Hurdles To Financing Geothermal Development In Argeo Countries, With Special Focus On Kenya

KenGen

By

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General Barriers

- Most of the projects are developed, at least in the initial stages, by Government agencies
- Initial work undertaken as part of a country-wide exploration programme:
  - Lack of technical capacity - human and equipment
  - Priority give to Hydro projects
  - Lack of information and promotion of geothermal

General Barriers.....

- Lack of Political Will
- Lack of supporting policies, regulatory frameworks
- Bureaucratic delays (budget controls)
- Lack of funding due to upfront high cost of drilling

Main Barrier

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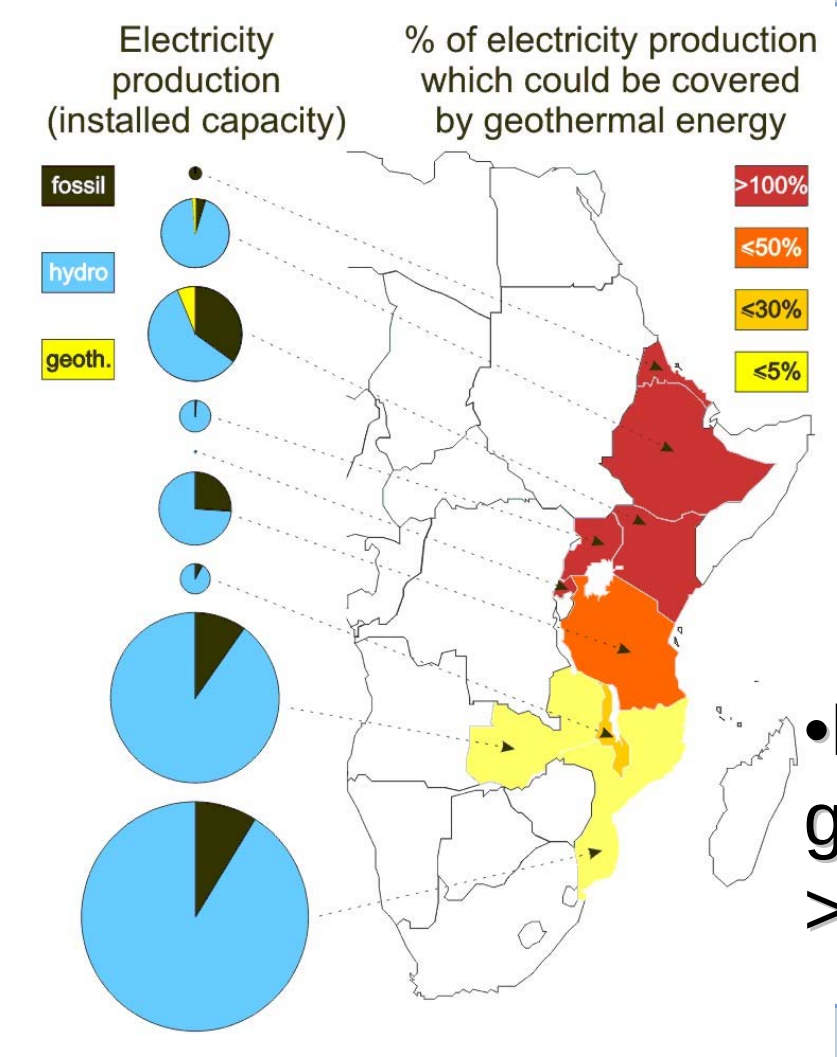
Where is the

