N°6 | 2014

CUTS International

Briefing Paper

Clean Development Mechanism Projects in the EAC: An Overview

Summary

This briefing paper analyses emission reductions and sustainable development benefits of Clean Development Mechanism (CDM) projects in East Africa, and provides recommendtions on improving the performance of such projects. Key among them is the need for a market-friendly environment for investment in CDM projects. The paper also indicates that hydro and reforestation projects and large scale projects have been found to perform best in promoting sustainable development.

Introduction

The United Nations Framework Convention on Climate Change (UNFCCC) was adopted in 1992 in order to tackle the major global issue of climate change. Thirty seven industrialized countries made specific legally binding commitments to the reduction of greenhouse gas (GHG) emissions by becoming signatories to the Kyoto Protocol in 1997. In light of their major contribution to the current high levels of GHG emissions, the Convention has primarily placed the burden of reducing emissions on developed countries under the principle of 'common but differentiated responsibilities'.

The Kyoto Protocol provides for carbon credits trading as a means for reducing emissions, Clean Development Mechanism (CDM) being one of the three flexibility mechanisms for carbon credits trading, which involves both developed and developing countries. As defined in Article 12 of the Kyoto Protocol, CDM's two main objectives are 1) to assist parties not included in Annex I in achieving sustainable development and in contributing to the ultimate objective of the Convention and 2) to assist parties included in Annex I in achieving compliance with their quantified emissions limitation and reduction commitments (UNFCCC, 1998). In essence, developed countries (Annex I) are able to receive certified emission reduction (CER) credits - each credit represents one metric ton of C02 - from projects that have been funded by developed countries in developing countries (non-Annex I), which allows the former to comply with their reduction targets while simultaneously assisting the latter in achieving sustainable development.

Over the last few years, a variety of CDM projects have been implemented across the East African Community (EAC). These are among the priorities of the East African Community Climate Change Master Plan 2011-2031 (EAC, 2011), that seeks to promote interventions which mitigate the effects of climate change. However, the CDM projects in the EAC constitute only a small part of the total amount of CDM projects on a global scale[1] and not all EAC partner states participate equally in CDM projects (e.g. Burundi not having any registered CDM projects), which could be explained by different levels of development e.g. overall emissions, human capacity and a growing electricity network arguably promoting greater CDM activity (Winkelman & Moore, 2011). In addition, the core CDM literature suggests that certain project types and scales have proven to be more successful at reducing emissions and providing sustainable development benefits than others. In this context, this briefing paper highlights the contributions and challenges of CDM projects in EAC[2] in terms of emissions reductions and sustainable development (SD) benefits, and outlines a set of recommendations on the way forward.

Contributions and Challenges of CDM projects: A literature review

Improving the quality of demonstrating additionality and setting appropriate emission baselines play a crucial role in ensuring the environmental integrity of the CDM. In the light of the CDM as an offsetting rather than a net reduction mechanism, it is important that "the CDM projects actually do reduce emissions to the extent that they are credited for" (Paulsson, 2009). Regarding the additionality of CDM projects, which addresses the question of whether the project would also be implemented without the CDM as policy intervention, it has been argued by Schneider (2007), Michaelowa & Umamaheswaran (2006), Cames et al. (2007), Haya (2007), and Michaelowa & Purohit (2007) that a substantial amount in their respective studies were found to be questionable. Moreover, Rosendahl & Strand (2009) contend that CDM projects do not necessarily result in full offsetting of GHG mitigation due to baseline manipulation and the likelihood of carbon leakage. According to Castro & Michaelowa (2008), the worst performers in terms of CER issuance are waste projects (31%), while industrial processing projects lead the ranks (79%) and renewable energy and energy efficiency projects display a decent performance, among which hydro power plants have the highest CER issuance rate (93%).

