ADDITIONALITY OF THE CLEAN DEVELOPMENT MECHANISM: INSIGHTS FROM CENTRAL AMERICAN CASE STUDIES

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OVERVIEW:

The links between the environment and development are increasingly exposed: climate change is causing visible changes and threatening people's livelihoods; biomass used for energy is contributing to deforestation and emissions; and poverty is closely tied with economic growth and resource use. Energy use has historically been correlated with quality of life,[i] but many people are now calling into question the development progression that is generally based on increasing fossil fuel use for industrialization. There is widespread agreement that the "warming of the climate system is unequivocal" and "most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic [greenhouse gas] concentrations."[ii]

Energy presents an interesting paradox when viewed in the light of development: increased energy access can reduce vulnerability and increase social and economic welfare, but at the same time, the majority of the energy supply has significant negative environmental effects from the emission of greenhouse gases (GHG). Given that under a business-as-usual scenario developing countries are projected to contribute 74% of the increase in emissions by 2030, actions will need to be taken to reduce emissions in all countries in order to abate climate change.[iii]

The international community agreed to reduce global greenhouse gas emissions by signing the Kyoto Protocol in 1997, where developed countries committed to target emission reductions. With the Kyoto Protocol, the Clean Development Mechanism (CDM) was developed as a market mechanism to reduce emissions and encourage sustainable development by helping finance emission-reducing projects in developing countries through carbon credits that could be put towards developed country commitments. Since its formal start in 2005, the CDM has grown rapidly and have touted potential economic development, but the implementation is often more difficult than the theory. One of the core principles is additionality, which states that in order for the credits to be used towards developed country commitments, the projects must not have occurred in the absence of the CDM. While additionality helps the Mechanism function on the global scale, the decision-making factors that determine projects do not always follow the theory.

Much of the attention of the CDM has been on the in large developing countries that provide the largest potential for emissions reductions, such as India, China, and Brazil, but it is often argued that less developed countries have a greater need for CDM projects because they are less affluent, lack universal energy access, and will be hit hard by climate change impacts. This study focuses on the interaction between renewable energy, the CDM, and small developing countries in Central America—specifically Honduras and Costa Rica. Why were CDM projects pursued there? What were the barriers? Did the CDM provide sufficient incentive to tip the balance to decide to implement renewable energy over a fossil fuel source?

The decision-making factors and challenges to implementing renewable energy CDM projects are analyzed through a series of stakeholder interviews in Honduras and Costa Rica. By examining the decision-making factors involved in renewable energy project development and CDM registration in Central America, the study compares the additionality of these projects to the theory behind additionality. Within international climate negotiations, there are contentious debates about how developing countries will grow in the future, especially regarding their right to develop and the additional emissions.[iv] As the climate negotiations in Copenhagen draw near, it is important to understand how the CDM has been implemented on the ground and what lessons can be drawn for a future mechanism, particularly in respect to additionality.

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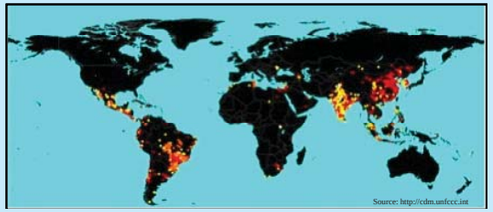
CLEAN DEVELOPMENT MECHANISM (CDM):

In 1997, the Kyoto Protocol, the first international agreement to reduce GHGs was signed, eventually bringing together 182 countries, notably missing U.S. participation. To appease 'common but differentiated responsibilities,' a principle of the climate negotiations dating back to 1992, the Kyoto Protocol separates countries into two groups: the developing non-Annex I countries that are not bound to emission reductions and developed Annex I countries that are bound to emission reductions. The Kyoto Protocol also stipulates that in order to give countries time to prepare for its implementation a post-2012 regime must be agreed upon by the end of 2009, so negotiations are continuing to discuss the future regime throughout the period of this study. While the Kyoto Protocol emission reduction targets for the 38 Annex I countries were intended to be implemented primarily through national measures, three flexibility mechanisms were designed to help countries meet targets in a cost-efficient manner, of which the Clean Development Mechanism is the only one to be involve non-Annex I countries.

