GEOTHERMAL DEVELOPMENT STRATEGY IN BURUNDI
Actual Status, Constraints and requirements
Country’s location
Energy sector

- Biomass: 95%
- Electricity: 2% : Hydro: 95%  
  Thermal: 5%
- Oil: 3%

Electricity

Hydro exploitable potential: 300 MW
Hydro install capacity: 32,46 MW
Thermal install capacity: 5,5 MW

Consumption capacity: 45 MW

- Importation capacity: 15 MW from RDC and SINELAC
- Demand capacity: 75 MW (Deficit: 30 MW)
CHALLENGES (défis)

✓ Energy demand is getting more higher,
✓ Offer in Hydropower becoming lower instead of regional electricity interconnection
✓ Energy sector stays undeveloped
✓ Main causes: climate changes (few water for Central hydropower), decrease available biomas, costs of fossil fuels
✓ Change in energy policy is necessary: reduce environment problems: promoting (e.g geothermal) altern. energy
Historic GEOTHERMAL RESEARCH IN BURUNDI

✓ First specific investigations of activity carried out by (UNDP) (McNitt 1969), Deelstra & al. (1972), Edeline and al. (1981) and

✓ Geological maps (1956-1981) : Base for reconn. study by Scientists IIDA/INEA (Iceland 1982) studies which :

✓ covered and described surroundings geology of 14 geothermal locations 8 rise outside the Rift in precambrian rocks, 6 In sediments rift valley; 15 geothermal water samples, 3 cold groundwater samples, 1 of gaz colected:

✓ and reported chemical analysis;
Geology and Structure survey

- All the reports concentrate on descriptions of thermal sources and immediate surroundings.
- The geothermal activity, mostly connected with faults in *precambrian rocks* (Mugara) or *sediments* (Rusizi valley and Kabezi).
- One record of connection between recent volcanism and geothermal activity in an area of *basaltic formations* according to the geological maps. (NW)
Burundi hot Springs location

Ruhwa 68°C
Cibitoke 48°C
Kabezi 37°C
Mugara 48°C
Mabayi 40°C
Mahoro 47°C
Mvumvu 30°C
Mashuha 38°C
Kumuyange 38° C

LEGEND:
- Geothermal samples
- Cold water samples NFA
- Cold water samples region
- Hot springs outside Burundi
- Road
- River
- Borders
- Town
Geology-structure (cont..)

✓ It is however, clear that all the sources are situated in the western or central parts of the country and none in the eastern part where intrusions are absent and which lies farthest away from the active rift zone.
The geothermal manifestations in Burundi are found mainly in two types of environment, e.g. Precambrian rock, mostly outside the rift valley, and sediments inside the valley.

- The old age and low porosity of the precambrian rock make the existence of an exploitable geothermal system within it highly unlikely.
- The higher porosity of the thick sediment layers, and the recent volcanism in the rift valley constitute conditions which could lead to exploitable geothermal systems.
There is considerable volcanism around Lake Kivu in whose vicinity geothermal heat has been reported; the chemical composition of the Lake water is affected by geothermal heat. The northwestern part of Burundi is on the edge of the Thibinde volcanic region of Lake Kivu, most promising of the geothermal areas in Burundi which were investigated.
Principal geological structures of central Africa

Intersection area

Fig 2 NW-SE /NE-SW Faults of Western branch
Application of Quartz geothermometers of Fournier and Rowe (1966) to chemical results of above authors suggests underground source temperatures as high as 110-120°C in at least two places in RUSIZI valley (Gestur Gislason 1983).

All discharges rising from sediments were carbon dioxide rich, indicator the presence of a powerful heat source.
Cl distribution

Fig 3 Cl distribution
F distribution
Na/Cl distribution

Fig 6

1982 Na/Cl distribution

LEGEND:
- Na/Cl 2 - 4 mg/mg
- Na/Cl > 4 mg/mg
- Na/Cl < 3 mg/mg
- Cold water sample source
- River
- Border
- Western rift valley
<table>
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<tr>
<th>Location</th>
<th>Measured temperature °C</th>
<th>Chalcedony temperature °C</th>
<th>Quartz temperature °C</th>
<th>Na-K-Ca-Mg temperature °C</th>
<th>Probable source temperature °C</th>
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<th>Location</th>
<th>Underground source temperature assuming no boiling, °C</th>
<th>Underground source temperature assuming maximum steam loss, °C</th>
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In summary an exploitable geothermal source whose temperature could be in 100°-160°C range, may exist in the Rusizi valley and probably extend well into RDC and Rwanda.

This source is thought to be connected to the Thibinde volcanic area south of Lake Kivu.

Therefore, an anomalously geothermal gradient may be expected in this region.

CONCLUSIONS: GEOCHEMISTRY
Observations / Recommendations

✓ More investigations including geological, geochemistry and geophysical studies are involved to define the geothermal potential assessment. (specialy in the whole of the Thibinde region: DRC, Rwanda, Burundi)

✓ Establish a policy for an integrated geothermal exploration and development of the resources.

✓ Mobilize funds both locally and through our development partners to support the above initiatives.

✓ Establish a good collaboration with East African’s countries in which geothermal system is best known.
MURAKOZE
THANK YOU
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