In terms of sustainable development (SD) benefits, after having assessed 16 officially registered CDM projects, Sutter & Parreño (2007) argue that despite the fact that 72% of the total portfolios expected CERs were likely to represent real and measurable emission reductions, and less than 1% were likely to make significant contributions to SD in the host country. In this sense, a variety of studies assert that the CDM involves trade-offs between producing cost-efficient emission reductions, which goes at the expense of achieving long term SD benefits (Sutter & Parreño, 2007; Pearson, 2007; Olsen, 2007). Also, the idea that small-scale projects contribute significantly more to SD than large-scale projects has been challenged by both Olsen & Fenhann (2008) and Subbarao & Lloyd (2011). In terms of project types, Watson & Fankhauser (2009) found that HFC, PFC, and N2O (i.e. industrial gas) reduction projects were found to have less SD benefits than renewable energy or forestry projects, which is confirmed by Alexeew et al. (2010) and Subbarao & Lloyd (2011), albeit the latter only for small-scale projects.

CDM Projects in the EAC: Emission reductions and sustainable development benefits

Given that 13 out of 38 CDM projects in the EAC have produced monitoring reports, the section on emission reductions will pertain to those projects for which monitoring reports were available. Because of the absence of SD impact studies, the analysis of SD benefits will have to focus on the Project Design Documents (PDD) of the currently registered projects, thereby laying emphasis on potential rather than actual impact. In order to be able to draw a comparison, categories of SD benefits were adopted. Similar to the study by Olsen & Fenhann (2008), these categories were primarily based on the data itself which was derived from the PDDs. Also, negative impacts were excluded and no different weights were attributed to benefits of the same category.

Monitoring reports: emission reductions

Of the thirteen monitoring reports available on the UNFCCC website, eight reports are about projects in Uganda (energy industries and afforestation/reforestation), while Kenya has three reports (energy industries) and Tanzania only one (waste handling and disposal). In retrospect, the projects have recorded lower emission reductions than previously estimated, except for Olkaria II (only recording an increase of 4.82% during the first monitoring period), Kiambere (73.22%), and to a much lesser extent Ishasha (0.98%). Most of these differences during the first monitoring periods are rather significant (i.e. 5 out of 13 projects are above the 72.79% mark). It should also be noted that the projects, which recorded the highest deficits on average during the first monitoring period, were those focusing on landfill gas combustion and biomass energy (respectively 95.38% and 72.79%). The geothermal project was the only project type which on average managed to exceed estimated reductions. On the other hand, the differences in emission reductions between hydro projects have ranged widely (if not widest) from not meeting 86.98% of the estimated reductions to an increase of 0.98%. Despite the disappointing results in terms of estimated reductions, based on a cut-off line of 45.000 tCO2e, it could still be observed that the hydro (except for Ishasha, WNEP, and Tana), geothermal power and biomass energy projects record the highest emission reductions. Overall, all of the CDM projects taken together have managed to achieve 62.82% of their estimated reductions.

The main reasons for lower emission reductions which were mentioned in the monitoring reports were a) plant availability (i.e. maintenance, downtime events/outages, b) start-up problems, c) coverage planted areas (i.e. planted less, burned, died out, and species composition), d) water availability/steam generation, and e) logistics (distribution and collection). In particular, reasons a), and c) could provide a partial explanation for the low emission reductions achieved by natural gas and reforestation projects and reason d) (the variability of water currents) for high variability of emission reductions by hydropower projects.

