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The use of the Clean Development Mechanism (CDM) tool to improve city development in Africa

Opaluwa Ejiga[1] and Professor Okedele S. Olaniyi[2]

[1]Caleb University, Lagos, Nigeria
[2]University of Lagos, Lagos, Nigeria

ABSTRACT: The process of city development is a major source of green house gas (GHG) emission, particularly in developing countries where there are insufficient policies and guidelines on limiting environmental pollution. An attempt to reduce this excess GHG emission has resulted in the establishment of CDM tools, particularly for developing countries. Clean Development Mechanism (CDM), is one of the alternative instruments created by the 3rd Conference of Parties (COP-3) to the United Nations Framework Convention on Climate Change (UNFCCC). It is structured to enable signatory countries reduce their carbon emissions. Currently, CDM is rated as the main international market-oriented tool tailored to minimise excessive carbon emission. CDM was specifically initiated to support developing nations in attaining their sustainable development goals, but it is yet to receive a landmark achievement in the specified countries. Over 200 review studies; which include articles and literature, have been carried out. Findings of the review disclosed that, left to market forces, the CDM does not impart meaningful development to developing nations. This paper is focused on how to improve city development through the use of CDM in Africa by, contributing to the current policy debates and decisions; comparing unilateral and bilateral/multilateral projects to determine which delivers more developmental benefits. It is submitted that a strategic implementation of CDM tools in the region will boost city development and support architectural practice through improved sustainable urban settlements, encouraging green architectural design, providing better environmental air quality, increased employment opportunities, reduction of fossil fuel consumption and promotion of renewable energy technology.

Conference Theme: Sustainability and Urbanism
Key words: clean development mechanism, climate change, developmental benefits, sustainable opportunities, unilateral/bilateral/multilateral projects.

INTRODUCTION

Global burning issues that pose serious connected challenges of climate change, clean energy and sustainable development are faced by countries of the world. The recent COP17 – 17th Conference of Parties held in Durban South Africa, once again saw a recommitment of developed nations to the implementation of Kyoto Protocol, Bali Action Plan and the Cancun Agreements. A well advanced carbon market which was borne out of previously stated agreements seeks to reduce greenhouse gas (GHGs) concentrations thereby mitigating the effects of global warming. The Clean Development Mechanism (CDM) as one of the alternative instruments has a dual objective of attaining Sustainable Development (SD) in developing countries also termed non-annex 1 countries and cost-effective reduction of GHGs in developed countries also termed annex1 countries. Over a decade since the birth and ratification of the protocol it is still doubtful if CDM is achieving one of its twin purposes; SD. To date encompasses a vast body of writings on the subject including economic, political, methodological and sustainable development aspects of how this tool is manifested operationally. This paper focuses on SD facet of the CDM and how CDM can improve city development in developing nations.

This paper will begin by tracing the context and historical background of CDM to establish its origin and conditions around its birth. It proceeds to an appraisal of the CDM to see in what manner the CDM impacts SD. Thirdly, development in the CDM project portfolio and the current status of the market are given a brief account as the conditions for assessment of realization of sustainable development.

THE EVOLUTION OF CLEAN DEVELOPMENT MECHANISM

The Kyoto protocol was designed to mitigate climate change through collaboration between developed (Annex I) and developing (non-Annex I) countries. Clean Development Mechanism, is one of the alternative instruments created by the Third Conference of Parties (COP-3) to the United Nations Framework Convention on Climate Change (UNFCCC) held in 1997 in Kyoto to enable signatory countries reduce their carbon emissions. Other

methods prescribed at the convention include; Joint Implementation (JI) mechanism and Emission Trading (ET) mechanism.

Clean development mechanism evolved from the combination of the two principal objectives of; the Clean Development Fund (CDF) which is to enable sustainable development through the funding of projects from penalties' paid by Annex I who failed to meet their obligations and that of the Joint Implementation which ensured that Annex I countries gained credits on Certified Emission Reductions (CERs) through participation in climate change mitigating projects. As a result of derived dual objectives of CD mechanism it gained acceptability between both parties (Annex I and non-Annex I countries), leading to its dominance as an international market-oriented tool tailored to minimise excessive carbon emissions. It is anticipated that the CDM will resolve the gap between the north and south climate change and development. The double target of this market tool can be seen as both a source of synergy and conflict.

