

## Increasing Clean Development Mechanism (CDM) Projects in Asia's Least Developed Countries

### *A Strategy for Enhancing Readiness Conditions*

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#### **Abstract:**

Recent years have witnessed a growing interest in bringing more carbon finance to Least Developing Countries (LDCs) from the Kyoto Protocol's Clean Development Mechanism (CDM). This paper draws upon stakeholder interviews and case studies of biogas projects in Cambodia and Nepal to recommend pragmatic steps for increasing CDM projects in Asia's LDCs. In contrast to previous studies that call for reforms to the CDM, the paper recommends a carefully calibrated strategy for enhancing carbon finance readiness conditions in LDCs. The paper emphasizes "calibrated" since the costs of phasing in the strategy must be weighed against the benefits from new financial flows. The strategy 1) begins with a clear signal from high-level policymakers to strengthen readiness conditions; 2) makes the commitment to strengthening those conditions credible with a needs assessment of human and data resources; 3) tailors reforms to the unique needs of low hanging sectors such as biogas and operational modalities needed to capture opportunities in those sectors such as program of activities (PoAs); and 4) builds around regional cooperation between CDM champion countries and LDCs with fewer than 10 projects. A carefully planned and deliberately measured response to flows of post-2012 carbon finance may position LDCs favourably to take advantage of a new CDM.

**Key Words:** *Least Developed Countries (LDCs), Clean Development Mechanism (CDM), sustainable development, co-benefits, Cambodia, Nepal, biogas project, Programme of Activities (PoA)*

The views expressed in this working paper are those of the authors and do not necessarily represent those of IGES. Working papers describe research in progress by the authors and are published to elicit comments and to further debate.

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## 1. Introduction

The Clean Development Mechanism (CDM) is a project-based offset mechanism that allows developed countries to purchase emission reductions in developing countries under the Kyoto Protocol. Over the past three years, negotiations over a successor agreement to the Kyoto Protocol have focused on increasing the number of projects in countries that have received limited flows of carbon finance from the CDM. At the 16<sup>th</sup> Conference of Parties (COP 16) to the United Nations Framework Convention on Climate Change (UNFCCC), parties agreed to establish a loan scheme to support the CDM in host countries with fewer than 10 registered projects (UNFCCC, 2010). More recently, the European Union (EU), the world's biggest buyer of certified emission reductions (CERs) of CDM, has announced that after 2013 the only credits eligible for compliance for Phase III of its emission trading scheme (EU-ETS) from 2013 up to 2020 will be sourced from least developed countries (LDCs) as well as from third countries with concluded agreements (European Commission, 2009a, b). In a similarly motivated development, the World Bank has also unveiled plan to launch a new fund called the Carbon Initiative for Development (Ci-Dev) that aims to provide LDCs with financial and capacity-building opportunities for better access to CDM projects (World Bank, 2011; Pointcarbon, 2011). For LDCs, these are potentially promising developments: increasing the presence of the CDM cannot only help mitigate climate change's long-term global impacts, but bring private finance to LDCs' near-term development needs.

Yet whether LDCs will capitalise on these opportunities depends not only on EU plans and World Bank programs but on LDCs themselves (Cosbey, A., et al, 2005; De Lopetz, et al, 2009; Deodhar, V, 2011). This paper draws upon stakeholder interviews and case studies of biogas projects in Cambodia and Nepal to recommend pragmatic steps for increasing CDM projects in Asia's LDCs. In contrast to previous studies calling for CDM reform, the paper recommends a carefully "calibrated" strategy for enhancing readiness conditions in LDCs. The paper emphasizes "calibrated" since the costs of phasing in the strategy must be weighed against the benefits from new financial flows. The strategy 1) begins with a clear

signal from high-level policymakers to strengthen readiness conditions; 2) makes the commitment to strengthening those conditions credible with a needs assessment of human and data resources; 3) tailors reforms to the unique needs of lower hanging sectors such as biogas and operational modalities compatible with capturing opportunities in those lower hanging sectors such as program of activities (PoAs); and 4) builds around regional cooperation between CDM champion countries and LDCs with fewer than 10 projects. A carefully planned and deliberately measured response to flows of post-2012 carbon finance may position LDCs favourably to take advantage of fresh flows of carbon finance.

The paper is divided into four sections. The first section reviews literature on the regional imbalance of CDM projects, focusing chiefly on Asia's LDCs. The second section suggests that, though much of the literature has faulted the CDM's institutional design, there has been less discussion of readiness conditions in LDCs. The third section then reviews a case study of biogas projects in Cambodia and Nepal that underlines the need for more attention to these conditions. The final section concludes with a step-by-step strategy that would help improve those conditions.

## 2. LDCs and the UNFCCC

The United Nations (UN) General Assembly established the category of least developed countries (LDCs) in 1971 to bring attention to the world's most disadvantaged countries. The countries that were classified as an LDC had low incomes, limited human capital, high economic vulnerabilities, and low national populations<sup>3</sup>. Since 1981, the unique developmental needs of LDCs<sup>4</sup> have been highlighted in a series of high-level meetings under the UN General Assembly<sup>5</sup> and documented in the

<sup>3</sup> These are the countries that satisfy three criteria of the United Nations (UN); per capita gross national income (GNI), human assets and economic vulnerability to external shocks. As of the end of November 2011, the list of LDCs includes 48 countries; 33 in Africa, 14 in Asia and the Pacific and 1 in Latin America. For details, see: <http://www.unohrrls.org/en/ldc/>.

<sup>4</sup> Even among a single category of LDCs, countries vary from landlocked developing countries (LLDCs), Small Islands Developing States (SIDS) and structurally weak, vulnerable, and small economies (SWVSEs) with each different developmental challenge.