As is laid out in the Kyoto Protocol, the CDM has two overarching goals: reducing GHG emissions and contributing to sustainable development. Furthermore, one of the original reasons for the CDM was to offer a more cost-effective method of reducing emissions for Annex I countries, while helping non-Annex I countries implement carbon-reducing project that normally are not cost-effective. The CDM also provides a method of involving developing countries in emission reductions. Since the rules were defined in 2001, there has been rapid growth of CDMs; there are currently 4,252 projects either registered or in the process, which will amount to 7,125,124 Mt CO2e reduced by 2020.[v] However, larger countries such as China and India attract most of the projects, as seen in the figure below which shows the CDM projects registered.



The process of doing a CDM project is governed by rules created by the CDM Executive Board. It functions by measuring emission reductions from a baseline and each tonne of CO2e reduced receives a Keeping in mind that the CDM is a mechanism involving thousands of individual projects, the CDM project cycle brings together the actors in a progression of steps that move projects from conception to completion through the same general process. The figure below provides an overview of the project cycle and the various actors involved.

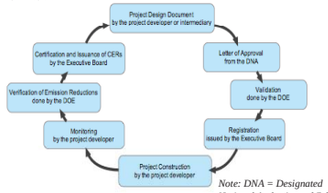
METHODOLOGY:

In a comparison to available methodologies, the case study methodology provided the best fit for this study. It allows the researcher to deal with technically difficult situations where there are many more variables of interest than there are data points. Utilizing multiple sources of data, the case study methodology uses triangulation as well as compares the results to theories. Moreover, the objectives of the study that focus around decision-making factors were reflected by this methodology. In other words, "the essence of a case study, the central tendency among all types of case study, is that it tries to illuminate a decision or a set of decisions: why they were taken, how they were implemented and with what result."[vi]

The study is composed of four main objectives, each which provides a main component of the overall analysis. The research methodology applied consists of triangulation between a variety of sources in order to combine existing data with first-hand experiences. This study uses an extensive literature review, including reports, databases, and government documents, and it combines them with stakeholder interviews. Table I shows the sources used paired with the objectives.

The literature and document review was complemented by data collection through stakeholder interviews. Many site-specific elements and challenges remain distinct to the host countries and they are often not evident on paper assessments, so two research trips were carried out in order to interview key stakeholders. From August 12, 2009 to August 25, 2009, the author traveled to Honduras, completing 15 interviews and visiting 4 project sites. The Costa Rica research trip was completed on December 11, 2009 through December 21, 2009, and enabled the author to interview 12 people. Most questions focused on the interviewees' experiences with renewable energy and the CDM. The open-ended questions were centered on the barriers to the projects. Furthermore, the interviews addressed which factors were the most influential in the decision to pursue renewable energy and to apply for CDM registration, as well as which factors were the greatest challenges during implementation.

CDM Project Cycle



Note: DNA = Designated National Authority and DOE = Designated National Entity

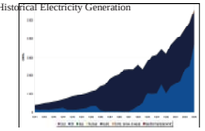
Table I. Objectives and Sources

Objective	*Types of Sources Used*	*Examples of Sources*
***Objective 1:* To understand the theory behind the additionality principal of the CDM**	- Literature review - Database review	- *Analysis of the Additionality Tool*[vii] - Science Direct database
***Objective 2:* To examine case studies of renewable energy CDM projects in Honduras and Costa Rica**	- Literature review - Semi-structured stakeholder interviews - Site visits	- REEEP *Renewable Energy Regional Policy Analysis Report* - Employee in the Energy Sector Direction, Ministry of the Environment, Energy and Telecommunications, Costa Rica - Inversiones Hondureno cogeneration plant
***Objective 3:* To disaggregate the barriers associated with renewable energy versus the CDM**	- Semi-structured stakeholder interviews - Database review	- Ecosecurities employee - UNFCCC Database
***Objective 4:* To analyze how the additionality of CDM projects in Honduras and Costa Rica compares to the theory of additionality**	- Literature review - Semi-structured stakeholder interviews	- *Additionality of the CDM*[viii] - Hydropower project developer