Energy Situation in ARGeo Countries

- Djibouti
- Eritrea
- Ethiopia
- Kenya
- Tanzania
- Uganda



- Potential to generate >10,000 MW

Djibouti

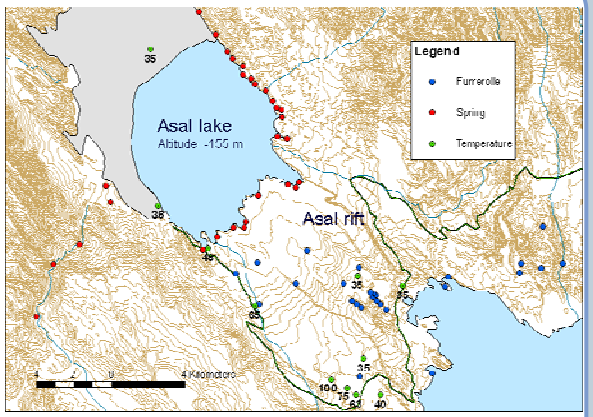
>Exploratory wells drilled in Assal

➢High temperature system

➢ High salinity of fluids and lack of funds

➢Resource development delayed

➢Estimates of resource: 230 - 860 MW



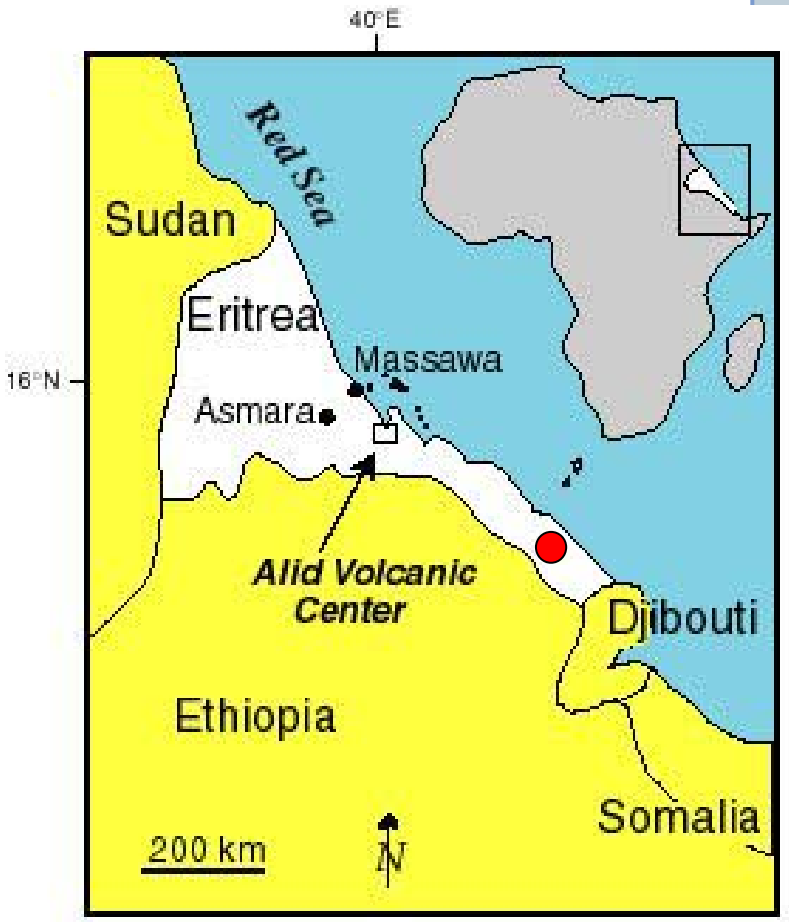
Eritrea

>Priority given to the Alid Volcanic prospect

➢Inferred temperature system of 250^{0}C

➢ More geo-scientific studies underway

➢Resource assessment delayed due lack of funds



Ethiopia

>Resources located in Lakes District, Central Afar, Southern Afar and in the Danakil Depression.

- Estimates > 1,000 MW
- A 7.2 MWe net capacity pilot plant was installed in Aluto Langano in 1999 – problems occurred
- Exploratory drilling at Tendaho
- Funding and political will lacking

Uganda

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>Focused on Buranga, Katwe and Kibiro in W/rift

➢No drilling yet

➢UNDP, OPEC, Icelandic government, Germany assisted with geo-scientific studies

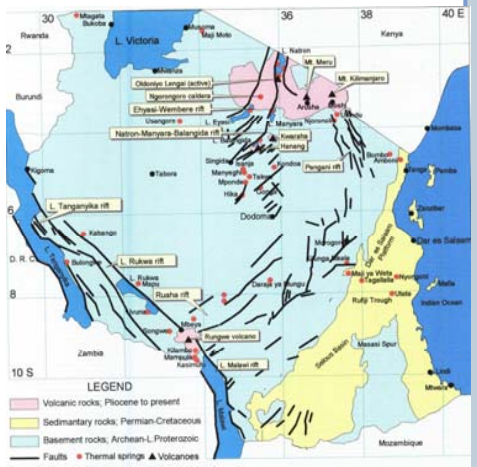
➢Data still insufficient to negotiate binding power purchase arrangements

