

South-South Cooperation in providing Clean Energy Solutions to Africa

The Case of UNEP ARGeo Programme.

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ABSTRACT

This paper describes the South-South Cooperation (SSC) elements/attributes employed in the UNEP African Rift Geothermal Development Facility (ARGeo) Program. This is in the pursuit of regional cooperation and exchange mechanisms through replication of best practices and synergy among various countries in East Africa region.

United Nations Environment Programme, South-South Cooperation (UNEP,SSC), is a process whereby two or more developing countries pursue their individual or collective development through cooperative exchanges of knowledge, skills, best practices, resources and technical know-how. It also aims to foster and create self-reliance of developing countries, by enhancing their capacity to find solutions to their development problems. The SSC promotes collective self-reliance among developing countries through exchange of experiences and strengthen the capacity of developing countries to identify their main development issues and formulate the requisite strategies to address them.

SSC has strengthened the voice and bargaining power of developing countries in multilateral negotiations, enhanced use of experience and capacity that already exists. SSC Exchange Mechanism has led to the development of new capacities in developing countries and to promotion and strengthening of economic integration among developing countries. This features case studies of best practices and lessons on a wide range of environmental and sustainable development subjects.

South-South Cooperation is currently using the African Rift Geothermal Development Facility (ARGeo) Project as a case study. ARGeo is a Global Environment Facility (GEF) funded regional project being implemented by United Nations Environment Programme whose core objectives entail promoting geothermal resource exploration, development and utilization as well as catalyzing private and public investment to accelerate development of geothermal energy through mitigation of risks associated with resource exploration. The project targets six Eastern African countries; Kenya, Ethiopia, Eritrea, Rwanda, Tanzania and Uganda. Additional seven Eastern Africa countries targeted for the regional networking include Djibouti, Burundi, Democratic Republic of Congo, Zambia, Malawi, Mozambique and Madagascar.

The case of this project was selected as one of its major pillars is focused on activities that gear towards the objective of developing regional networking, information systems, capacity building in terms of skilled manpower and equipment, policy advice and awareness creation. As a country with the more advanced geothermal infrastructural and institutional capacities in the region, Kenya

can vastly share and exchange its key geothermal development solutions to other East African countries.

2. INTRODUCTION

United Nations Environment Programme has been promoting South-South Cooperation through systematic partnership-building and the exchange of expertise, experiences, best practices and knowledge among experts and institutions of the South. A critical component of these efforts culminated in the development of the South-South Cooperation Exchange Mechanism, an interactive knowledge management platform that promotes synergies and enhances collaboration among different actors in the environmental management and sustainable development spheres which was launched at the 17th session of the United Nations General Assembly High-Level Committee on SSC on 23 May 2012.

SSC is a mutual sharing and exchange of key development solutions, knowledge, experiences, good practices, policies, technology, know-how and resources between and among countries in the global south. The mechanism features news, events and case studies of best practices and lessons on a wide range of environmental and sustainable development subjects hence the reason, ARGeo Project is used to showcase the application of South-South Cooperation among developing countries of the East Africa region in the context of enhancing clean energy (geothermal energy) development as solution to Africa energy needs. The project major components focuses on activities geared towards developing regional networking and information systems, strengthened capacity in terms of skilled manpower and equipment, providing policy advice and awareness creation.

ARGeo has been facilitating exchanges of knowledge, skills, technical experience and know how fielding over hundreds of geothermal scientists and engineers in more than thirteen East Africa countries since 2003.

3. THE USE OF AFRICAN RIFT GEOTHERMAL DEVELOPMENT FACILITY (ARGeo) PROJECT AS A CASE STUDY FOR SOUTH-SOUTH COOPERATION

A case study of the UNEP-ARGeo Project is used to showcase the application of South-South Cooperation among developing countries of the East Africa region in the context of enhancing clean energy (geothermal energy) development as solution to Africa energy needs. The project was selected because it has SSC components of regional networking, information systems, capacity building, policy advice and awareness creation as well as technical assistance for surface exploration studies.

