



## **The factors impeding Clean Development Mechanism (CDM) implementation and carbon emissions reductions and energy management in relation to climate change and sustainable development in Africa.**

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### **Abstract**

The paper focuses on experimentally researched information on factors that are an impediment to the implementation of clean development mechanism, the effects and solutions on carbon emissions reduction and energy management initiatives for sustainable development in relation to climate change in Africa. The objectives are to identify some countries in Africa where experimental studies have been done on factors which hinder implementation of CDM and the research methods, results, findings obtained and application in providing solutions on the way forward for implementation of CDM in Africa., to highlight the impacts of the failure and or success to implement the clean development mechanism on carbon emissions reductions and energy management in relation to climate change and sustainable development in Africa and to suggest solutions that can be used to accelerate the implementation of CDM in Africa. The methods used to collect data in both Kenya and Burkina Faso studies were questionnaires, interviews and workshops, whereas SPSS computer package method was used to analyze the data. CDM is a tool provided by Kyoto Protocol in 1997 established by United Nations Framework convention on Climate Change, that ensures all parties (developed & Developing Countries) of the Protocol benefit from the project activities designed to reduction of greenhouse gases in to the earth's atmosphere. The findings of the studies done in Kenya, and Burkina Faso show the following factors to be hindering implementation of CDM:- policy barriers, project financing gaps, institutional barriers and gaps, lack of information and knowledge on CDM, government bureaucracy, corruption, limited resources and insecurity due to terrorism attacks. The solutions proposed for Burkina Faso and Kenya are given as- introduce efficient carbonization techniques, enhance community participation, create a black and white lists for approving CDM projects, promote in-country expert capacity building in CDM projects and provide tax incentives to CDM investors.

Key Words- Clean Development Mechanism, Energy, carbon, emissions, Africa, barriers, Climate change.



## **1. Introduction.**

The definition of Clean Development Mechanism (CDM) is given by (Climate Network Africa, 2006), as a provision of the Kyoto Protocol, (1997), that intended to ensure that all parties within the developed countries and developing countries would benefit from projects activities designed to reduce the emission of greenhouse gases in the earth's atmosphere. CDM was calculated to enable developing countries (Referred to as Non- Annex Parties in this paper) to achieve sustainable development through projects carried in their countries by the developed countries (which are referred to as Annex 1 Parties in this paper). The CDM projects that are encouraged to be established in developing countries as investments by the developed countries include and are not limited to promotion of forestry and afforestation, renewable sources of energy (solar, wind, geothermal, water and bioenergy) and improved technology in transportation and agricultural sectors. CDM promises developed countries certified emissions reduction (CERs), if they comply with their quantified emission targets, and developing countries get sustainable development benefits, if they participate and invest in clean development mechanism projects. However, sustainable development shall only be achieved if the current barriers and gaps facing CDM implementation are addressed (Mutevu, 2010).

The Africa region is insignificant in terms of emissions of greenhouse gases, accounting for only 7% of the global total, and at the current rates and pace of economic growth. The other parts of the world accounting of greenhouse gases emissions are as follows: - U.S.A and Canada 25%, Europe, 21%, Former Soviet Union, 12%, Industrial pacific Asia, 5%, developing Asia, 19%, South and Central America, 11 %, Middle East and North Africa, 3 %, and Sub-Saharan Africa 4 %. (International Energy Agency, 2000). African can attract CDM projects but only in those countries that offer favourable investment environments will reap maximum benefits. Off the total 2944 projects in the pipeline, Asia -Pacific has the highest number of CDM projects with 2137 which accounts for 74 %. Latin America is second with 635 project accounting for 22 %. North Africa and Middle East accounts for 43 CDM projects with 1.5 %. And Sub-Saharan Africa with 38 CDM projects accounting for 1.3 % of the global CDM projects. (Mutevu, 2010).

### **1.1 The problem.**

Africa has so far benefitted little from Clean Development Mechanisms (CDM). Up to 2013, there were only 141 registered CDM projects in Africa, making up only 2.12% of the total registered CDM projects in globally, of these 8 are in Kenya. The purpose for this paper is to come up with researched information which shows factors hindering Africa from successful implementation of CDM projects and evaluate how carbon emission reductions and energy management relates to climate change and sustainable development in Africa.

### **1.2 Aim and Objectives**

The aim of this paper is to focus on experimentally researched information on factors that are an impediment to the implementation of clean development mechanism (CDM), and the effects and solutions on carbon emissions reduction and energy management initiatives for sustainable development in relation to climate change in Africa. The objectives are



- i). To identify some countries in Africa where experimental studies have been done on factors which hinder implementation of CDM and the research methods, results, findings obtained and application in providing solutions on the way forward for implementation of CDM in Africa.,
- ii). To evaluate the impacts of the failure and or success to implement the clean development mechanism on carbon emissions reductions and energy management in relation to climate change and sustainable development in Africa and
- iii) To suggest solutions that can be used to accelerate the implementation of CDM in Africa.

