



CLEAN DEVELOPMENT MECHANISM (CDM) DEVELOPMENT IN KENYA –GEOHERMAL CONTRIBUTION

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ABSTRACT

The Clean Development Mechanism (CDM) is a project-based mechanism designed to promote investment in projects that reduce or sequester emissions of greenhouse gases (GHG) in developing countries, under the Kyoto Protocol (UNFCCC). The Kyoto Protocol, which was created out of the United Nations Framework Convention on Climate Change (UNFCCC), and entered into force in February 2005, commits signatories from the industrialized nations to reduce their emissions of Greenhouse Gases (GHGs) such as carbon dioxide and methane by an average of 5.2% in the period 2008 – 2012. In Kenya, there is growing interest in geothermal development along the country's expansive rift valley. Most companies are seeking geothermal development from CDM financing.

1. INTRODUCTION

CDM is one of the market mechanisms defined under Article 12 of the Kyoto Protocol of the United Nations Framework Convention on Climate Change (UNFCCC) (1992). UNFCCC provides the framework for stabilization of GHG concentrations in the atmosphere at non-dangerous levels and preventing dangerous Climate Change globally. The Kyoto Protocol (KP) is a legally binding addition to the 1992 UNFCCC treaty. CDM is intended to meet two objectives: to assist developing countries in achieving sustainable development and in contributing to the ultimate objective of preventing dangerous climate change; and to assist developed countries in meeting cost effectively, their greenhouse gas emission reduction commitments as defined under the Kyoto Protocol. The developed countries meet part of their emission targets/caps by buying "Certified Emission Reductions" or carbon credits from CDM emission reduction projects in developing countries.

There has been increased interest by energy countries in financing geothermal development of CDM projects in Kenya. The Kenya Electricity Generating Company (KenGen) is the pioneer company in the Clean Development Mechanism (CDM) project development process in the country. It began exploring the possible benefits of CDM from as early as 2000.

During the 2006 Carbon Expo held in Cologne, Germany, KenGen had its first discussions on CDM project development with the World Bank. The Bank showed willingness to consider KenGen's

projects and hence commenced the relationship between KenGen and the World Bank on CDM project development. One CDM project has since been registered by the UNFCCC, and the World Bank has provided technical support on some of the current CDM projects.

Other companies involved in geothermal utilization have sourced or are in the process of financing development through CDM. Orpower 4 Inc developed its Olkaria III phase 2 geothermal project partly through CDM. The project has since been registered by UNFCCC and is projected to generate 177,600 CERs annually.

More recently, another company, AGIL, that has been licensed to exploit geothermal resource to the east of Olkaria has developed the project design document (PDD) and is seeking to develop the geothermal resource at Longonot partly through CDM finance.

1.1 CDM Geothermal Projects Contribution to Sustainable Development in the Country

Developing geothermal CDM projects are likely to support the sustainable development of Kenya in the following respects:

- i. Economic: The projects will supply the growing economy with an increase in the amount of reliable electricity supply from a domestic primary energy source. Geothermal projects are base load in the country and are affected by weather fluctuations like hydropower projects.
- ii. Social: The projects will create local employment opportunities for both construction and operation offering Kenyan people new experience and skill in a sector that is growing internationally.
- iii. Environmental: The power project is fuelled by renewable geothermal heat that has much less greenhouse gas emissions compared to thermal power projects.

2. STATUS OF CDM GEOTHERMAL PROJECTS IN THE COUNTRY

Since the country ratified the Kyoto protocol, there has been an increase of CDM projects, notably in geothermal energy sector.

TABLE 1: CDM Geothermal energy projects pipelines in Kenya

Project name	Amount of annual expected CERs per year	Status of project
Olkaria II Geothermal expansion	1,496,315	Registered
Olkaria III Phase 2 Geothermal Expansion Project	177,600	Registered
Longonot Phase I Geothermal Power Project	660,000	PPD development stage
140MW Olkaria I units 4 & 5 geothermal project	669,000	PDD development stage
140MW Olkaria IV geothermal project	669,000	PDD development stage
78MW Olkaria Wellhead geothermal project	400,000	PDD development stage

Worldwide there are currently, 3560 are registered generating annual CERs of 534,967,682 (Source: <http://cdm.unfccc.int/Statistics/index.html>). Of the registered CDM projects, 67% are under energy industries, renewable and non-renewable. Geothermal projects account for 21 of all the registered projects worldwide. The projects in the CDM pipeline are projected to account for approximately 3 % of all CERs (UNEP Risoe).

3. FINANCIAL CONTRIBUTION – A CASE FOR OLKARIA II GEOTHERMAL EXPANSION

Table 2 below shows the investment costs associated with Olkaria II Geothermal expansion project and projected expenses.

TABLE 2: Calculation and comparison of financial indicators

Item	Value
Costs of equipment and plant (initial investment cost) (million US\$)	120
Project life (years)	25
Electricity tariff (US cent/kwh)	5.829
Electricity export amount (GWh/year)	276
Revenues and Expenses	
Electricity sales (million US\$)	16.01
O&M costs/yr (million US\$)	1.51
Project IRR (%)	8.0

Based on the above, the project IRR for Olkaria II Geothermal Expansion Project was calculated to be 7.9%. Given that the benchmark value is 15%, the Projects' IRR clearly demonstrates that the project is not feasible for KenGen on commercial basis. This therefore implies that the project is not viable without additional financing.

Based on assumed annual CER of 149,632 tCO₂e, at a cost of US\$ 10 per CER, annual revenue will be approximately 1.5 m US\$ per annum. This is approximately equivalent to O&M for the project. This therefore implies that CDM could contribute significantly to financial return of the project costs.

4. CONCLUSIONS AND RECOMMENDATIONS

The potential of geothermal energy in Kenya's Rift Valley is estimated at 10,000MW. KenGen targets to have an installed capacity of 3000MW by the year 2018. With high capital outlay, CDM financing could significantly accelerate the development of geothermal power projects.

There are barriers of investing in renewable energy due to pre-investment costs such as feasibility studies. Other notable barriers are:

- a) Slow validation process making the CDM process extremely slow.
- b) One has to keep up with the frequent amendments in the approved methodologies.
- c) Due to large dispatch data sets making calculation and update of national Grid Emission a major challenge.
- d) Rigorous monitoring program such as; instrument calibration, record keeping and capacity building for operational staff.

In order to accelerate development of CDM projects in the country, the following recommendations are proposed:

- a) Need for more awareness on CDM and strengthening of national capacity for well prepared projects.
- b) Strengthen capacity of project developers on negotiating on Emission Reduction Purchase Agreements (ERPAs) and other carbon contracts.
- c) Formation of Carbon Centre – KenGen to set up a Carbon Centre: to provide carbon project development support and consultancy.
- d) Need for collaboration with other project developers, financiers, and other institutions in the voluntary and compliance carbon markets

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