Presented at Short Course III on Exploration for Geothermal Resources,
organized by UNU-GTP and KenGen, at Lake Naivasha, Kenya, October 24 - November 17, 2008.

GEOTHERMAL TRAINING PROGRAMME

Kenya Electricity Generating Co., Ltd.

OPPORTUNITIES AND CHALLENGES OF GEOTHERMAL CLEAN DEVELOPMENT MECHANISM PROJECTS IN KENYA

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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. The CDM is known as one of the flexible mechanisms under the Protocol.

1. INTRODUCTION

The concept of CDM emanated from the Kyoto Protocol (1997) under the UN Framework Convention on Climate Change (UNFCCC) mooted at the United Nations Conference on Environment and Development (Earth Summit) in 1992. The Convention on Climate Change and the follow-up initiatives were prompted by the increasing evidence of global warming triggered by anthropogenic emissions of Greenhouse Gases (GHGs) which include Carbon Dioxide, Nitrous Oxide, Methane, Halogenated Hydrocarbon and Tropospheric Ozone. Burning of fossil fuels, agriculture, industrial operations and deforestation due to various human activities are known to cause the GHG emissions, which have significantly increased over the years (IPCC 2001). Current evidence suggests that there is discernible human influence on climate change. There is already increase in extreme weather events such as droughts, heavy precipitation, heat waves and the intensity of tropical cyclones.

CDM could help unlock potential geothermal development in Kenya where there are barriers in development of most energy projects. According to KenGen's capacity expansion program, geothermal power stations of over 1000 MW will be constructed in the next 10 years. Upon completion of these projects, annual tonnes of emission abated will be approximately 4.7 million tonnes of CO_2. CDM projects will contribute to sustainable development in the country.

2. MECHANISMS FOR EMISSION REDUCTION

While the Kyoto Protocol identified a number of modalities for implementation of the Climate Change Convention and the Protocol, further negotiations in several rounds of the Conference of Parties (COP) were held to develop the operational details. As a result, in the 7th Conference of Parties, a comprehensive rule book known as the Marrakech Accords (2001) has been prepared and the Accords also provide clarification to help ratification by the countries. The Kyoto Protocol as further clarified through the Marrakech Accords has recognized the following cooperative mechanisms to help the developed countries (enlisted as Annex I Parties) for meeting their emission reduction targets:

- Emission trading (ET) - Through this mechanism, countries are entitled to transfer parts of their allowable emission termed as "Assigned Amount Units (AAU)".

- Joint implementation (JI) - Under this mechanism, countries can claim credit for emission reduction accrued from investment in other developed countries and thereby transfer of equivalent "Emission Reduction Units (ERU)" is permitted between these countries.

- Clean Development Mechanism (CDM) - Through this mechanism, the investors from developed countries can take up emission reduction projects, which help sustainable development in developing countries and thereby earn "Certified Emission Reductions (CERs)" to be used for achieving compliance of their quantified emission reduction commitments.

The Emission Trading (ET) and Joint Implementation (JI) projects are confined to developed countries with defined emission reduction targets; the Clean Development Mechanism (CDM) offers a new avenue for emission reduction in developing countries which do not have any obligatory emission reduction target.

2.1 Rationale for the mechanism

The CDM projects are to assist the developing countries in achieving sustainable development through investment from developed countries (governments as well as private companies). Thus, the CDM projects are expected to help the developing countries in activities that will lead to their economic, social and environmental benefits. Clean water and air, employment, poverty alleviation and energy efficiency are among the multiple gains that could be derived through this mechanism. For the developing countries, which are in need of additional funding and technology transfer to achieve sustainable development, the CDM promises a new opportunity and incentive not only for meeting their basic human needs but also for their active participation in global GHG reduction initiatives.

2.2 CDM eligibility and procedure

The CDM project cycle entails seven basic stages: project design and formulation, national approval, validation and registration, project finance, monitoring, verification/certification and issuance of "Certified Emission Reduction (CERs)". The first four stages are performed prior to implementation of a project, while the latter three are undertaken during lifetime of the project.

Non-Annex – I: comprise mainly developing countries. Their commitments depend on the financial resources and technology provided by the developed countries.

For participation in CDM, all countries are required to meet the following prerequisites:

- Ratification of the Kyoto Protocol;
- Establishment of a National CDM Authority; and
- Willingness for voluntary participation in CDM

In addition to the aforesaid pre-requisites, the developed countries should also comply with the following requirements as stipulated in the Protocol:

- National System for the estimation of GHG emissions;
- National registry and annual inventory;
- Accounting system for sale and purchase of emission reductions; and
- Establishment of assigned amount as per emission limitation and reduction commitment to reduce their overall GHG emission by at least 5 per cent below 1990 levels in the first commitment period of 2008-2012.