THE GAP IN CLIMATE CHANGE AND SUSTAINABLE DEVELOPMENT

The idea of SD became well-liked and accepted with the Brundtland Report of 1987 by the World Commission on Environment and Development titled "Our Common Future". In 1988, at a conference organized by World Meteorological Organisation the eminent danger of man induced global warming and its consequence on climate change were brought to the notice of policymakers. Although, having shared characteristics (influence of man on the environment), these ideas remained in disagreement with each other for a long time. Arguments on climate change (CC) have been conducted on the grounds of natural science, while, arguments on SD have aligned with social and human science. These debates running mainly in parallel have played out in different organisational activity scenes with little cross-fertilization. The two debates continued independently until a policy to direct the focus towards combining and connecting CC and SD was created in 2001/2002 by the Third Assessment Report of the International Panel on Climate Change (IPCC) and the World Summit on SD.

WRITTEN WORKS ON CONNECTIONS BETWEEN CLIMATE CHANGE AND SUSTAINABLE DEVELOPMENT

From that time on, numerous publications have treated a variety of topics on the subject matter including synergies and trade-offs between the two. Amongst the contributions were attempts to express CC as a developmental challenge rather than an environmental challenge (Swart, Robinson et al. 2003; Davidson, Halsnaes et al. 2003). The journal; "Climate Policy" published a supplement report on the linkages between CC and SD: Grubb (2003). A summary of the areas of dispute and important subjects on the discourse include: Fairness, Opinions of developing nations, acclimatisation and poverty and the effects of CDM projects on sustainability (Olsen 2005).

Until the present Developed countries have maintained a perspective that is a global environmental problem while Developing countries perceive it to be a development problem. Researchers from the latter are united in their emphasis that SD are time and again not addressed in the Climate discourse (Najam et al. 2003). In the development of the assessment process by the IPCC three important points featured in the first three reports which are: cost effectiveness, equity and alternative development paths. Every discussion on Climate Change is aimed at one very important point which is the stabilization of Greenhouse Gases (GHGs), was in the IPCC third assessment report concluded to be reliant on development paths and socio-economic choices and as much as on policy. This insightful statement has helped a great deal in framing CC within the context sustainable development. Other debates emanating from developing countries are; the unbalanced strategic plans which favours cost-effective reduction of Carbons over equity, palliation over adaptation and carbon trading over SD (Wiser 2002; Tovey 2009; Huq et al 2002). Other contributions raise the issues of how CC is affected by geographic location, a factor which to a great extent affects the possibility of SD projects (Wilbanks 2003) and the need to contextually consider local and regional policies in the examination of trade-offs and synergy for climate abating policies in developing countries (Brown et al 2004).

From the inception of the discourse the factor of equity has been a front burner, centering on fairness and justice in relation to emission reduction targets. Studies on this matter sponsored by concerned parties have focused on the different principles of equity as it suits the role they want to play in target allocation and consequences. The ethical standards of equity are: responsibility; emission reductions must be proportional to the contributions to the problem, capability; emission reductions must be proportional to the capability to contribute based on income, technology etc., and need; emission reductions must leave room to develop and eradicate poverty (Olsen 2005). In order to strike a balance it is needful that the ethical standards of equity be defined within the SD framework rather than the CC framework which is rather limiting. The Kyoto protocol was not explicit in the definition of equity; justice and fairness but was rather a political solution for sharing the burden.

Until 2001, major focus was on preventive measures (mitigation policies) rather than on curative measures (adaptation policies) because, CC was perceived as a medium to long term (50-100 years) challenge. A recent additional insight to the argument is poverty and adaptation. As a result of visible impacts (e.g. the draughts in the horn of Africa) of CC, adaptive reactions are featuring often on the programs of developing countries and developed countries. Developed countries are taking the CC problem seriously because of the relationship between poverty and adaptive solutions. Sectors such as water, health, infrastructure and agriculture are affected by CC and developing countries are expected to be worst hit as a result of their reliance on nature due to the disproportionate susceptibility of poor people and their below average ability to adapt. Suggestions have been

made and programs have been generated toward the mainstreaming of adaptation into development policies and development aids (Huq et al 2004; Bloom 2004; Devereux et al 2004; Bank et al undated; Danida 2005).