➢Funding and political will lacking

Tanzania

>Surveys done country-wide

- Two potential areas: Arusha and Mbeya
- Over concentration on hydro and gas
- Lack of policy and regulatory framework
- Lack of technical expertise, funding, political will
- No drilling yet



Zambia

- Surveys done on anomalous hot areas
- Focused on two potential target areas: Kapisya and Chinyunyu
- Shallow wells drilled at Kapisya and a pilot plant of 200 kW installed
- Plans underway to develop Chinyunyu resort
- Lack of policy and regulatory framework
- Lack of technical expertise and funds

What next?

- Lack of policy
- Lack of funds
- Lack of political will
- Lack of expertise

Kenya's Experience

Kenya was the first African country to use geothermal energy for electric power generation and direct uses

Both public and private sectors are involved in its development

Direct uses….Green houses

Green houses using geothermal heat

Direct uses.... Tourist attraction

Spectacular hot springs at Kapedo, near to Silali volcano

Barriers in geothermal energy development in Kenya

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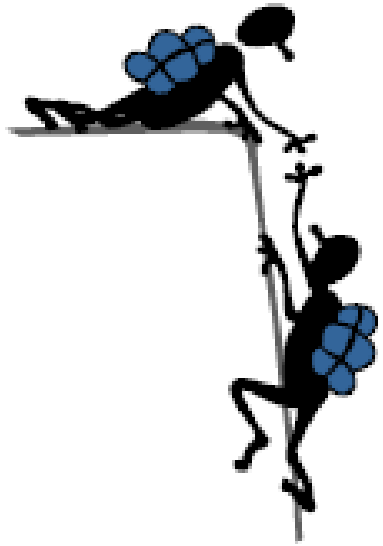
- Large upfront investment in exploration, appraisal and production drilling
- Commercial Risks
- Technological Constraints
- Legislative Framework – been addressed



Stages in Geothermal Development

- **Resource Exploration:** Geo-scientific surface studies and exploratory drilling. USD 10m
- **Resource Assessment:** Drilling of appraisal wells and well testing. USD 20m
- **Power Plant Development:** Drilling of production wells, steam pipeline connection and Power Plant construction. USD 200m

Funding Options: Resource Exploration and Assessment

- **Some Funding options considered:**
- Geothermal company **Profits** and or **Taxes** due to the Government being redirected
- Differential in interest on on-lent funds being set aside

Funding Options: Resource exploration and Assessment ….

- The Government introduces a Geothermal Development Levy
- Public & Private partnerships
- Carbon Credit mechanism
- Risk Guarantee

Funding Options:Power Plant Construction stage

- Offering competitive bidding to private and public institutions
- Strategic alliances

Funding Options:Power Plant Construction stage ….

- Carbon credit earned form displacing fossil fuels
- Tax incentives
- Sale of Bonds
- Early Generating units to provide cash stream

Example of Olkaria II

FINANCING:

- GoK, IDA, EIB and KfW
- Shortage of money interrupted progress in 2002
- Cash flow resolved early 2002
- Commissioned end of 2003
- It took 17 years

Lessons Learned

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- Timely financing of projects critical
- Siting of the first well is critical
- Early utilisation of exploration wells important
- You need something to create interest
- Stepout of appraisal wells at short distances
- Environmental issues and particularly local community views. EIA now required by law
- Importance of Technical reviews

Conclusions

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- Geothermal energy will remain one of the primary renewable sources of power and direct use in ARGeo.

- The initial high risk investment stages of geothermal development should be borne by the Government, but the later stages be shared between the public and the private sector. Formation of GDC (100% Government)

- Incentives like the e.g tax holidays and enabling proper Legislative framework should be set to attract more private investors in the industry.

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Thank You