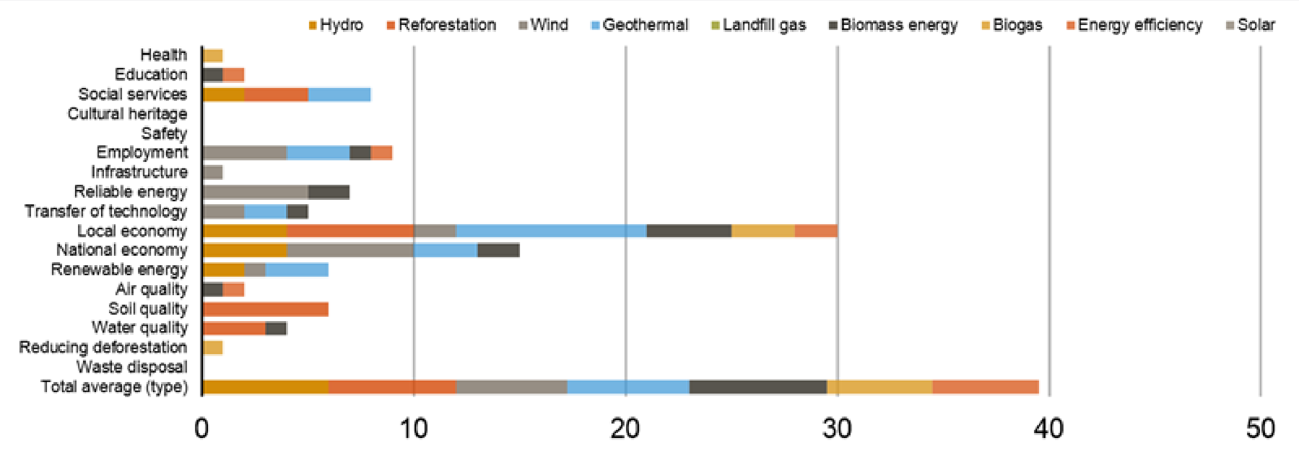
Table 1: Differences between estimated and actual emission reductions during the projects' first monitoring periods

Name of project (type)	Monitoring period	Estimated #1	Actual	Difference (E-A)	% (D/E x 100)
Mtoni Dumpsite (landfill gas)	01/01/2009 - 31/12/2009	303406.5	14009.93	289396.57	95.38
NBRP No 3. (reforestation)	01/04/2007 - 05/04/2012	29795	1936	27859	93.50
WNEP (hydro)	01/01/2005 - 31/10/2009	175015	22786	152229	86.98
NBRP No. 5 (reforestation)	01/04/2006 - 05/04/2012	31556	8393	23163	73.40
MSCL (biomass energy)	01/10/2008 - 30/06/2011	259254	140544.8	188709.2	72.79
Electrogaz (energy efficiency)	30/05/2010 - 31/05/2012	52736	22057	30679	58.18
Tana Hydro Power (hydro)	11/10/2011 - 31/12/2012	31449	18980	12469	39.65
Kachung (reforestation)	01/10/2006 - 22/11/2012	42159	31181	10978	26.04
Bujagali (hydro)	01/12/2011 - 31/10/2013	1648162	1400523	247639	15.03
Bugoye (hydro)	01/01/2011 - 31/12/2011	51074	50385	689	1.35
Ishasha (hydro)	01/07/2012 - 31/10/2013	26232	26489	-257	-0.98
Olkaria II (geothermal)	01/01/2012 - 31/12/2012	161520	169308.93	-7788.93	-4.82
Kiambere (hydro)	01/11/2012 - 30/06/2013	27319	47322	-20003	-73.22
Total	-	2839677.5	1953915.66	955761.84	37.17

Source: Data derived from monitoring reports.

In sum, it could be argued that EAC projects in the energy industries (i.e. hydro, geothermal, and biomass energy) are most successful at achieving actual emission reductions in total, while specifically hydro and geothermal projects were able to achieve their estimated reductions most successfully. These findings seem to correspond provisionally to those of Castro & Michaelowa (2008), who identified industrial processing industries (i.e. MSCL) as top performers while renewable energy projects perform averagely and waste projects poorly. However, given the limited amount of monitoring reports and the variability within and between specific types of projects, it still remains hard to say unequivocally which type of projects in the EAC are

Fig. 1: Sustainable development benefits per project type in Kenya



Source: Data from Kenyan PDD.

more successful at reducing emissions.