CASE STUDIES:

Since the Mechanism must be applicable to all non-Annex I countries and the larger countries are the most frequently studied, this study focuses on the less-studied, small Central American countries. Honduras and Costa Rica were chosen as the two case study countries based on rationale derived from a preliminary literature review and informational interviews completed during the project development stage. Table X outlines basic characteristics of each country, showing the differences between them. Costa Rica is the wealthiest Central American country, renowned for its environmental laws and its ability to work with international governments to attract funding for the environment. However even though the country has the institutional capacity and political will to pursue CDM projects, it has surprisingly few projects registered. Honduras, on the other hand, is a stark contrast to Costa Rica: it has high poverty rates, lax environmental regulations, and a government that is often characterized by inefficiency. These characteristics are usually correlated with a low number of CDM projects, but Honduras in fact has many projects relative to its population.

Honduras, Historical Electricity Generation



Costa Rica, Historical Electricity Generation

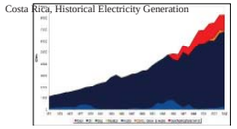


Table II. Case Studies

	HONDURAS	COSTA RICA
Energy	In the 1980s, the government built a 300MW hydropower plant, resulting in 90% of the electrical capacity on the grid. After a financial crisis, lack of investment, and a severe drought, an energy crisis in 1993 led to the privatization of electricity generation, although the National Electric Company (ENEE) still continues to dominate transmission, distribution, and signing generation contracts. Since then, private sector investment in thermal generation has resulted in 70% of electricity originating from fossil fuels. New laws encourage renewable energy, but are not yet fully implemented. Meanwhile, despite poor coverage, a capacity shortfall is projected due to lack in government investment and rising demand.	Due to abundant resources, the government has implemented primarily hydropower since the 1940s and succeeded in creating a coverage rate of 98%. By 1995, it had opened up 30% of electricity generation to the private sector, limiting it to renewable energy, and more recently there has been debate over increasing that amount. Along with involvement in the climate change negotiations and pilot CDM projects, there has been some diversification into windpower and geothermal. With a lack of government investment and low oil prices, in recent years thermal generation has been added by the government.
Barriers to Renewable Energy	Private sector barriers: • Low price for electricity • Difficulty obtaining financing • Dealing with government bureaucracy • Length of time needed to acquire environmental permits Other barriers: technical capacity, poorly maintained transmission lines, NGO opposition of hydropower	Public sector barriers: • Price of oil • Insufficient financing allocated by Congress • Lack of base load Private sector barriers: • Limited participation • Dealing with government bureaucracy and lack of transparency Other barriers: NGO opposition of hydropower, time for environmental permits, technical capacity
CDM	• 14 projects • 9 hydropower, 2 cogeneration, 2 biogas recovery, methane capture • 2 large-scale/12 small-scale • All private sector	• 6 projects • 2 hydropower, 1 wind, 1 biomass, 1 cement industry, 1 landfill gas and utilization • 4 large-scale/2 small-scale • 3 public sector/3 private sector
Barriers to the CDM	• Complexity of the process • Lack of awareness	• Clean baseline (leading to low CER revenue) • High transaction costs

ADDITIONALITY:

Theory

One of the most important principles of the CDM is additionality, and more specifically environmental additionality. Emission reductions from CDM projects are supposed to be beyond reductions that would have occurred without the CDM. The importance of this concept relates to how the CERs are used, counting as reductions within cap and trade schemes. The potential problem arises that if a project was business as usual, it would increase the overall emission cap when traded in. Thus, in the process design of the CDM, all projects must prove that they would not have been implemented if it were not for the CDM, and guidelines were developed to assure strict environmental additionality. A project must prove its additionality in the Project Design Document by describing how it meets certain criteria in one of the approved methodologies. The CDM Executive Board has developed a four-step process to prove additionality, which include:

1) Identification of alternatives,
2) Investment analysis,
3) Barriers analysis, which must include one type of barrier - investment, technological, common practice, or other barrier,
4) Common practice analysis.