<sup>5</sup> So far, four United Nations Conferences on the Least Developed Countries have been held in 1981, 1990, 2001 and 2011. The third conference agreed on the Programme of Action for the Least Developed Countries for the Decade 2001-2010, and the latest fourth conference reviewed the Programme. For details, see:

LDC Country Report on the UN Millennium Development Goals (MDGs). More recently, the UN and related international organisations have established schemes that prioritise support for sustainable socio-economic development and poverty reduction in LDCs. Recently these efforts have intersected with another concern that threatens to undermine development in LDCs: climate change.

The UNFCCC has long recognised the needs of LDCs to address climate change. The limited capacity and resilience to respond to climate change impacts and adapt to its adverse effects is not only illustrated in numerous COP decisions but in climate

change funding mechanisms (Table 1). For instance, the Least Developed Countries Fund (LDCF) was established to help LDCs prepare and implement national adaptation programmes of action (NAPAs). Considering that the adverse impacts of climate change pose the greatest threat to development in poor countries, it is with good reason that most of the UNFCCC efforts to support LDCs have focused on adaptation. However, there are also opportunities to access carbon finance that could bring tangible developmental benefits. A potentially valuable source of that finance would flow from the private sector and be aimed specifically at supporting sustainable development.

**Table 1. The UNFCCC COP decisions on LDCs**

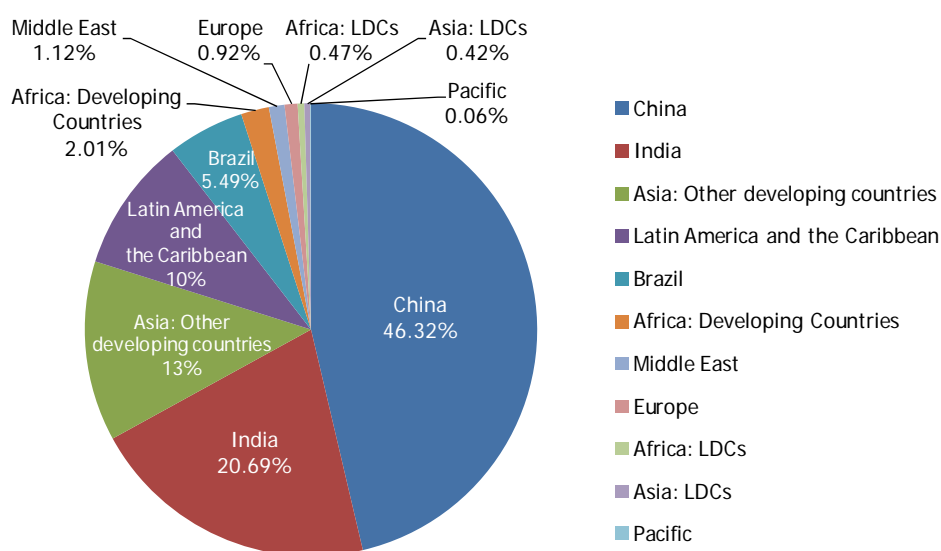
COP 17 Decisions
<ul style="list-style-type: none"> <li>Decision -/CP.17 : National adaptation plans</li> <li>Decision -/CP.17 : The financial mechanism of the Convention: the Least Developed Countries Fund: support for the implementation of elements of the least developed countries work programme other than national adaptation programme of action</li> </ul>
COP 16 Decisions
<ul style="list-style-type: none"> <li>Decision 5/CP.16 : Further guidance for the operation of the Least Developed Countries Fund</li> <li>Decision 6/CP.16 : Extension of the mandate of the Least Developed Countries Expert Group</li> </ul>
COP 14 Decision
<ul style="list-style-type: none"> <li>Decision 5/CP.14: Further guidance for the operation of the Least Developed Countries Fund</li> </ul>
COP 13 Decision
<ul style="list-style-type: none"> <li>Decision 8/CP.13: Extension of the mandate of the Least Developed Countries Expert Group</li> </ul>
COP 11 Decisions
<ul style="list-style-type: none"> <li>Decision 3/CP.11: Further guidance for the operation of the LDC Fund</li> <li>Decision 4/CP.11: Extension of the mandate of the Least Developed Countries Expert Group</li> </ul>
COP 10 Decisions
<ul style="list-style-type: none"> <li>Decision 4/CP.10: Work of the Least Developed Countries Expert Group</li> </ul>
COP 9 Decisions
<ul style="list-style-type: none"> <li>Decision 6/CP.9: Further guidance for the operation of the LDC Fund</li> <li>Decision 7/CP.9: Extension of the mandate of the LEG</li> <li>Decision 8/CP.9: Review of the guidelines for the preparation of NAPAs</li> </ul>
COP 8 Decisions
<ul style="list-style-type: none"> <li>Decision 8/CP.8: Guidance to an entity entrusted with the operation of the financial mechanism of the Convention, for the operation of the least developed countries fund</li> <li>Decision 9/CP.8: Review of the guidelines for the preparation of national adaptation programmes of action</li> </ul>
COP 7 Decisions
<ul style="list-style-type: none"> <li>Decision 2/CP.7: Capacity-building in developing countries</li> <li>Decision 5/CP.7: Implementation of Article 4, paragraphs 8 and 9, of the Convention</li> <li>Decision 7/CP.7: Funding under the Convention</li> <li>Decision 27/CP.7: Guidance for the operation of the LDC Fund</li> <li>Decision 28/CP.7: Guidelines for the preparation of national adaptation programmes of action</li> <li>Decision 29/CP.7: Establishment of a least developed countries expert group</li> </ul>

Source: Extracted from the UNFCCC website: Relevant LDC Decisions and Conclusions ([http://unfccc.int/cooperation\\_support/least\\_developed\\_countries\\_portal/relevant\\_decisions/items/4724.php](http://unfccc.int/cooperation_support/least_developed_countries_portal/relevant_decisions/items/4724.php)).