PDD analysis of sustainable development benefits

Kenya

The four most commonly reported benefits are a) boosting the local economy (30), b) boosting the national economy (15), c) employment (9), and d) social services (8). In terms of SD dimensions, the Kenyan projects could be considered being heavily geared towards the economic dimension, especially making contributions to the local economy. Alternatively, providing social services and improving soil quality score the highest respectively in the social and environmental dimension. Regarding project types, the biomass energy projects produce the highest amount of benefits (6.5) on average, while the biogas and energy efficiency projects the least amount (each 5). In comparison, it seems to be that the hydro, wind and geothermal power projects predominantly are economically oriented, as opposed to those focused on reforestation and biomass energy, which are either more environmentally or widely oriented. Boosting the local economy is the strongest suit of geothermal, reforestation, hydro, and biomass energy projects, whereas stimulating the national economy that of wind (and hydro) projects. Strikingly, despite the high amount of energy industries projects, little transfer of technology and building of infrastructure have been recorded.

Uganda

The four most commonly reported benefits are a) boosting the local economy (19), b) employment (13), c) health (12), and d) education (12). In terms of SD dimensions, it could be argued that the Ugandan projects are predominantly geared towards the social and economic dimension, especially making contributions to heath, education and the local economy. Alternatively, renewable energy scores the highest in the environmental dimension. Regarding project types, the hydro power projects produce the highest amount of benefits on average (9.6), while the landfill gas and biogas projects the least amount (each 4). In comparison, it seems to be that the hydro and reforestation projects are not necessarily oriented towards one dimension, but rather display a wide coverage of benefits, although the former is highly underrepresented in the environmental dimension. Both reforestation and hydro power projects are most successful at boosting the local economy, whereas the landfill gas and biogas project do not produce this particular benefit. Approximately, these types of projects are also equally good at producing health, education, employment, infrastructure, and local economy benefits.

Rwanda

The four most commonly reported benefits are a) waste disposal (5), b) reliable energy (3), c) health (2), and d) education (2). In terms of SD dimensions, the Rwandan projects arguably are not necessarily geared towards one dimension, but rather make small contributions to each dimension. Specifically, health and education have an equal score in the social dimension, whereas reliable energy and waste disposal score the highest respectively in the economic and environmental dimension. Regarding project types, the energy efficiency projects produce the highest amount of benefits (6), and the solar projects the least amount (2). In comparison, it seems to be that the solar projects predominantly are not economically oriented, as opposed to those focused on energy efficiency, which are more widely oriented. While the energy efficiency projects display their best performance in waste disposal, the solar projects are equally good at stimulating good health and reducing deforestation.

Tanzania

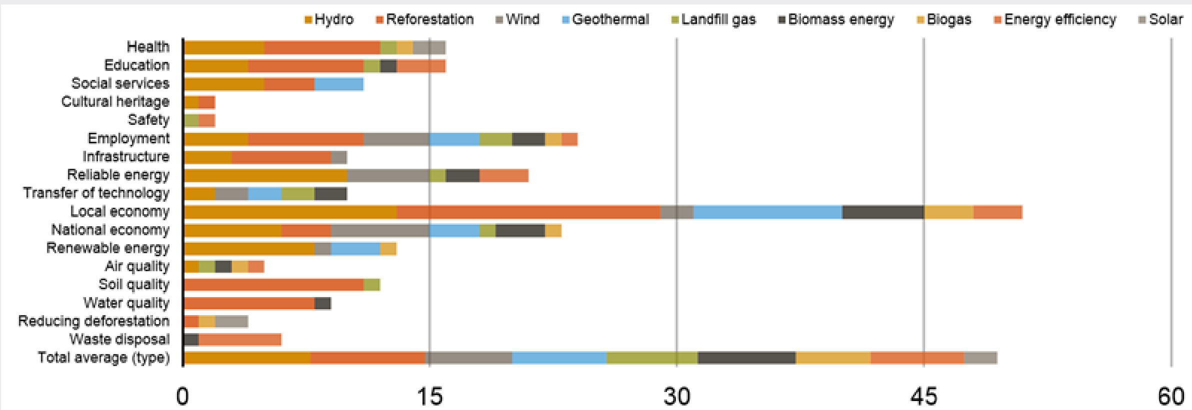
The four most commonly reported benefits are employment, reliable energy, transfer of technology, and stimulation of national economy (each 2). In terms of SD dimensions, it could be argued that the Tanzanian projects are predominantly geared towards the social and economic dimension, albeit in the form of very small contributions. Regarding project types, the landfill gas project produces the highest amount of benefits (7), while the hydro projects produce the least amount (2). In comparison, it seems to be that the biomass energy project is more economically oriented, whereas those focused on hydro power and landfill gas are either more socio-economically or widely oriented. Only the landfill gas and biomass energy project are slightly represented in the environmental dimension (air quality and waste disposal).

