

Technology Fact Sheet for Mitigation

Sector: Energy.

Sub sector: Energy supply

Technology: Geothermal power technologyⁱ

A.1 Introduction

Geothermal energy originates from the high-temperature aquifers inside the Earth's crust at depths of between 1-4 Kilometres. These aquifers are surrounded by porous, soft rocks and/or sand and are heated by the Earth's heat. Hot water or steam within the aquifers could reach temperatures of over 300oC. This heat can be used for heating of buildings and/or production of electricity.

A.2 Technology characteristics

Geothermal electricity can be delivered to large grids and mini-grids. Large-scale plants are grid-connected and deliver power for base load purpose. A large-scale geothermal flash plant of (50 MW) capacity could have a load factor of 90%. Geothermal power is a reliable source of energy and commonly has high capacity factor of between 70 and 90% of installed capacity.

A.3 Country specific / applicability

Sudan has geothermal resource in different parts of the country which lead to facilitate the applicability of those technologies e.g. (Beoda desert, Red sea, Jabal Mara in western Sudan). The suggested Geothermal project 100MW will reduce 237,300 tonnes of CO₂ per year per megawatt hour of installed capacity, 2010 grid emission factor 0.301tonnes CO₂ per MWh how much potential

A.4 Status of technology in country

Geothermal is unexploited resource in Sudan. Recently Potential studies have been carried and a power project with total of 100 MW (location not identified) is now under study in Beoda desert (North West of Sudan). There is well organized administrative layout for all renewable energy technologies such as renewable energy Directorate at Ministry of Electricity and Dams (MED), Energy Research Centre and different universities but the status of technical know-how is limited.

A.5 Barriers

- High initial capital cost due to high exploration cost. ; Lack of private sector investment.
- Limited technical Know- how
- The exploration of the geothermal energy systems could be complex.

A.6 Benefits to economic / social and environmental development

Economic:

- Contribute to poverty reduction (provide jobs),
- Low operation & maintenance cost.
- Geothermal energy is an indigenous source of energy and reduces the need to import fossil fuels.

Social

- Social investment activities. Such as employment increase, upgrading of services level at project areas

Environmental

- Clean technology but some pollution due to hot water at rejects point is expected. Waste management issue is to be considered as some chemical may be used to prepare the extracted steam to the turbine quality.

A.7 Costs

Generally the capital cost of geothermal is very high comparing with conventional thermal plant, the capital cost of a MW of geothermal installation approximately about 4, 000,000 USD /MW (Energy Information Administration November 2010) (EIA). The advantage of this technology that it has low operation and maintenance cost. The exploration stage could take about 25% of the total investment costs.

ⁱ This fact sheet has been extracted from TNA Report – Technology Needs Assessment for Climate Change Mitigation - Sudan. You can access the complete report from the TNA project website <http://tech-action.org/>