PROSPECTS OF CDM AND UNRESOLVED ISSUES

Evolved from the bargain and blend of JI and CDF as earlier stated, the CDM inherited a twin goal which by implication was believed would be beneficially effective to all parties, particularly for the less developed nations who looked forward to its sustainable development benefits; investments, poverty alleviation, technological transfer etc hence leading to its popularity in the market (Kaupp et al 2002; Bhandari 2003). Despite its wide welcome there were still some worry about the modalities and procedures yet to be decide upon (Cigaran 2004). The protocol establishing the mechanism stated that; emission reductions must be real, measurable and long-term and must be additional to those that would have otherwise occurred, the supervision of such projects is vested in an Executive Board (EB), administrative overheads and adaptation expenditures are to be funded by profits from approved project activities. What the protocol didn't state were; the systems for establishing baselines, if carbon sinks would be covered by the mechanism and ascertaining additionality. Down the line, mainly after the seventh Conference of Parties (COP7) that clarification and procedures for sinks and small-scaled projects were developed.

WAYS IN WHICH CLEAN DEVELOPMENT MECHANISM PROMOTES SUSTAINABLE DEVELOPMENT

Over the years, the expected synergy and win-win concept proposed by the mechanism does not reveal the entire situation in context as shown by a wide variety of discourse.

What is sustainable development?

The actual impact of CDM projects on sustainable development is difficult to assess because it depends on the definition of sustainable development which is defined by most countries in very broad terms. Many countries have established and published criteria to assess whether a project contributes to sustainable development. However, they are often very general and comprise many different aspects, including environmental, social, economic and technological criteria (Schneider 2007). The following are examples of standards for the above named criteria: environmental: reduction of GHGs and fossil fuel consumption, resources (local) conservation, better impact on human health and reduced pressure on the local environment; social: poverty alleviation, equity and provision of basic amenities to the people; economic: financial returns to local entities and a sense of balance of payment that is beneficial; technological: the advancement, utilisation, dissemination and/or transfer of unharmful and sound environmental technology (Schneider 2007; Olsen 2005). This implies that there are no true explanations to what constitutes SD, as this concept varies from one host country to another based on what it identifies as its development priority. As common with most things, this approach has some flaws one of which is that different parties rank different aspects of SD as important (Brown 2003; Kim 2003). Due to unbalanced power relations among stakeholders, most times it's the resource strong party that dictates the conditions for the carbon trade (Nelson et al 2003). Also, another challenge with this approach is the general inclination of competition among Non-Annex I countries to entice CDM investments by setting low yardstick of SD (Sutter 2003). Owing to the last point issues of who guarantees sustainability of CDM projects and how have risen.

STUDIES ON CDM AND SUSTAINABILITY

After the protocol in 1997 literary works have attempted to examine the likely contributions of CDM to SD, examples of such works include how far the CDM would advance SD goals by Austin and Faeth in 2000, if the CDM would increase or stall SD (Banuri 2000), whether the CDM can influence SD (Watson and Fankhauser 2009) etc. Common to most of the early studies between 2000 and 2002 was the absence of CDM project data as the mechanism was in its early stages however; research was carried out based on literature reviews from potential projects. Results from these indicated viability of SD and other gains CDM projects bring to non-annex I's. Along with the potentials of the market tool these debates also brought to light issues of how much is CDM contributing to SD, identifying and reacting to the non-carbon benefits of CDM projects, and alternative measures to check situations where trade-offs rather than the combined effects exists between the aims of the CDM.

Between 2002 and 2007 most research works focused on the evaluation of the effect of CDM projects on sustainability by using criteria and indicators. Varying opinions between the methods/procedure occurs when it comes to choosing criteria and indictors for assessment which tend to vary with the type of project and if the measurement of the impacts is applicable to the project at local, national and regional levels. There exist variances in the manner indicators are created and weighed against each other for examining the different parts of SD employing quantitative and qualitative techniques, or mixing both. Different methods have been suggested for use in the evaluation of sustainability in CDM projects. These approaches are: ranking methodologies, cost-benefit analysis, guidelines, checklists, cost-effective analysis. Others include: negotiated targets and multi-criteria assessment, which can be used singly or combined.