This paper looks at the Clean Development Mechanism (CDM) as one potentially valuable vehicle for delivering that finance. The CDM was created as a means of achieving the ultimate goal of the UNFCCC—that is, stabilisation of GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. But it was also created with the parallel goal of aligning global climate concerns with local development needs. This was explicitly spelled out in the Kyoto Protocol (KP) Article 12.2 that states the CDM’s twin objectives are “to assist Parties not included in Annex I in achieving sustainable development and in contributing to the ultimate objective of the Convention, and to assist Parties included in Annex I in achieving compliance with their quantified emission limitation and reduction commitments.” There is little disagreement that the CDM has met the first objective. As of February 2012, there are 3,818 registered projects, delivering 564 million certified emission reductions per year (UNFCCC, 2012). At the same time, the CDM has brought 2.7 billion dollars from the private sector to host developing countries (World Bank Institute, 2010; IGES, 2011a).

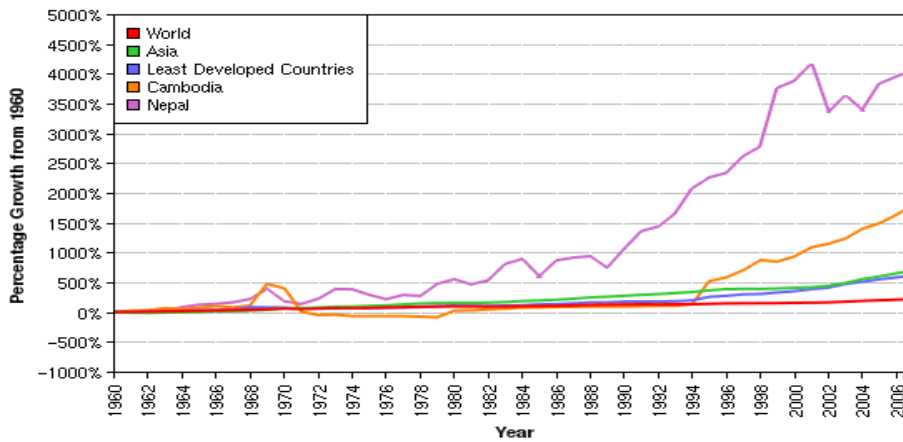
There is also many who argue that CDM has not performed well on its second sustainable development objective. While some have maintained it failed to meet this objective because few CDM projects promote sustainable development, others have focused on the regional distribution of projects (Pearson, 2004; Cosbey et al, 2005; Olsen, 2007; De Lopez, 2009; Olhoff et al, 2003; Schneider, 2007; Sutter and Parreno, 2007; Alexeew et al, 2010). A brief review of the data can demonstrate the uneven distribution (Figure 1). Though the number of the global total projects has grown rapidly, LDCs in Asia and Africa make up approximately 0.9% of the total number of projects. This fraction pales in comparison to major developing countries such as China, India and Brazil that account for 72.5% of the total number of projects and 79% of expected CERs respectively (UNFCCC 2011b, IGES 2011). The data on LDCs is even less encouraging in Asia. For instance, though GHG emissions from Asia’s LDCs have increased sharply since the 1990s (Figure 2), only five out of the total Asia’s fourteen LDCs have registered projects. In fact, the 15 CDM projects in Bangladesh, Bhutan, Cambodia, Lao PDR and Nepal make up 0.4% of the global total.

**Figure 1. Number of Registered CDM Projects per Region (As of end of November 2011)**



Source: UNFCCC, 2011b.

Figure 2. National CO<sub>2</sub> emissions in selected LDCs in Asia from 1960 to 2007 (As of November 2011)



Source: Climate Analysis Indicators Tool (CAIT) Version 8.0, WRI, 2011.

Literature on the CDM’s performance not only supports the above data, but attributes the lack of projects to two broad causes. One set of causes suggested by Olsen (2007) is the CDM’s institutional design. A second set of causes suggested by Jung (2006) are LDCs’ investment conditions. In the next section, the paper uses institutional rules and investment conditions to categorise barriers frustrating the uptake of projects in LDCs.

### 3. Barriers to the CDM in LDCs

#### 3-1. Institutional rules

There are a number of reasons that the rules governing the CDM project approval process have contributed to an underrepresentation in LDCs. The first are transaction costs. The amount of time it takes to move from project registration to credit

generation can be an important consideration for potential buyers. Understandably, buyers are less willing to invest if a project takes more time and delivers fewer credits. This presents a problem because has been getting longer. The admittedly small sample of four cases in LDCs in Asia suggests the time from initial project stage of public comment to registration and CER issuance can be considerable. For the two biogas projects in Nepal, it took nearly five years (more than 2,000 days) to issue a credit (Figure 3), whereas other biogas projects located in non-LDCs took 270 days.<sup>6</sup> While it is difficult to determine how much waiting costs, earlier work (Fichtner et.al 2003) found that CDM transaction costs are estimated to be between 6% to 53% of the total project costs (this figure includes technical assistance and administration costs).

Figure 3. Average days from registration to the first certified emission reduction (CER) issuance by year in LDCs

Name of CDM Project Activity	Region	Host Party	Registration Date	Date of first issuance	Day count
Kampot Cement Waste Heat Power Generation Project (KCC-WHG)	Asia	Cambodia	2009/4/17	2011/5/2	745
Energy Efficiency Improvement Project At A Beer Brewery In Lao PDR	Asia	Lao	2007/4/7	2010/5/14	1133
Biogas Support Program - Nepal (BSP-Nepal) Activity-1	Asia	Nepal	2005/12/27	2011/9/23	2096
Biogas Support Program - Nepal (BSP-Nepal) Activity-2	Asia	Nepal	2005/12/27	2011/8/24	2086

Source: Extracted from the IGES 2010a.