East African Community

In comparison, the projects in Kenya are relatively more oriented towards the economic dimension, whereas in Uganda and Tanzania the projects have a wider coverage among the three dimensions of sustainable development. The Rwandan projects are only marginally represented in the economic dimension. On average, the top performers are the hydro and reforestation projects (respectively 7.75 and 7), whereas those focused on biomass energy, geothermal power, energy efficiency, and landfill gas combustion comprise the middle range (6; 5.75; 5.67; 5.5) and wind power, biogas, and solar power the lower range (5.25; 4.5; 2). The majority of the project types are most successful at boosting the local economy, except for wind power (national economy), landfill gas (employment and transfer of technology), energy efficiency (waste disposal), and solar (health and reducing deforestation). Although small scale projects are more widely oriented than large scale projects - which are relatively more economically focused - it is large scale projects which are more successful at producing SD benefits on average (6.71 as opposed to 5.83).

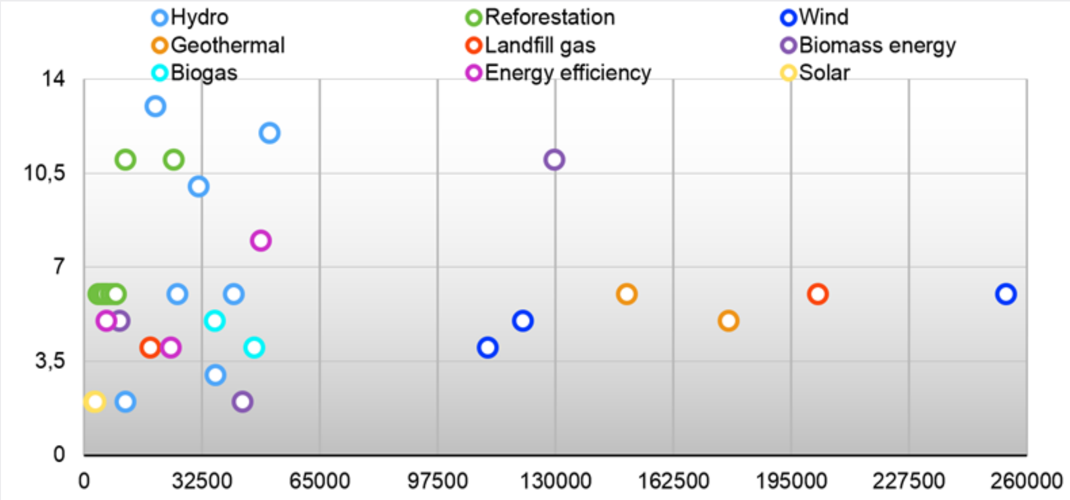
Going by the literature, it is tempting to argue for a clear trade-off relationship between emission

Fig. 2: Sustainable development benefits per project type in the EAC



Source: Data from EAC PDD.