3.1 THE AFRICAN RIFT GEOTHERMAL DEVELOPMENT FACILITY (ARGeo) PROJECT

The African Rift Geothermal Development Facility (ARGeo) Project is a Global Environment Facility (GEF) funded project which was officially launched in November 2010 at the opening session of the Third African Rift Geothermal Conference (ARGeo-C3) in Djibouti. The project aims at supporting the development of the large untapped geothermal resource potential in the Eastern Africa region with the main objective of reducing the risks associated with the resource's exploration. ARGeo also aims at reducing greenhouse gas (GHG) emissions by promoting the adoption of geothermal energy in the region and seeks to demonstrate that the resource is reliable, cost effective and indigenous as compared to other sources of power in the region. The project further seeks to promote the utilization of the resource in agriculture and industry as well as catalyzing private and public investment to accelerate development of geothermal energy through mitigation of risks associated with resource exploration.

The project targets six Eastern African countries; Eritrea, Ethiopia, Kenya, Rwanda, Tanzania and Uganda. Additional seven countries- Burundi, Democratic Republic of Congo, Djibouti, Madagascar, Malawi, Mozambique and Zambia are also targeted for the regional networking. The United Nations Environment Programme (UNEP) is responsible for overseeing the successful achievement of the project objectives.

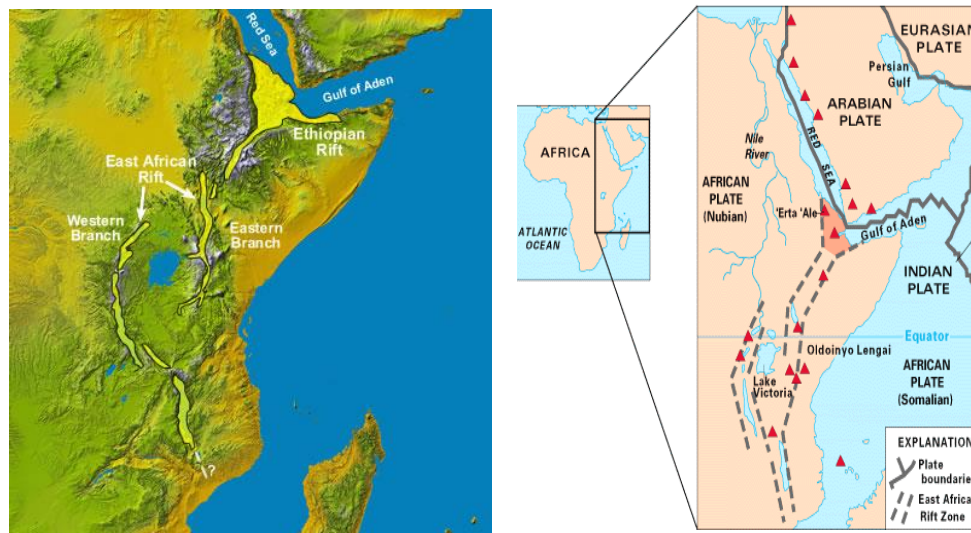


Figure 1. The East African Rift System

ARGeo partners include African Union Commission (AUC), Geothermal Development Bank (KfW), Icelandic International Development Agency (ICEIDA), German Federal Institute for Geosciences and Natural Resources (BGR), United Nations University-Geothermal Training Programme (UNU-GTP) and United States International Development Agency (USAID).