A widespread discovery of using any of the sustainability evaluation tools to case studies of CDM projects shows that there is a compromise between both goals of the CDM with cost effective reductions of GHGs being the more favoured. It is important that these tools are critical on the tradeoffs and spot crucial indicators such as poverty

Clean development mechanisms' implementation in Africa

Currently, there are very few registered CDM projects in Africa. Below is a table showing the distribution of wind and solar power CDM projects in various countries. This simply implies that all current CDM projects in Africa are

in the minute fraction, and to think that Africa with majority of its land mass lying on the equator where solar radiation is high is not benefiting from such projects. Some of the potential emission reduction opportunities on the continent include: use of gas for electricity generation, utilization of agricultural residues for electricity generation, energy efficient lighting, utilization of compressed natural gas for transport fuel, more efficient passive and full utilization of solar technologies in the residential, commercial and industrial sector, building efficiency, utilization of bio-fuels as transport and cooking fuel etc (Carbon Trade and Clean Development Mechanism Projects - An Emerging Market, 2010). As noted above, no project has yet been registered in the area of building efficiency. Lack of projects in this sector is considered a missed opportunity, as cumulative carbon reductions from this sector could be meaningful and especially for the developing countries of Africa, were sustainable developmental benefits as; investments, technology transfer and contributions to poverty alleviation are lacking.

Wind CDM projects		
Country	Projects	MW
India	567	8360
China	794	46206
Mexico	22	2470
Brazil	27	1860
South Korea	13	371
Chile	7	274
Morocco	7	584
Cyprus	5	241
Egypt	4	406
Dominican Republic	4	129
Uruguay	4	94
Costa Rica	3	82
South Africa	3	600
Nicaragua	3	103
Sri Lanka	3	30
Serbia	3	396
Israel	2	34
Philippines	2	113
Ecuador	2	8
Thailand	2	62
Jamaica	2	39
Argentina	2	17
Kenya	1	310
Honduras	1	102
Azerbaijan	1	50
Panama	1	81
Mongolia	1	50
Senegal	1	125
Colombia	1	20
Tunisia	1	34
Vietnam	1	30
Cape Verde	1	28
Mauritius	1	18
Total	1492	63326

Table 1: Global Distribution of wind CDM projects

Source: (UNEP 2011)

Solar CDM projects		
Country	Projects	MW
South Korea	26	157
China	39	490
India	24	231
Thailand	5	463
Israel	3	225
United Arab Emirates	2	110
Rwanda	2	0.04
Peru	2	40.00
Morocco	1	8
Madagascar	1	
Chile	1	0.1
Tunisia	1	1
Lebanon	1	
Indonesia	1	
Total	109	1725

Table 2: Global Distribution of solar CDM projects

Source: (UNEP 2011)

The need for CDM implementation in Africa

As can be seen from previous sections of this paper, CDM projects must meet some key requirements. Clean Development Mechanism projects are classified into two categories; large/normal projects and small scale projects. There is generally a poor investment in the CDM projects in Africa, as at June 2009, out of 1681 approved CDM projects world wide in all sectors, there were just five (0.3%) such projects considered to contribute to SD; Moldova hosted two, India had two and South Africa had one (Jiang, 2009). This is because investors ignore the issue of equity and consider it least relevant to the CDM, which is contrary to the views of users of CDM projects, for example, investors prefer to engage in pure climate oriented projects which reduce CO2 emissions the cheapest and most effective way than in solar homes CDM projects which ranks high in developmental benefits (Olsen, 2005). It has been observed that there is usually a trade-off between the two objectives of the CDM in favour of cost effective reductions of greenhouse gases (Sutter, 2003; Markandiya et al, 2002; Kolshus et al, 2001).