## **2 Literature Review**

### **2.1 The concept and rationale of Clean Development Mechanism**

Clean Development Mechanism (CDM) is a provision of the Kyoto Protocol held in 1997, that ensures that all parties (of developed countries referred to as Annex 1 Parties and developing countries referred to Non Annex 1 parties) to the protocol benefit from the project activities designed to reduce emission of greenhouse gases into the earth's atmosphere (Climate Network Africa, 2006). CDM provision aims to assist Parties not included in Annex 1 achieving sustainable development and in contributing to the ultimate objectives of Kyoto Protocol. CDM is also aimed at enabling Annex 1 Parties to meet their GHG emissions reduction obligations by supporting sustainable development projects located in the Non- Annex 1 countries (Climate Network Africa, 2006). It is assumed that the Africa region and other developing countries are to benefit from CDM projects and also have access to other sustainable developments funds that may be made available by the developed countries. CDM is one of the new mechanisms contained in the Kyoto Protocol to the United Nations Framework – Convention on Climate Change (UNFCCC). The CDM is intended to bring about cooperation in emissions of GHG's reduction between industrialized countries, for which GHG reduction is mandatory under the Protocol, and the developing countries, which for the time being are allowed to continue emitting GHG's. The concept was, for a tax to be levied on Annex 1 Parties for non-compliance with their GHG emissions reduction commitments. Under this arrangement, those Annex 1 Parties that failed to meet their GHG reduction targets or take expected actions would be charged a levy, and the monies would thus obtained would go in to a fund to assist Non-Annex 1 parties with their emission reduction and limitation efforts even , these were not mandatory. This is what led to clean development mechanism. (Climate Network Africa, 2006).

CDM projects promises developed countries certified emissions reductions (CER) if they comply with their quantified emissions targets and developing countries sustainable development benefits if they participate and invest in clean development technologies. Energy development and management through CDM investments transfer can contribute to sustainable development (Mutevu, 2010). According to (Sokona et al, 2000), it can be said that the four most important requirements for the satisfactory functioning CDM projects are that, (i) It functions on a multilateral basis (ii) Ensure that “ avoided future GHG's emissions have equal priority status as emissions reductions.” (iii) Operates to an explicit set criteria that prioritize sustainable development as well as GHG's emissions mitigation. (iv) Incorporates those criteria that are of



special interest to Africa into the notions of certifications and baselines, as well as the constitution of the Executive Board and other operational entities.

## 2.2. Advantages and disadvantages of CDM in Africa

A study carried out in by (Mutevu, 2010) showed that by implementing CDM projects in Kenya, several benefits would be realized, which included and not limited to the following: technology transfer, payments for carbon credits, improved environmental conservation, reduced soil erosion, increased foreign direct investments, reduced indoor and outdoor pollution and increased growth of sustainable development and increased responses to management practices of climate change. The Burkina Faso study by (World Bank, 2000) identified the benefits of using CDM projects in Africa as emphasis on renewable energy sources, for example introduction of photovoltaic systems to create social benefits such as access to safer drinking water, the PV program to create market and employment opportunities, increased forestry through afforestation and reforestation for sustainable development, agricultural technology improvement, fuel saving transportation options such as improved technologies, less polluting industry and mining production methods and ecological restoration, improved waste management practices all for improved sustainable development.

The disadvantages of implementing CDM projects in Africa are few and limited. They include and are not limited to the following:- CDM has never been tried before, there is an atmosphere of suspicion about the intention of Annex 1 Parties, certain proposals on CDM appear the adverse social effects the projects may have on local populations, project proposal in the area of land use change and forestry touch on very sensitive areas to with land tenure, and over-emphasis on energy may jeopardize development funding for other sectors of development (Climate Network Africa, 200).

## 3 Methodology

Case studies approach of several countries in Africa has been used in this paper, which included, Kenya, Burkina Faso, Sudan, Swaziland, South Africa, and other countries in Africa. These case studies investigated on a variety of sectors and of CDM projects which were implemented or were proposed to be implemented which included, afforestation & reforestation, transport, energy, industry, agriculture and wastes. These case studies were done between 2000 and 2010.

The method used to collect in most of these case studies included but were not limited to the following; interviews, questionnaires, literature review, field visits and observations, website and internet sources were also used for data collection.

The methods used to analyze data included SPSS computer package which resulted into table, graphs, pie charts and percentages, some of which are used in this paper.