For small-scale projects (< 15 MWs), the rules have been simplified and consist of just the barriers analysis.

While the additionality principle is one of the core principles of the CDM, it was also one of the most contentious to negotiate and contains strong arguments both for and against its use.

+ There must be true environmental additionality to be traded into a cap and trade system so as not to enlarge to size of the cap. Furthermore, to be additional, they must be real, measurable, and verifiable, which requires a system in place to ensure that this is true. However, it is difficult to prove the counterfactual and there is great debate over whether additionality can be proven with absolute certainty.
+ Additionality is also usually supported because it is deemed economically efficient. From an economic perspective, it is cheaper to implement some of these emission reduction projects in non-Annex I countries rather than in Annex I countries.
+ A final argument is that additionality is needed in order to use credits to meet Annex I commitments, and by having the CDM it allows developing country gains, not only in a greater number of projects, but in technology transfer and sustainable development.

- Contrary to the third argument above, it is also argued that additionality does not benefit host countries by additional projects because in general a CDM project is useful to the host country regardless of whether it is additional or not, and by limiting the projects that can earn CERs to those that are additional, the host country may lose out on greater funding.
- The calculations for the proof of additionality add to the complexity of the Mechanism for the project developers.
- On the national scale, in fact, the additionality principle could offer a perverse incentive by giving countries a reason not to implement laws that reduce emissions, such as stricter regulations or renewable energy laws.
- From an economic point of view, the most economically viable projects are the most likely to occur with or without the CDM, but this also means that they are the least likely to qualify as additional.

Findings

The first stage of the analysis was a review of the additionality justifications in the Project Design Documents. In Honduras, there are currently 2 large-scale projects that completed the entire additionality process and 12 small-scale projects, all but two of which cited all 3 types of barriers. In Costa Rica, there are currently 4 registered large-scale projects and 2 small-scale projects, one which cited all 3 barriers and one which omitted the common practice barrier.

The justification for meeting the additionality criterion were analyzed and compared to the results of the stakeholder interviews. Given that the decision to pursue a project is generally derived from a combination of factors, this section uses the outcomes of the stakeholder interviews to analyze the decision-making factors that went into the CDM projects. Building off of the barriers identified in the case studies, this looks at how additionality functions on the ground in order to draw conclusions about the CDM. The main decision-making factors were (note that "H" implies only in Honduras and "CR" only in Costa Rica):

- Government Policies
  - Price paid for electricity
  - Lack of familiarity government institutions have of renewable energy (H)
  - Non-transparent price calculations
  - Difficulty of getting government contract
  - Limited private participation and uncompetitive market (CR)
  - Unclear regulatory frameworks (H)

- Financial Viability without the CDM
  - Availability of financing – poor loan terms (H)
  - Lack of investment allocated by Congress
  - Risk

- Financial Viability with the CDM
  - Revenue from CERs
  - Baseline (CR)
  - Time needed to complete CDM process
  - Transaction costs

- Project Cycle
  - Bringing all the decision-making factors together, it is important to look at the project cycle. By the time a project applies for CDM registration, it has already completed and paid for feasibility studies and project design; it has applied for and hopefully received a loan to finance the project; it has competed for a PPA if done by the private sector, or competed internally with other options if done by the government; and it has applied and likely waited for environmental permits to be approved. Each of these takes time and money. If the project is rejected by the CDM EB, will it really cease to be implemented, especially with these sunk costs? Furthermore, how does a project developer incorporate the risk that a project is not approved?