<sup>6</sup> It is important to underline that three projects including Nepal case are small scale with an average time that is much higher than medium-scale projects.



A second obstacle is the quality and quantity of data. A shortage of data can make it challenging for project developers to generate project-specific baselines needed to measure and then monitor emissions reductions (Kamal, 2010). It also makes it difficult for project proponents to locate project opportunities. The data and transaction costs issue are related since the longer it takes to gather good data, the longer it will take to register the project, validate and verify reductions, and generate CERs.

A third stumbling block is that until recently there was no preferential treatment extended to LDCs for CDM projects (De Lopez et al., 2009). Although non-Annex I countries cover a diverse range of countries from advanced emerging countries (e.g. Brazil, China, India, and South Africa) to the LDCs (e.g. Bhutan, Cambodia and Nepal), for most of the CDMs early history they have followed the same measurement, reporting and verification (MRV) rules regardless of their project size, emission patterns, and economic or human development conditions. While the UNFCCC introduced the Nairobi Framework to build capacity of designated national authorities (DNA) capacity and increase participation of African countries in a market-based mechanism, it is only recently that it tried to correct the regional imbalance by extending preferential treatment to LDCs (discussed more in the opportunities section).

### 3-2. Investment conditions

Another set of reasons for the limited uptake of CDM projects in LDCs are the investment conditions in those countries. Almost by definition, there are generally fewer mitigation opportunities in LDCs. This also translates to the scale of the projects; on average projects in LDCs tend to be smaller in scale. For instance, the average number of issued CERs from LDC projects is only 0.02% in total (162,141: 4 LDCs in Asia-Bhutan, Cambodia, Lao PDR and Nepal; 105,678 and only one LDC in Africa -United Republic of Tanzania; 56,463) and the average number of credits from non-LDCs dominates 99.98% (783,631,746) as of the end of November, 2011 (UNFCCC, 2011b). The limited GHG emissions mean there are fewer incentives for investors to finance projects in LDCs.

Second, it is more difficult for LDCs to bear the initial finance and maintenance costs. Many of the CDM projects require significant upfront investments on alternative technologies that can be recouped from the purchase and issuance of CERs. However, for poor communities the initial outlay of financing can frequently be beyond their means. The lack of financial institutions and limited collateral to get a loan is a related hurdle. The need for training to operate and maintain alternative technologies can also place an additional burden on LDCs.

Third, LDCs generally have limited administrative capacity. As suggested above, moving from the conceptualisation to credit generation is a time consuming process. To reduce these costs, there is a need for human capital and training; but both tend to be in short supply in LDCs. De Lopez et al (2009) have argued that the reason that some countries have been unable to host CDM projects is because of their lack of institutional, human, and technical resources. Especially for countries with imminent development needs, allocating staff and time to a designated national authority (DNA) can be also seen as diversion of resources for non-essential tasks.

Last but not least, project risks for investors could be a barrier. In LDCs, political and economic risks can act as a disincentive for project developers (De Lopez et al, 2009; Deodhar, 2011). Civil unrest and violations of contract are among the factors cited as contributing to the increase uncertainty about CDM projects in LDCs. These risks become all the more significant because financial rewards are spread out over long crediting periods. The longer time means there is a greater chance that political, economic or social turbulence will cut off resource flows.

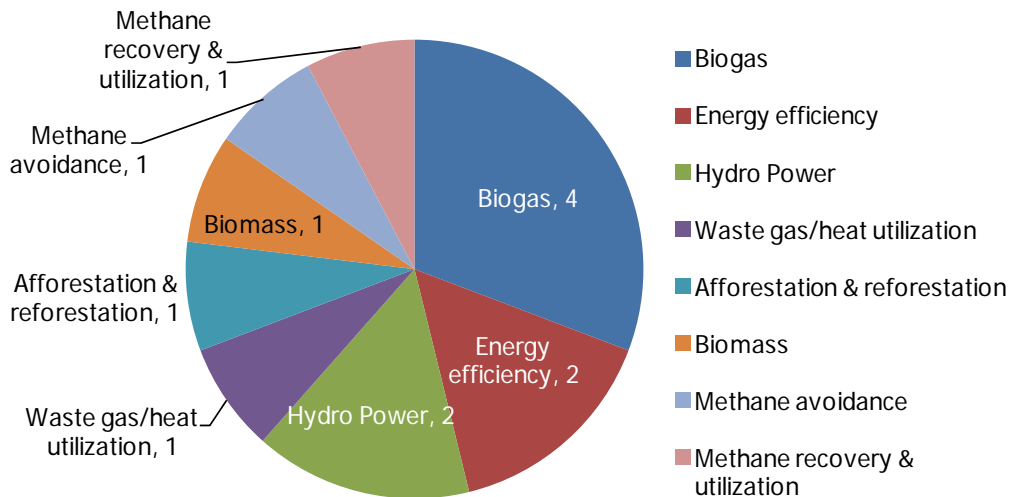
As noted above, there is an expansive literature on why the CDM has not performed well in poorer countries. However, there are few studies that have determined how those obstacles relate to particular cases in LDCs. The paper offers this closer examination, focusing on the case of biogas projects in Asia's LDCs.

#### 4. Case study in Cambodia and Nepal

As illustrated in figure 5 below, biogas projects account for the largest number of registered CDM projects in Asian LDCs. The paper analyses biogas CDM projects in Nepal and Cambodia to determine

which of the previously discussed barriers - investment conditions and institutional rules - hindered project development in those countries and how key barriers can be overcome.