The eligibility criteria for the CDM projects include the following:

- All parties involved must approve the projects;
- The projects should promote sustainable development in host countries;
- The projects should result in real, measurable and long-term benefits towards climate change mitigation; and
- The emission reduction should be additional to what would have otherwise occurred without the projects.

3. POTENTIAL CDM PROJECTS IN DIFFERENT SECTORS

There are opportunities for developing CDM projects in the developing countries. The important sectors which have potential for CDM projects in developing countries are as shown in Table 1 below.

TABLE 1: Potential CDM projects in different sectors

Sectors	**Potential Projects/Activities**
Agriculture	• Improvement in cultivation practices to reduce methane emissions. • Reduction of energy use through demand side management. • Improvement in use of agrochemicals (fertilizers and pesticides).
Buildings (residential, commercial and government)	• Energy efficient design of buildings. • Energy efficient appliances. • Energy conservation measures. • Fuel switching in households and commercial boilers. • Use of renewable energy sources.
Energy (nuclear energy excluded from CDM)	• Development of renewal energy sources (hydro, solar, wind, geothermal and biomass). • Clean coal technologies • Fuel substitution measures. • Improvement in transmission and distribution network. • Reduction of leakage in transport, handling and distribution of oil and gas.
Forests	• Afforestation & Reforestation
Manufacturing	• Energy conversion and energy efficiency measures. • Process modifications requiring lesser and emission • Change of feedstock in boilers (e.g. coal to gas).
Mining	• Coal bed methane recovery and reduction of methane emissions • Control of fires in mines. • Energy efficient systems.
Transport	• Introduction of alternate fuels (e.g. biofuel). • Switch over to cleaner fuels. • Fuel efficiency measures. • Improvement in public transport. • Urban Planning and traffic management.
Wastes	• Landfill gas recovery and use. • Waste to energy conversion activities.

3.1 Opportunities for KenGen CDM projects

In line with the KenGen's transformation strategy, geothermal development has been identified as the key area for electric power development. In the company's capacity expansion program, geothermal power stations of over 1000 MW will be constructed in the next 10 years.

Benefits from developing proposed geothermal power stations as CDM projects:

- Conservative estimate of load factor of 90% annual generation of 7,800 GWh of clean energy.
- Grid emission factor of 0.6 tonnes CO_2/Mwh will give annual tonnes of emission abated of approx 4.7 million tonnes CO_2
- An average price of € 10/tonnes CO_2 will generate revenue of about € 47 million annually. This will remove barriers preventing the implementation of these projects and also improve return on investment
- In addition there will be contribution to sustainable development through improved environmental quality, increased productivity and opportunities for expanded rural electrification and less dependence on imported crude will save country foreign exchange which will be channelled to other economic activities.

3.2 Challenges in implementing CDM projects

KenGen's interest in CDM started in 2000 when the company wrote to the UNFCC, through the Ministry of Environment seeking support in obtaining benefits from CDM for some of the projects. Later, discussions were held with the World Bank carbon team who promised to offer KenGen technical assistance on carbon trading. In 2006, KenGen developed Project Idea Notes (PINs) for nine projects and the World Bank accepted six.

In developing the CDM projects the following challenges have been observed:

- Justification of CDM projects
    a. Consideration of project as a CDM project before implementation
    b. Additionality criteria must be strong
- Financial analysis – Detailed financial analysis is required
- Monitoring protocol – This is very important since it forms basis of issuance of CER certificate.
    a) Monitoring procedure – records
    b) Calibration equipment and certificates
    c) Despatch data and emission reduction calculation
- Validators are few and overwhelmed, therefore very rare will you have validation done in less than three month.
- There is still lack of capacity to develop CDM projects in the country.

4. CURRENT INITIATIVES TO DEVELOP CDM PROJECTS IN THE REGION

In recognition of the important role that CDM has for the region, KenGen is starting a regional CDM centre which will act as a catalyst for CDM projects development in the country.

- It will bring together project developers, financiers, transaction advisors and all players in the carbon market
- Will bring together synergies in CDM field.

5. CONCLUSIONS AND RECOMMENDATIONS

There are huge opportunities for CDM projects development in the geothermal sector. CDM projects will contribute to sustainable development in the country.

In Kenya development of most energy projects face a number of barriers and financial benefits from CDM could help unlock potential geothermal development.

Developing of geothermal CDM projects requires credible additionality justifications.

In view of the importance of CDM for developing countries it is necessary to take advantage of this mechanism through:

- Capacity building to identify and manage CDM projects
- Establishment of a regional CDM centre will be a one stop shop for CDM projects and should be set up as soon as possible.

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