i. Najam, A., and C. J. Cleveland. 2003. Energy and sustainable development at global environmental summits: An evolving agenda. Environment, Development and Sustainability 5: 117-138.
ii. IPCC (Intergovernmental Panel on Climate Change). 2007. Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II, and II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. Geneva, Switzerland: IPCC.
iii. IEA (International Energy Agency). 2008. IEA energy statistics. OECD and IEA. www.iea.org.
iv. Roberts, J. T., and B. C. Parks. 2007. A climate of injustice: Global inequality, north-south politics, and climate policy. Cambridge, Massachusetts: MIT Press.
v. UNEP Risoe Centre. 2008. CDM pipeline spreadsheet. UNEP Risoe Centre. Also available online at http://www.cdmpipeline.org/overview.htm (accessed December 2008).
vi. Yin, R. K. 1994. Case study research: Design and methods. Thousand Oaks: Sage Publications: 12.
vii. Schneider, L. 2007. Is the CDM fulfilling its environmental and sustainable development objectives? An evaluation of the CDM and options for improvement. Berlin: World Wildlife Fund.
viii. Ringius, L. 2004. Analysis of the additionality tool (with project examples). Presented at the CDM Methodologies and Project Design: Workshop for CDM Project Developers, Buenos Aires.
ix. Mizuno, Y. 2005. Additionality of the CDM. Prepared for the Integrated Capacity Strengthening for the Clean Development Project Design Document Training Workshop, Bangkok.

CONCLUSIONS:

It has been established that there is a range of barriers that can prevent a project from occurring. The CDM Executive Board has worked hard to incorporate this into the additionality analysis by allowing projects to choose the investment or barriers analysis and by simplifying small-scale requirements. While this is a positive step in one sense because it realizes the complexity of the decision-making process; on the other hand, it may allow for justifications that make a project pass, even if the factors were not strong enough to prevent the project from occurring without the CDM. Although there are many shades of grey that are difficult to discern, if a project would be implemented without the CDM, it does not adhere to the principle of strict environmental additionality.

Furthermore, if there is not strict additionality, there are implications for the inclusion of CERs in cap and trade systems. Revisiting the underlying structure of the Kyoto Protocol, the emission caps placed on Annex I countries are intended to limit each country's emissions so the world can reduce emissions below the business as usual level. If projects that would have occurred in the absence of the CDM earn credits, and those credits are used to meet the Kyoto targets, then essentially the size of the cap is enlarged. This is not meant to draw specific conclusions as to how many projects are or are not additional, but rather meant to point out the consequences. Often the decision-making factors behind projects are more chaotic than theory predicts, and if projects are not strictly additional, there are negative implications for their impact on Kyoto reductions.

Additionality was one of the concepts created to reconcile the global and local scales. Projects implemented in developing countries have potential to contribute to domestic sustainable development, such as the provision of energy, technology transfer, increased knowledge and training, employment, and community projects. At the same time, the credits can be used to meet Annex I Kyoto commitments. The difficulty is that the theory applied in the policy-making process does not always carry through as planned to implementation. A wide variety of barriers pose challenges to renewable energy projects, there are nuances involved in the decision-making process, such as how risk is or is not incorporated. These Honduran and Costa Rican case studies illustrate how the international level of policy and local implementation are not always in line.

Even though this only includes 20 out of 4,252 CDM projects in the pipeline and the CDM must be applicable to a wide variety of countries, there are a few implications for policy worth noting, especially as the climate change negotiations in Copenhagen approach. First, now that the CDM has been functioning for several years, there is a need to re-evaluate the role of additionality in a mechanism such as the CDM. How does it function in different parts of the world? How should the Mechanism intersect with cap and trade systems? Due to the findings that strict additionality is questionable, perhaps the CDM should be modified so that additionality is not a core requirement, such as would be possible by a limit on Annex I reductions that are allowed to be obtained from CERs. Furthermore, considering the critique that the CDM is too complex, how can the Mechanism ensure additionality while limiting complexity?

Finally, it is important to recognize that while the discusssions that ensue leading to Copenhagen will incorporate both theoretical and practical arguments, they will also take on political dimensions. The debate over how the world should cooperate to combat climate change will involve larger debates over responsibility for emissions, capability to mitigate, and the right to develop, all of which will impact the future of the CDM. While this study did not pursue analysis of the CDM's goal of sustainable development and education, it is nonetheless important and should be included in policy discussions. There are many reasons to continue a mechanism similar to the CDM in the post-2012 climate regime. The energy path and future emissions of developing countries will have a profound impact on climate change, and who takes responsibility for the emissions is primarily a political question at this point. Then, beyond the political negotiations, a post-2012 mechanism must continue to strive to reconcile the global level with the local and to make implementation reflect theory, or at least recognize when it does not.