Fig. 3: Scatter plot of estimated emission reductions and sustainable development benefits of CDM projects in the EAC*



*Excluded as outliers: Olkaria I, Olkaria IV, Lake Turkana, and Bujagali. Source: Data from EAC PDDs and available monitoring reports.

reductions and SD benefits, never the less there seems to be no indication for establishing such an association (Fig. 7). If anything, the relationship seems to be characterized by a high degree of variability, especially within the lower range of 0-50.000. However, it should be noted that this comparison takes into account estimated amounts rather than degrees of additionality, such as in Alexeew et al. (2010), and Sutter & Parreño (2007). The above findings seem to overlap with those of Watson & Fankhauser (2009), and Alexeew et al. (2010), who argue for the importance of renewable energy and reforestation projects, and those of Subbarao & Lloyd (2011) regarding the role of small scale projects.

Recommendations on improving the CDM performance in the East African Community

Create a market friendly environment for investment in CDM projects.

Although it has become clear that investments are inclined towards those developing countries with already existing and thriving industrial infrastructure, the EAC could still make its economic environment more attractive for CDM investments. In the East African Community Climate Change Master Plan 2011-2031, it is suggested to introduce renewable energy feed-in tariffs policies, a provision of tax incentives, and favourable import tariffs on technology for projects that reduce emissions. Such policies could substantially increase the participation of EAC countries in the CDM, particularly that of Burundi. Specifically targeting renewable energy, reforestation and large scale projects, which in this paper are identified as rather successful at reducing emissions and/or producing SD benefits, could be a proper focus in this new investment policy structure.

Ensure the environmental integrity of the CDM by conducting research.

Although the monitored projects were able to meet 62.82% of their estimated amounts, the deficit also clearly shows that the potential for emission reductions has been overestimated by project participants, which necessitates more critical assessment of the credibility of the current CDM projects, particularly considering whether the projects are additional and lead to 'real' reductions. Further research on the environmental integrity of CDM projects in the region is also highly recommended.

Develop a coherent framework for sustainable development criteria appropriate to the EAC.

Currently, the UNFCCC allows host countries to define SD criteria according to their own respective development priorities. In order to tackle common challenges, however, the EAC should develop a coherent and suitable framework for the Designated National Authorities of its member states, which should also take into account the specific concerns of individual members as much as possible.

'Market' sustainable development benefits.

Because of the absence of formal SD standards, it has been observed that developing countries are more inclined to lower their criteria in order to attract more CDM investments, which results in a trade-off between the two CDM objectives, ultimately constituting a 'race to the bottom'. Apart from considering a common framework for criteria, the EAC could 'market' SD benefits by introducing means to differentiate the SD quality of projects, such as labels or premium price. In turn, such 'distinctive' investments could be used by developed countries to enhance their public reputation. Although there seems to no clear indication of a trade-off for CDM projects in the EAC, differentiating between CDM projects could reduce the possibility of a trade-off relationship between the two main objectives of the CDM.

Promote capacity building of Designated National Authorities (DNAs) in terms of a substantive system of monitoring of sustainable development benefits.

While monitoring reports on emission reductions have structurally been carried out over the years by project participants, a similar system of assessing the SD impact of CDM projects has yet to be established. In this sense, the DNAs, which initially have the responsibility to assess whether CDM projects contribute to their countries' SD, could follow up on their validations by carrying out SD impact studies with the support of internal/external funding. Having a clearer idea of the SD potential of CDM projects would allow for substantively informed guidance of future EAC development policies.

References

1. Alexeew, J., Bergset, L., Meyer, K., Petersen, J., Schneider, L., & Unger, C. (2010). An analysis of the relationship between the additionality of CDM projects and their contribution to sustainable development. International Environmental Agreements: Politics, Law and Economics, 10(3), 233-248.

2. Cames, M., Anger, N., Böhringer, C., Harthan, R. O., & Schneider, L. (2007). Long-term prospects of CDM and JI. Climate change 12/07. Dessau: German Federal Environmental Agency.