The adaptation of the full potential of such projects is being challenged by: the complex procedure for receiving CDM approvals; which make CDM project implementation time consuming, the absence of readily useable sustainable development criteria for CDM project proponents to consider while preparing a PDD, inadequate DOEs in Africa, the general uncertainty as to what happens to carbon credits after 2012; as commitments to the protocol expires in 2012. Others include: investment, technological, infrastructure, institutional and management barriers.

Effective approach to SD through CDM

Sustainable development which promotes synergy and dynamics between man-made and natural systems can be achieved via Clean Development Mechanism which in-turn contributes to CO_2 reductions and mitigates its effect

on the climate/ecosystem. New technologies and new developments are expected to contribute immensely to the conceptual framework.

For example professionals within the industry have in recent years said that in order for the built environment to meet with its qualitative and quantitative targets, sustainable principles must be observed. According to a statement on the "Earth Pledge. Org" web site; construction projects consume large amounts of material and produce tons of waste; therefore, buildings can produce stress on natural systems both as consumers and as producers of waste. Using great amount of resources during their life cycle (materials, energy and water); they also produce pollution and emission that aggravate critical environmental situations (Poveda, 2009). Sustainable construction/building/ architecture aims at minimising the environmental impacts associated with infrastructural construction, life in use and at the end of their life and making a positive and appropriate contribution to the social environment they inhabit, by addressing peoples practical needs while enhancing their surrounding environment and their psychological and physical well-being (Hui, 2002). In the light of this, products of construction such as buildings, roads etc. should be regarded as organisms where synergy occurs. "The principles that rule most ecosystems should be applied to the design of human environment. Balance, synergy and interdependence are key aspects to create a harmonic relationship between man made and natural systems" (Poveda, 2009). Various calls for reform in the industry have bordered on a holistic approach to confront the challenges of resource scarcity and abuse of the planet's carrying capacity. Ecological philosophy in the construction industry require imputes of all related experts, i.e. architects, engineers and construction mangers/specialist but not exclusive to these alone. Each professional contributes ecological and technological innovations, leading to a sound environmental and cost effective resolution of the way human development process contribute to the environment that they change. Green development is a "two edged" sword forged with ecological and technological sustainability. With one "edge" it promotes development of balance and integration of components of natural system and processes reducing its effect on the atmosphere, while the other "edge" simultaneously employs smart engineering systems using resources in methods that are environmentally respectful and have awareness of the limitation of resources. Up until recent times buildings have been separated from their context, using technology to dominate nature, this practice is gradually giving way to the re invention of the future through technology and science in terms that are socially and ecologically responsible.

Every activity of man is characterised by a cycle, this life cycle resides with every constructional activity or infrastructural development which shows a far reaching/inclusive image of how these expressions of development act toward the environment. Professionals in this era need to be conscious of various aspect of developmental interactions; interactions with location (site), functions of the unit (systems and subsystems) and the performance of individual members related by interdependence (assemblies and subassemblies). Sustainable Developmental activities should be guided by this very important principle that the satisfaction of human needs involves the protection of natural systems.

CONCLUSION – SUSTAINABLE DEVELOPMENT IS POSSIBLE IF...

Gains of sustainable development can only be ascertained on a project-by-project basis within its current framework. No method or available data exist for measuring the total contribution of the CDM to SD. Achievements of SD can at best be inferred form the trends of CDM project portfolios and the carbon market. With regards to popular CDM projects preferred by most investors, many literature on the subject have established that there are no developmental benefits in them, like stated earlier they are most common because, they are low-cost emission reduction activities. Judging from the perspective of sustainable development the Clean Development Mechanism is ineffective; reasons being that it is not engaging in renewable energy/carbon forestry projects that have high development co-benefits. In line with factors previously mentioned within the text, Olsen in her review summarised the challenges facing the non-developmental realisation of the CDM:

- Defining sustainable development
- Lowering transaction costs
- Managing the market (the biggest challenge)
- Access to finance and use of overseas development assistance

Negotiating the CDM post 2012 in addressing these subjects of concern would turn the "Kyoto surprise" into an excellent instrument.

REFERENCES

"Carbon Trade and Clean Development Mechanism Projects - An Emerging Market in Nigeria" (2010). Retrieved from http://www.detailsolicitors.com/index.php?section= news&cdm=details&newsid=19.