**Figure 6. Difference of projects area of registered CDM in Asian LDCs (As of end of November 2011)**



Source: IGES 2011c.

##### 4-1. Background

Biogas is a renewable fuel produced from organic waste such as dead plants, animal dung, sewage and kitchen waste. It is comprised chiefly of methane (CH<sub>4</sub>), carbon dioxide (CO<sub>2</sub>), and small amounts of hydrogen and nitrogen. These gases can be combusted or oxidised through a process that converts biogas into fuel. Absent this conversion, biogas is released into the air as CH<sub>4</sub> and nitrogen. If converted into fuel, biogas can be used for daily heating or cooking. Biogas can therefore be a potential energy source that also contributes to GHG mitigation by replacing conventional fossil fuel energy sources.

In developing countries, producing and utilising biogas as a key energy source offers one of the most significant opportunities for mitigating climate change. This potential is underlined in studies showing GHG emissions in LDCs come chiefly from household energy consumption (Warget 2009) as well as research indicating that 30-95% of total energy use in 15 LDCs come from household consumption (Li et al 2005). In addition to

households, the GHG contribution from agricultural activities comprises a significant amount of the annual total GHG emissions. For instance, agriculture comprises 85% and 80% of national GHG emissions respectively in Cambodia and Nepal (Ministry of Environment, Cambodia, 2002; Ministry of Population and Environment, Nepal, 2004). In the agricultural sector, animal dumping or wastewater generates GHG emissions as well as environmental and health risks. Producing biogas from animal dung and waste products can therefore mitigate GHGs as well as curtail environmental and health risks.

Given the above advantages, it is not surprising that biogas projects have been introduced as small-scale renewable applications for both household and factories in many countries. They appear destined to play this role in Asia's LDCs. For instance, in Cambodia an anticipated increase in economic and population growth will result in increased food consumption (especially meat and egg). Both the growth in organic waste and reliance on livestock accompanying the increased consumption are likely to bring about a rise in CH<sub>4</sub> emissions: the



percentage of GHG emissions from agriculture are projected to increase from 15.5% in 1994 to 27.5% in 2020 (Ministry of Environment, Cambodia, 2002). It could also meet a critical need in Asia's LDCs. In Nepal, for instance, transforming agricultural emissions into biogas can serve dispersed and decentralized electricity needs in rural areas. Thus, a biogas project cannot only replace conventional energy use patterns in rural household with sustainable alternatives, but offers a GHG mitigation opportunity (Ministry of Environment, Cambodia, 2002; Ministry of Population and Environment, Nepal, 2004). These opportunities would presumably appeal to Nepal and Cambodia.

Among LDCs in Asia, there has been modest progress with biogas projects. Part of the reason progress has only been modest is biogas projects require additional revenues to become financially viable. The revenue from CDM could potentially meet this need (Danida, 2009). The next section draws upon case study research on biogas projects as well as interviews with stakeholders working on CDM in LDCs to analyse barriers and opportunities to acquiring this carbon finance.

## **4-2. Barriers**

### **4-2-1. Investment conditions**

One of the identified key constraints to introducing biogas in Nepal and Cambodia are upfront and maintenance costs for conversion technologies. The costs of a biogas programme depend on the costs of the biogas plant installation, support activities and programme implementation. While the technology required to implement biogas projects are cheaper than those for other CDM projects, one of the main hurdles to project implementation is that the investment costs often have to be covered by households since biogas serves as small-scale household energy source. These costs can be a critical barrier because households often lack the initial capital to invest in the technologies.

A second hurdle involves the appropriateness of technology. In Cambodia, for instance, a biogas CDM project was initiated with a purpose of promoting wastewater treatment, eliminating odours, and thus improving sanitation in wastewater lagoon ponds (UNFCCC, 2006). However, technological

availability and expected impacts of both electricity installation capacity and GHG reductions made it difficult to replicate the project. The biogas generation from the wastewater treatment was relatively new to Cambodia, and the technologies were not manufactured domestically (UNFCCC, 2006). An interviewee in Ministry of Environment, Cambodia, stressed that this is important because if a biogas generating facility needs to be repaired, parts and technicians must be secured outside the country, which could also hinder creating a self-sustained market for bio-digester in the country. Therefore, a key factor in the case of biogas is whether neighbouring countries possess the knowledge and experience to apply biogas technologies. In the case of neighbours around Cambodia, Thailand has 38 registered CDM biogas projects (IGES, 2011b). The proximity of Thailand and Vietnam made it more feasible for Cambodia to adopt the technology for one project (UNFCCC, 2008). But the high upfront and maintenance costs can hurt the chances of replicating the project. Without this proximity, even one project could be impossible.

A third challenge is harnessing opportunity for building and strengthening capacity for all phases of the CDM development process of project. On this point, one of the interviewees for this paper mentioned the need to plan for the formal creation of the Designated National Authority and its capacity building together, because a lack of DNA capacity at critical stages of implementation (i.e. project monitoring and evaluation) can hinder smooth project process. In the cases of Cambodia's DNA, staff from different governmental divisions could not permanently attend to the needs of CDM project development. To keep in place human resources and develop capacity, sustained support for salaried positions, continuous training, and constant interactions with stakeholders were deemed essential. Related to the capacity issues is that often public agencies and private sector companies lack awareness about the technical and financial benefits of CDM; or have few resources to collect data required for implementing CDM projects. Here again capacity building was cited as essential.