3.1 KENYA AS BEST EXAMPLE AND MODEL FOR OTHER EAST AFRICAN COUNTRIES

In the East African Rift region, Kenya is the leader in advancing geothermal resource exploration and development. This has partly been due to the problems that it has in developing its limited hydro resources and the successes that it had in small scale development since 1981. Kenya's first electricity generating plant has been operating now for more than 25 years and has proven reliable and economic, running at 98% availability. This has encouraged Kenya to speed up its geothermal power development program and is now generating about 577 MWe (Muchemi, G. 2014) and 18 MWt are being utilized for indirect and direct uses, respectively (Omenda, 2012). Kenya Electricity Generating Company Ltd (KenGen) and Geothermal Development Company Ltd (GDC) have undertaken detailed surface studies of most of the prospects in the Kenya rift and active drilling is in progress in the Greater Olkaria field and at Menengai. Under the UNEP ARGeo program, GDC acquired a technical and financial support from UNEP to perform surface exploration studies and enabled to site accurately exploratory wells in the Silali geothermal prospect. GDC plans to develop the first 800 MW project in phases of each phase with 200MW that will in turn contribute to the Government's target of generating additional 5000 MW by December 2016. GDC will jointly develop the field with the private sector through PPP arrangement.

Kenya, in addition of using geothermal energy for electricity generation, it also uses the geothermal for direct use application for horticultural and agricultural purposes. Oserian Development Company is a good example where the heated fresh water heats about 50 ha of greenhouses at night where roses are grown. CO₂ from the well and some additional brought from

Olkaria III is added into the greenhouses to assist in photosynthesis. Kenya has for decades used geothermal heat to dry pyrethrum flowers and condense steam for drinking at Eburru.

The Kenya Government through the newly formed utility (GDC) has embarked on an ambitious geothermal generation expansion to install additional 5,000 MWe of electric power by the year 2030 (Omenda, 2012). The planned geothermal developments require huge capital investments and therefore GDC and KenGen are pursuing private sector involvement to finance the projects. In the process of these activities, Kenya has acquired considerable expertise in geothermal related earth sciences and engineering. It has also led to a development of the institutional infrastructure that is necessary for geothermal resource exploration, development and utilization.



Photo 1: Geothermal Power Plant and direct use application in Olkaria (Source KENGEN)

The Northern Corridor countries comprising of Kenya, Uganda, Rwanda, and South Sudan have also directed GDC to develop a regional geothermal center of excellence in Nakuru. This is with a view of developing the capacity of these countries in terms of geothermal science and technology through sharing and learning the best practices of GDC in geothermal exploration and development. Currently, UNEP in collaboration with GDC is carrying out skill gap analysis of all East African countries to set up the agenda and curriculum of the regional Geothermal Centre of Excellence.

2 EAST AFRICAN COUNTRIES LEARNING FROM KENYA THROUGH ARGeo EXCHANGE MECHANISMS

The key drivers of SSC in the geothermal energy exploration and development through ARGeo include:

- Growing consensus around the region, affirming SSC as effective instrument for catalyzing geothermal development and investment
- SSC is widely accepted as a good model of geothermal development to North-South Cooperation
- SSC is helping East African countries to benefit from innovations, lessons and good practices experimented elsewhere in the South

The strategy for regional cooperation and exchange mechanisms between Kenya and the rest of East African countries on the basis of the above key drivers of SSC, is described below:

(a) Regional Networking

East African countries are learning from Kenya's best practices through platforms that spur geothermal resource development in the region such as ARGeo Biennial Conferences that draw hundreds of regional and international geothermal delegates who presented technical papers and stage exhibitions. For instance, the Fourth African Rift geothermal Conference (ARGeo-C4) gathered more than 600 international and regional delegates and had 124 technical papers and a number of plenary sessions presented and 25 staged exhibitions. UNEP through ARGeo program

is currently co-organizing ARGeo-C5 with Government of Tanzania and regional countries are expected to benefit more.

The platform created an opportunity to member countries to gain valuable knowledge and insights in to new market developments and discover East African geothermal case studies from local, regional and global speakers.