"Estimating the amount of CO2 emissions that the construction industry can influence". Department for Business Innovation skills. Retrieved from http://www.bis.gov.uk.

"Kyoto Protocol to the United Nations Framework Convention on Climate Change". (2011). Retrieved from http://unfccc.int/resource/docs/convkp/kpeng.html

Austin, D. & Faeth P. (2000). How much sustainable development can we expect from the Clean Development Mechanism? An overview. In financing sustainable development with the clean development. World Research Institute, Washington D.C.

Bank, A. D., Bank, T. W., U. K. Department for International Development, E. U. Directorate – General for Development, G. Federal Ministry for Economic Cooperation and Development, T. N. Ministry of Foreign Affairs – Development Cooperation, UNDP & UNEP. (Undated). Poverty and climate change. Reducing the vulnerability of the poor through adaptation.

Banuri, T. & Gupta, S. (2000). The Clean Development Mechanism and Sustainable Development: an economic analysis. Asian Development Bank

Bhandari, P. (2003). Is the euphoria over CDM unwarranted. The Financial Express: 2

Bloom, G. (2004). Health in a changing world. Ids Bulletin-Institute of Development Studies 35

Brown, K. & Corbera E. (2003). A multi-criteria assessment framework for carbon mitigation projects: putting development in the centre of decision making. Tyndall Centre for Climate Change Research

Brown, K., Adger, W. N., Boyd, E., Corbera-Elizalde, E., & Shackley, S. (2004). How do CDM projects contribute to sustainable development? Tyndall Centre for Climate Change Research Technical Report 16

CDM Rulebook "Eligibility Criteria in Paragraph 6(c)". (2011). Retrieved from http://www.cdmrulebook.org/152

Cigaran, M. P. & Iturregui, P. (2004). Institutional strategy to promote the CDM in Peru. UNEP RisØ Centre on Energy, Climate and sustainable development:

Danida 2005. Danish climate and development action programme. Climate proofing Danish development cooperation. Draft version for consultation. Ministry of Foreign Affairs:

Davidson, O., Halsnaes, K., Huq, S., Kok, M., Metz, B., Sokona, Y., & Verhagen J. (2003). "The development and climate nexus: the case of Sub-Saharan Africa" Climate Policy 3S1

De Coninck, H.C., Haake, F. & Van der Linden, N. H. (2007). Technology transfer in the Clean Development Mechanism. Energy research Centre of the Netherlands- ECN-E-07-009.

Dechezleprêtre, A., Glachant, M. & Ménière, Y. (2007). The Clean Development Mechanism and the International Diffusion of Technologies: An Empirical Study. JEL Classification: Q5, Q55. Retrieved form http://www.feem.it/Feem/Pub/Publications/ WPapers/default.htm

DeFries, R., Achard, F., Brown, S., Herold, M., Murdiyarso, D., Schlamadinger, B., & de Souza, C [Jr]. (Elsevier 2007). Earth observations for estimating greenhouse gas emissions from deforestation in developing countries. Environmental science & policy, 10: 385–394. doi:10.1016/j.envsci.2007.01.010.

Den Elzen, M. & Hohne, N. (2008). Reductions of greenhouse gas emissions in Annex I and non-Annex I countries for meeting concentration stabilisation targets. Climatic Change, 91:249–274. DOI 10.1007/s10584-008-9484-z.

Devereux, S. & Edwards J. (2004). Climate change and food security. Ids Bulletin-Institute of Development Studies 35

Grubb, M. (2003). "On carbon prices and volumes in the evolving 'Kyoto market" OECD Global Forum on Sustainable Development: Emissions Trading. Concerted action on tradable emissions permits country forum, Paris 17-18 March, 2003.

Huq, S. & Reid, H. (2004). Mainstreaming adaptation in development. Ids Bulletin-Institute of Development Studies 35

Huq, S., Sokona, Y., & Najam, A. (2002). "Climate change and sustainable development beyond Kyoto". International Institute for Environment and Development: 2

International Association for Energy Economics. Retrieved from https://www.iaee.org /en/publications/proceedings.aspx

Iwayemi, A. (2008). Nigeria's Dual Energy Problems: Policy Issues and Challenges.