Yet a fifth set of impediments relate to security of the investments. In discussing opportunities for CDM in LDCs, one interviewee emphasised that political

instability or frequently changing policy priorities (i.e. eliminating subsidies or initiating new regulations) raises investment risks. To be attractive to investors, there needs to be clear values and limited risks. The absence of leadership decision signalling support for CDM further deepens these risks. For an interviewee reflecting on China's success with the CDM, credible governmental leadership commitment was considered absolutely crucial to the CDM's success.

Demonstrating that barriers are often connected, one interview remarked the absence of this commitment can also have implications for human and institutional capacity. This observation merits underlining because the shortage of capacity may be felt most acutely in the DNA or among project stakeholders but its source lies at the highest political levels. Ideally this support would help policymakers in LDCs to mainstream CDM into the national development strategies, creating the commitment that effectively connects the high level political support to the operational level technical expertise.

#### 4-2-2. Institutional rules

In addition to first five barriers that focus chiefly on the factors in LDCs, the case of biogas and interviews revealed a few constraints related to the CDM institutional rules. The one cited most frequently was the transaction costs. For biogas projects, the transaction costs range from \$25,000 to more than \$100,000, depending on the size and type of the project. To make a biogas project more attractive, a minimum CERs issuance should be between 15,000-20,000 t-CO<sub>2</sub> per year. Yet the typical amount of issued CERs was between 1,700-30,000 t-CO<sub>2</sub> per year (Linden and Gautam, 2009). In Nepal, the transaction costs is a major consideration, because the recent biogas CDM projects took four years to get its first CERs verified and certified. In this instance, the greatest challenges are identifying techniques to monitor and quantify the carbon credits from thousands of plants spread over long distances and remote areas (World Bank, 2011). These transaction costs also factor into projects in LDCs because they constitute a larger share of small- and micro-scale projects and they can place an added strain on institutional capacity.

Another significant barrier mentioned during project interviews is the uncertainty over the future of CDM following the fate of the Kyoto Protocol. Similar to the lack of a signal from higher level leadership, the current uncertainty over whether and how the CDM will function in a post-2012 international climate change regime can undercut investor confidence. Current uncertainty over international negotiations on of post-Kyoto regime, however, is of course not only a concern for LDCs but the carbon market as a whole.

### 4-3. Opportunities

#### 4-3-1. Investment conditions

Even with these constraints, it is important to reiterate that biogas CDM projects are registered more than other CDM projects in LDCs. Moreover, there have been recent attempts to manage the listed barriers. Why have biogas projects enjoyed relatively more success and what opportunities are there to overcome the barriers more generally?

Arguably the main opportunity is the benefits beyond the GHG reductions. While interviewees<sup>7</sup> stressed that, though tangible benefits of CDM projects are more a hope than a reality, it was also apparent officials have clear picture of various benefits. For example, one interviewee suggested that the CDM is expected to improve livelihoods first and mitigate carbon second. A similar observation was made in the case of Nepal. Prior to the biogas CDM project in Nepal, a cost-benefit analysis was conducted to assess the benefits of replacing conventional cooking and heating system such as fuel wood and kerosene. The analysis found that some of the largest benefits of the projects are its social co-benefits. These included that the project would free up money otherwise spent on fuel wood for cooking and heating, and convert waste of the biogas plant bio-fertilizers (UNFCCC 2006). Similarly, experts commenting on Nepal noted that a biogas project is expected to generate health benefits for woman suffering from indoor air pollution and school

<sup>7</sup> To gain additional perspectives on how barriers mentioned in the literature relate to on-the-ground reality, interviews were conducted with a number of experts with rich experience in the CDM. As suggested in the literature, interviewees also noted that the limited uptake of CDM project in LDCs was an issue in need of redress. Regarding this issue, the points drawn from the interviews are summarised below. The interviews revealed that there is a gap between ideal and reality when it comes to the CDM.

children who could devote more time to school rather than gathering firewood.

Another opportunity lies in the cost-effectiveness of the CDM projects. For example, the installation cost of biogas facilities is cheaper than other mitigation projects. Biogas installation cost range from 200-400 EUR in Asia, to 500-1000 EUR in Africa (UNEP, 2009) (the cost differences among the regions results from the accessibility of finance and raw materials, design, technology, human resources, the degree of risks for the investment, and the feasibility and experiences of neighbouring countries). In this respect, small-scale projects are more feasible in terms of financial, social and economic capacities of LDCs. Indeed, a user-friendly bio-digester installed in Cambodia can help households reduce their consumption of fuel wood up to 7 kg and eliminate GHG emissions by up to 4.8 t-CO<sub>2</sub> per year, while meeting basic energy needs. In the past, it was not possible to imagine that unmanaged manure could deliver these benefits (Ministry of Environment, Cambodia and UNEP, 2010).

A third opportunity in the case of Nepal involves leveraging previous experiences with biogas. Unlike Cambodia, Nepal has not encountered concerns over technological appropriateness due to its national biogas program. The first biogas projects were introduced in Nepal in 1955 through the National Biogas Support Program (BSP-Nepal) with international funding on an experimental basis to meet rural household energy needs for off-grid power. The program has been developed further with support from continued international donors and national government subsidies (Sundar and Bajgain etc, 2005; UNFCCC 2005). This experience led to development of the first biogas CDM project as an alternative financing methods under the umbrella BSP-Nepal biomass program in 2004.

A fourth and final opportunity related to LDCs is the possible carry over from a successful case. The fact that Nepal will receive around \$350,000 from the CERs provides evidence that projects can be developed. According to an interviewee in Nepal, a host of issues need to be addressed before full-scale implementation, biogas projects “fit” LDCs. At the same time, the recent Nepal biogas CDM provided an example of how many participants from

households with biogas systems in their residences could benefit from an international mechanism. Getting the right “fit” and experiencing the range of benefits flowing from the project might generate positive spillovers and tangible demonstration effects for local project beneficiaries.