Photo 2: Participants of the ARGeo-C4 conference (Source: UNEP-ARGeo)

(b) Information Systems

UNEP through ARGeo program developed different information exchange mechanism that include website, newsletters, banners, brochures, fliers and Geothermal Inventory Data Base (AGID) which aims at enhancing geothermal investment in the region by providing geothermal related data and information to potential investors from the region and out of the region that may be willing to enhance the development of geothermal energy in East African Countries.

This regional database created a sharing platform and hub among the East African countries to share their relevant geothermal data and information. The database also maintained rosters of experts, institutions, and good practices in geothermal science and technology. The ARGeo website also created a regional network hub to exchange information related to current geothermal news regionally and globally.



Snapshot of the ARGeo Geothermal Inventory Database (Source UNEP ARGeo)

(c) Capacity Building

ARGeo has strengthened institutional and infrastructural capacities of East African countries through organization and successful completion of various short courses, trainings, hands on experience and on the job training. These included three parallel training courses in November 2012 in collaboration with various geothermal partners and stakeholders, technical review meetings (TRM) on Silali and Tendaho geothermal sites in June 2014. The trainings include exploration techniques and technology, geothermal development, financing geothermal projects among others.



Photo 2: Geothermal training during the ARGeo-C4 Conference (Source UNEP ARGeo)

This mechanism enhanced geothermal technical capacity at country and regional level. It also provided support in building national institutional capacities to enhance geothermal development.

(d) Policy Advice and Awareness Creation

UNEP ARGeo has mobilized upstream policy support for geothermal development. It has also facilitated various geothermal policy dialogue and exchange among policy makers and private developers to set up a clear and coherent geothermal policy, legislation and institutional and regulatory frameworks. The Kenya Renewable Energy Policy 2013 that includes Geothermal Act was used as a model to review the existing energy policies of Rwanda, Uganda and other East African countries.

The setting up of appropriate institution such as GDC to alleviate the risk associated with geothermal resource exploration is also taken as a best practice by other East African countries. This is to fast track geothermal development in the countries. The recent establishment of GDC Tanzania and Geothermal Resource Department in Uganda are good examples.

UNEP has created awareness on how the East African geothermal resource can be harnessed towards the realization of increasing renewable energy mix and enhancement of universal access. This was done through organization of a high level group visit to Olkaria geothermal power plant and Menegai geothermal drilling.

(e) Technical Assistance for Surface Exploration Studies

Similarly, ARGeo held a Technical Review Meeting of the Silali and Tendaho projects in Kenya and Ethiopia aimed at enhancing and optimizing the information and quality of the conceptual model of the system that will allow for accurate siting of exploratory wells and minimize risk of drilling of dry wells while increasing the chances of drilling high productive wells and bridge the existing gaps in the accurate siting of exploratory wells, and target sites.

During the (TRM) meeting, a platform for learning best practices and exchanging knowledge in conceptual modeling of geothermal system was created. All ARGeo member countries attended the meeting and were able to meet high level and well regarded geothermal experts from all over the world.

4. CONCLUSION

The East Africa has a large untapped geothermal resource potential (> 20,000 MWe) which is an indigenous, reliable, environmentally clean and economically viable, renewable energy resource. However, its development is constrained by risks that are associated with resource exploration and development, high upfront cost of exploration including drilling, financial risks associated with investment in power development projects and inadequate policy and legislation as well as institutional and regulatory framework to attract private developers. Projects like ARGeo which have components of South-South Cooperation such as regional networking, information systems, capacity building, policy advice and awareness creation, and technical assistance for surface exploration studies are key for successful realization of the vision to light Africa through provision of clean energy solutions.

Impact of SSC between Kenya and rest of East African countries in terms of solution providers etc..

Kenya being an advanced country in geothermal resource exploration, development and utilization is best placed to share its best practices with the rest of East African countries. Consequently the setting up regional Geothermal Centre of Excellence in Nakuru will accelerate geothermal trainings, short courses, hands on experience and on the job training.

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