3. Castro, P., & Michaelowa, A. (2008). Empirical analysis of performance of CDM projects. Climate Strategies Report, University of Zurich.

4. Haya, B. (2007). Failed mechanism—how the CDM is subsidizing hydro developers and harming the KyotoProtocol. Berkeley: International Rivers. Retrieved March 25, 2009, from http://www.internationalrivers.org/files/Failed_Mechanism_3.pdf.

5. EAC (2011). East African Community Climate Change Master Plan 2011-2031.

6. Michaelowa, A., & Purohit, P. (2007). Additionality determination of Indian CDM projects. Can Indian CDM project developers outwit the CDM Executive Board? University of Zurich. Institute for Political Science, Zurich.

7. Michaelowa, A., & Umamaheswaran, K. (2006). Additionality and Sustainable Development Issues regarding CDM projects in energy efficiency Sector (No. 346). HWWA Discussion Paper.

8. Nussbaumer, P. (2009). On the contribution of labelled Certified Emission Reductions to sustainable development: A multi-criteria evaluation of CDM projects. Energy Policy, 37(1), 91-101.

9. Olsen, K. H. (2007). The clean development mechanism's contribution to sustainable development: a review of the literature. Climatic Change, 84(1), 59-73.

10. Olsen, K. H., & Fenhann, J. (2008). Sustainable development benefits of clean development mechanism projects: A new methodology for sustainability assessment based on text analysis of the project design documents submitted for validation. Energy policy, 36(8), 2819-2830.

11. Paulsson, E. (2009). A review of the CDM literature: from fine-tuning to critical scrutiny?. International Environmental Agreements: Politics, Law and Economics, 9(1), 63-80.

12. Pearson, B. (2007). Market failure: why the Clean Development Mechanism won't promote clean development. Journal of Cleaner Production, 15(2), 247-252.

13. Rosendahl, K.E., and J. Strand (2009). 'Simple Model Frameworks for Explaining Inefficiency of the Clean Development Mechanism'. World Bank Policy Research Working Paper No. 4931

14. Schneider, L. (2007). Is the CDM Fulfilling its Environmental and Sustainable Development Objectives? An Evaluation of the CDM and Options for Improvement. WWF Report.

15. Subbarao, S., & Lloyd, B. (2011). Can the clean development mechanism (CDM) deliver?. Energy Policy, 39(3), 1600-1611.

16. Sutter, C., & Parreño, J. C. (2007). Does the current Clean Development Mechanism (CDM) deliver its sustainable development claim? An analysis of officially registered CDM projects. Climatic change, 84(1), 75-90.

17. UNFCCC (1998). Kyoto Protocol to the United Nationals Framework Convention on Climate Change.

18. Watson C., Fankhauser S. (2009). The Clean Development Mechanism: too flexible to produce sustainable development benefits?. Centre for Climate Change Economics and Policy, Working Paper No. 3.

19. Winkelman, A. G., & Moore, M. R. (2011). Explaining the differential distribution of Clean Development Mechanism projects across host countries. Energy Policy, 39(3), 1132-1143.

Endnotes

1 Asia & Pacific, 84.1%; economies in transition, 0.6%; Latin America & Caribbean, 12.8%; Africa, 2.4%. From UNFCCC website, 30th of April 2014.

2 While there are a considerable amount of EAC CDM projects 'in the pipeline', the author has decided to limit the research to the projects which have been indicated as 'registered' on the CDM-UNFCCC website due to limited data availability. Although currently in the process of registering projects, this means that Burundi is excluded from the study.

CUTS International, Geneva

37-39, Rue de Vermont 1202 Geneva, Switzerland
Ph: +41 (0) 22 734 60 80 | Fax:+41 (0) 22 734 39 14
Email: geneva@cuts.org | Web: cuts-geneva.org
Skype: cuts.grc