## 4 Results and discussion.



A study done in Kenya on the various barriers and gaps affecting the implementation of CDM projects came out with the following results (Mutevu, 2010). The project financing barriers and gaps came out as the most significant to the development of CDM projects among 80% of the 20 institutional participating respondents interviewed. Institutional barriers and gaps had 70% of the respondents interviewed acknowledging that it was another impediment to CDM implementation in Kenya, while 60 % of respondents saw policy barriers and gaps as other impediments slowing CDM projects development in Kenya. The same study showed that 90%, 53% and 60 % of the respondents drawn from the private sector, public sector and civil society organizations respectively showed admitted that there were presence of barriers and gaps that were key impediments to CDM development in Kenya, as indicated by the Table 1.1.

**Table 1 Barriers and gaps that were key impediments to CDM development in Kenya**

Type of Barrier	Respondent by Sector					
	Public		Private		Others	
	No	%	No	%	No	%
Policy Barriers and Gape	5	17	3	10	8	27
Project Financing Barriers & Gaps	4	13	12	40	5	17
Institutional Barriers & Gaps	7	23	12	40	5	17
Percentage (%) sectoral distribution	16	53	27	90	18	17

Source Mutevu, (2010)

**Table 1.2 Shows the greenhouse gases (Co2) emission abetment in the Burkina Farso case study that could be converted in a similar CDM project**

Component	Cost (US\$)	Co2 emission 6years	Abateme nt 30 years	Unit abateme nt cost (6 years)	Unit abatemen t. Cost (30 years)
Improved carbonization	650,000	916	15,170	0.71	0.04
Sustainable forest management	970,000	245	3,825	3.96	0.25
Kerosene Stoves	500,000	271	6,006	1.84	0.08
Solar Units	280,000	18	163	15.49	1.72
Total	2,500,000	1,450	25,164	1.66	0.10



Source: World Bank, CDM in Developing countries, Global Division, 2000. Presented in Climate Network Africa, 2006.

The overall objective of the Burkina Farso project was to contribute to meeting the rapidly growing urban demand for household fuels without further loss of forest cover or loss of ecosystem's carbon sequestration potential (Climate Network Africa, 2006). The Burkina Farso project was co-financed and supported by the AIJ- Activities implemented Jointly component at \$2.5 million for the purpose of development of low carbon and non-carbon energy sources. According the World Bank, NSS study, 2000, estimates this was equivalent to preventing the leveling of 130,000 tons of wood for charcoal burning. It also opened expanded and strengthened the market for non-carbon sources of energy and contributed to 300,000 tons of Co<sub>2</sub> emissions per year. Over a period of five years the project was expected to produce an estimated an estimated 1.5 million tons of carbon.

Table 1.2. Shows the greenhouse gases (Co<sub>2</sub>) emission abatement in the Burkina Furso case study that could be converted in a similar CDM project. The Burkina Farso example emphasizes the areas for CDM investment in Africa, namely sustainable forestry management and renewable energy (especially Solar Energy and Bio-energy), and their various linkages with Sustainable Development. According to Kenya's Least Cost Power Development Plan (LCPDP), biomass including wood fuel, charcoal, and agricultural waste accounts for 75% of the total energy consumption by urban and rural populations in Kenya (Ellis, et al, 2013).

### **Recommendations and areas for further study**

The solutions proposed for Burkina Faso and Kenya in overcoming the impediments that hinder the implementation of CDM projects in Africa are given as- introduce efficient carbonization techniques, enhance community participation, create a black and white lists for approving CDM projects, promote in-country expert capacity building in CDM projects, provide tax incentives to CDM investors, eliminate corruption by strictly enforcing the law, arresting and taking to court the corrupt individual people, develop less polluting industry and mining production methods and ecological restoration, promote forestry, reforestation and forest conservation, encourage the importance of renewable energy sources and non- GHG emitting source of energy as well as the promotion of fuel substitution, promote fuel saving transportation options such as improved environmentally friendly technologies and more effective transportation systems. CDM projects in recipient countries should contribute to poverty eradication, job creation and improved standard of living

### **Conclusions**

The findings of the studies done in Kenya, and Burkina Faso show the following factors to be hindering implementation of CDM:- policy barriers, project financing gaps, institutional barriers and gaps, lack of information and knowledge on CDM, government bureaucracy, corruption, poverty, joblessness and limited resources. Another conclusion that can be drawn from the two study cases is that CDM project should be compatible with and supportive of national and development priorities and strategies, contribute to cost-effectiveness in achieving global benefits and endeavor to address all relevant sources, sinks, and reservoirs of greenhouse gases.



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