#### **4-3-2. Institutional rules**

Another set of opportunities focus more on the CDM itself. The UNFCCC and its CDM Executive Board has not been blind to the distribution of projects. As noted at the outset, it has in fact been increasingly proactive when it comes to addressing the regional imbalance in the CDM. The COP in 2001 called for the CDM EB to report “to the COP/MOP on the regional and sub-regional distribution of CDM project activities with a view to identifying systematic or systematic barriers to their equitable distribution” (UNFCCC, 2001). The CMP1 in 2005 required the EB to suggest options to address these issues, and to broaden participation in the CDM (UNFCCC, 2005). At COP15, it was decided to simplify the process for demonstrating additionality of small-scale projects, allowing postponement of the payment of registration fee, and provide upfront financing for validation and registration for projects in under-represented countries (UNFCCC, 2009). Advancing these recommendations, a CMP5 decisions (technically adopted as a decision at the 56<sup>th</sup> CDM EB) called for a loan programme to be provided to the countries with fewer than 10 projects.

A way that the CDM EB has sought to deal with higher transaction costs and small project size is what is known as a program of activities (PoA). While the agreement on a PoA in 2007 was not meant exclusively for LDCs, PoA allows for the bundling of many small comparable projects as a single project with a common methodology. The motivation is to bring down high transaction cost for small diffuse technologies such as biogas. It is important to note that the PoA did not formally move forward until the EB decided to simplify some of the rules in May 2009. A few months after those rule changes, the number of submissions increased significantly. There is also a growing potential to combine PoA’s with existing microfinance scheme in the local community in LDCs (Danish Ministry of Foreign Affairs, 2009).

Another opportunity to address the shortage of data that make it difficult to calculate baselines needed for crediting. There has been a growing effort to introduce reforms that help reduce the data burden by introducing default values for parameters that underpin the creation of baselines for key project types. Standardized baselines are gaining attention.

A fourth set of reforms to help deal with the time needed to register a project. The CDM EB has also put forward reforms that allow for certain countries and project types to have their projects approved more quickly. The centrepiece of this reform effort are waivers on additionality for certain project types or countries with fewer than 10 projects since proving additionality can be one of the more time consuming parts of the project approval process. More recently, the 60<sup>th</sup> EB meeting agreed upon guideline for demonstrating additionality of micro-scale project activities so that a project can be regarded as additional in the event it meets one of the criteria. This treatment helps them to develop projects by removing a formidable barrier.

A fifth opportunity is the Designated National Authorities Forum (DNA Forum). The CDM EB established the DNA Forum in response to a request from the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP) at its first session. The CMP requested the EB to broaden participation in the CDM through, for instance, regular meetings with DNAs from different countries. The resulting DNA forum provides opportunities for DNA representatives to exchange views, share experiences and bring forward issues requiring additional attention.

A final opportunity is less about the CDM and or LDCs but potential buyers. This involves the recent announcements some major CERs buyers in the international carbon trading market and donor have proposed for assisting LDCs through CDM. The highest profile such development is the, EU's decision to only source credits eligible for compliance for Phase III of its EU-ETS from LDCs (European Commission, 2009). This opportunity, also highlighted at the beginning of the paper, offers a transition to the recommendations and conclusion.

## 5. Recommendations and way forward

The previous sections attributed the limited number of CDM projects in Asian LDCs to several barriers and then used stakeholder interviews to determine how significant they were in the case of biogas projects. It also looked at some opportunities to overcome those barriers. While there is broad agreement between the literature, the case studies, and the interviews on the limitations of CDM, some additional findings can be distilled from the analysis.

Some of these findings relate to research. In past studies, there has been a tendency to list rather than analyse the barriers preventing the uptake of CDM projects in LDCs. An implication of this tendency is that there have been few studies to examine which sets of barriers (institutional rules or investment conditions) have the most significant impact on LDCs. This is partially due to the fact that the limited number of projects has made it difficult to answer these questions. But it is also illustrates a gap in the research.

Fortunately, the modest increase in the number of project experiences in LDCs and recent success cases can help fill that gap. On balance, the paper finds that while the institutional rules governing the CDM have limited the number of CDM projects in Asian LDCs, an equally formidable barrier are readiness conditions. The lack of these conditions should not be read as indictment of LDCs but rather as an area to focus upon in addressing the regional imbalance of projects in Asia. Organisations such as the World Bank have begun to address this imbalance with initiatives such as the newly proposed fund the Carbon Initiative for Development (Ci-Dev) and its forerunner the Community Development Carbon Fund (CDCF) (World Bank, 2011).<sup>8</sup>

While the paper finds these efforts laudable, they will work better with carefully calibrated strategy in the host country. First, this strategy will have a narrow scope so as to conserve resources. It will also have several-related elements that build incrementally on each other so as to build trust

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<sup>8</sup> One of the CDCF's goals to build readiness in host countries in the poorest countries



Table 2. Summary of LDCs' barriers and opportunities on CDM discussed in this paper

