,410 per year

- Sell for discounted $0.05 per kWh to Makerere University
  ($0.05/kWh)(13,800 MWh/year) = $690,000 per year

- Total Profit from selling energy = $31,564,410 per year -
  = $28,380,369 per year

Revenue for JRB Consulting

- We will ask for 5% of KenGen's annual profit to pay for the costs of scholarships and advertising to move into Kampala
  KenGen annual profit = $28,380,369
  Consulting firm annual profit (5%) = $1,419,018

Feasibility Assessment

- Cost of startup:
  - KenGen will have to invest $135 million to build the plant in Kampala, but will pay this off in about 5 years with a profit of $26,961,351 per year
- Annual costs: Including advertising costs and money for scholarships, we will pay $231,783 per year
- Annual revenue= $1,419,018

Total Annual Profit = $1,187,234

Feasibility Assessment

Our largest barrier is to establish a relationship between KenGen and the people of Kampala.

We have the financial resources, but if there is no support for our plan after advertising and working with Makerere University, we cannot continue to build a geothermal plant outside the city

Conclusion

- People of Uganda will benefit economically, socially, and environmentally as a result of the production of a geothermal plant near Kampala

- Large profit of $28,380,369 per year for KenGen, $1,187,234 for JRB Consulting, and less expensive energy for University and people of Kampala

- Worthwhile investment, but barriers must be bridged in order to make it a reality