Jiang, P. & Tovey, K. (Elsevier 2009). Overcoming barriers to implementation of carbon reduction strategies in large commercial buildings in China. Building and Environment xxx: 1–9. doi:10.1016/j.buildenv.2009.09.004.

Kaupp, A., Liptow, H. & Michaelowa, A. (2002). CDM is not about subsidies – it is about additinality. Energize 1

Kim, J. A. (2003). Sustainable development and the CDM: a South African case study. Tyndall Centre for Climate Change Research

Kolshus, H. H., Vevatne, J., Torvanger, A. and Aunan, K. (2001). Can the Clean Development Mechanism attain both cost-effectiveness and sustainable development objectives? Oslo, Norway, Centre for International Climate and Environmental Research (CICERO)

Lile, R., Powell, M. & Toman, M. (1998). Implementing the Clean Development Mechanism: Lessons from U.S. Private-Sector Participation in Activities Implemented Jointly. Discussion Paper 99-08. JEL Classification Numbers: Q28, F21. http://www.rff.org.

Markandya, A. and Halsnaes, K. (2002). Climate Change and Sustainable Development. Prospects for developing countries. London, Earthscan Publications Limited

Michaelowa, A. (2005). CDM: current status and possibilities for reform. HWWI Research Paper No. 3 by the HWWI Research Programme International Climate Policy. ISSN (Internet) 1861-504X.

Minang, A. P., McCall K. M. & Bressers A. HTh. (2007). Community Capacity for Implementing Clean Development Mechanism Projects Within Community Forests in Cameroon. Environ Manage, 39:615–630. DOI 10.1007/s00267-005-0275-2.

Najam, A., Rahman, A. A., Huq, S., & Sokona, Y. (2003). "Integrating sustainable development into the fourth assessment report of the Intergovernmental Panel on Climate Change, Climate Policy 3, supplement 1: S9-S17

Nelson, K. C. & De Jong, B. H. J. (2003). Making global initiative local realities: carbon mitigation projects in Chiapas, Mexico. Global Environmental Change 13

Okoro, O. I. & Chikuni, E. (2007). Power sector reforms in Nigeria: opportunities an challenges. Journal of Energy in Southern Africa, Vol 18 No 3.

Olsen, H. K, (2005). The Clean Development Mechanism's Contribution to Sustainable Development, A review of the literature. Energy, Climate and Sustainable Development, UNEP Riso centre. Retrieved from http://www.earthmind.net/labour/ briefing/docs/unep-2005-cdm-sustainable-development.pdf

Poveda, G. Z. M. (2009). Sustainability as Driver of Architectural Practices: San Francisco federal building case. Paper presentation - 26th Conference on Passive and Low Energy Architecture, Quebec City, Canada.

Schneider, L. (2007). Is the CDM fulfilling its environmental and sustainable development objectives? An evaluation of the CDM and options for improvement. Report prepared for WWF. http://www.oeko.de

Sutter, C. (2003). Sustainability check-up for CDM projects. Berlin, Wissenschaftlicher Verlag.

Sutter, C., & Parreno C. J. (2007). Does the current Clean Development Mechanism (CDM) deliver its sustainable development claim? An analysis of officially registered CDM projects. Climatic Change, 84:75–90. DOI 10.1007/s10584-007-9269-9

Swart, R., Robinson, J., & Cohen, S. (2003). "Climate change and sustainable development: expanding the options" Climate Policy3 3, Supplement 1: S19-S40

Thorne, S. & La Lovere, L. E. (1999). Criteria and Indicators for Appraising Clean Development Mechanism (CDM) Projects. HELIO International.

Wilbanks, T. J. (2003). Integrating climate change and sustainable development in a place-based context. Climate Policy 3, Supplement 1: S147-S154

Wiser, G. (2002) 'Frontiers in trade: the clean development mechanism and the general agreement on trade in services', *Int. J. Global Environmental Issues*, Vol. 2, Nos. 3/4, pp.288–309.

Zegras, P. C. (2006). As if Kyoto Mattered: The Clean Development Mechanism and Transportation. Energy Policy,