	Barriers observed in the literature	Barriers observed in the case study and interviews	Opportunities
<b>Institutional rules of CDM</b>	<p><b>Data</b></p> <ul style="list-style-type: none"> <li>✓ Typical absence of sufficient required data and low data reliability</li> <li>➢ Related to current limit of human and financial capacity to deal with stricter MRV processes</li> </ul> <p><b>Uniform rule</b></p> <ul style="list-style-type: none"> <li>✓ Limited project developments regardless of guideline for simplifying demonstration of additionality</li> <li>➢ Related to current limit of human and financial capacity to deal with stricter MRV processes</li> </ul> <p><b>Transaction cost</b></p> <ul style="list-style-type: none"> <li>✓ Typical longer time process for winning CERs for smaller scale project</li> <li>✓ Cause of rejection or no-issue</li> <li>➢ Related to current limited data availability for faster completion of MRV processes</li> </ul>	<p><b>Data</b></p> <ul style="list-style-type: none"> <li>➢ Related to current limit of human and financial capacity to deal with stricter MRV processes</li> </ul> <p><b>Uniform rule</b></p> <ul style="list-style-type: none"> <li>✓ Time-lag for gaining from the special treatment by guideline for demonstration of additionality</li> <li>➢ Related to partial cause of higher transaction cost</li> </ul> <p><b>Transaction cost</b></p> <ul style="list-style-type: none"> <li>✓ Difficulty in cost recovery due to higher transaction cost for dominant small- and micro-scale projects</li> <li>➢ Related to hurdles due to uniform rule</li> </ul> <p><b>Others</b></p> <ul style="list-style-type: none"> <li>✓ Fear for uncertain future of CDM under Kyoto Protocol</li> <li>➢ Related to stuck in small-size project</li> </ul>	<p>→ <b>Promote programme of activities (PoA)</b></p> <p>→ Bring similar projects under the same rule with less transaction cost and wider dissemination of both technology, benefits and experiences among various project participants</p> <p>→ <b>Creation of standardised baseline for key project and introducing fast track approval</b></p> <p>→ Remove typical major formidable barrier in LDCs such as data requirement and shortage of capacity to deal with stricter MRV processes</p>
<b>Investment condition in LDCs</b>	<p><b>Project size</b></p> <ul style="list-style-type: none"> <li>✓ Disincentive for project investor and getting external financial support due to limited potential and poor credit rating</li> <li>➢ Related to boosting initial project cost under uniform rule treatment</li> </ul> <p><b>Initial cost</b></p> <ul style="list-style-type: none"> <li>✓ Typical longer time process for winning CERs for smaller scale project</li> <li>✓ Limited financial support for up-front cost payment</li> <li>➢ Related to data availability (MRV)</li> </ul> <p><b>Limited capacity</b></p> <ul style="list-style-type: none"> <li>➢ Related to current limited data availability for faster completion of MRV processes</li> <li>➢ Disincentive for project investor due to poor credit rating</li> </ul>	<p><b>Project size</b></p> <ul style="list-style-type: none"> <li>✓ Disincentive for project investor and difficulty in getting external financial support due to limited potential and poor credit rating</li> <li>➢ Related to current limit of human and financial capacity to deal with stricter MRV processes</li> </ul> <p><b>Initial cost</b></p> <ul style="list-style-type: none"> <li>✓ Upfront and maintenance cost for handling new and/or advanced technologies</li> <li>✓ Burden for household expenses</li> <li>➢ Related to current limit of governmental financial capacity to secure sufficient project budget</li> </ul> <p><b>Limited capacity</b></p> <ul style="list-style-type: none"> <li>✓ Lack of technical expertise and knowledge to produce and manage new facility</li> <li>✓ Weak and temporary establishment of DNA and unsatisfied basic needs for members</li> <li>➢ Related to availability of initial and long-term financial access</li> </ul> <p><b>Others</b></p> <ul style="list-style-type: none"> <li>✓ Risk of project deadlock due to national political instability</li> </ul>	<ul style="list-style-type: none"> <li>✓ Harnessing project benefits on the ground</li> <li>✓ Maximising cost-effectiveness of small scale project</li> <li>✓ Leveraging previous experience</li> <li>✓ Finding successful cases</li> </ul> <p>→ <b>Setting national CDM strategic development plan</b></p> <p>→ Set national target on promotion of CDM and other GHG emission mitigation opportunities</p> <p>→ Correspond timely to international decisions</p> <p>→ Harmonise with international financial assistances for wider project dissemination</p> <p>→ <b>Sharing experience via DNA Forum</b></p> <p>→ Actively share and learn each other on good practice, technical and methodological learning</p>

among relevant stakeholders. It would begin with a clear statement from high-level government officials anticipating potential increases in carbon finance and committing the country to attracting those resources. This might come in the form of an executive order or a new institutional arrangement (including a new law). The form will vary across countries according to the national economic, social and environmental circumstances.

Secondly, the strategy would follow with needs assessment of capacity building to manage CDM processes. The *needs assessment* should outline where human resources could support the public sector, particularly the DNA, to draw carbon finance for one or two low hanging sectors. It would also look to strengthen capacity among a select group of private sector actors, operating both within the target sector(s) and within consultancies that can help support the analytical work in the sector. The needs assessment would also identify resources that could support data collection and baseline development for the target sector, with a special focus on PoAs as they are more compatible with LDCs decentralized economic structure and mitigation opportunities. The needs assessment can be shared with the UNFCCC such as regional DNA forums and all other stakeholders in the development community. A related element of this strategy would be reinforced by engaging with voluntary organisations and NGOs that possess locally-gained knowledge and experiences to fill capacity gaps and promote projects.

A third step would involve greater efforts to build synergies with countries with similar natural resource endowments and development experiences. The South-South cooperation experienced through the DNA Forum is indeed a positive development, but it could complement more concentrated twinning arrangements that exchange knowledge and know-how between countries with similar needs in similar circumstances. In this regard, Nepal and Cambodia might serve as an important intermediary for other LDCs in Asia since they have succeeded with a few projects. Much of this knowledge transfer will focus on recent CDM reforms that could potentially help LDCs such as PoAs, standardised baselines, and fast track registration additionality. Perhaps most important will be the partnering of

developing countries that have benefitted from the CDM (i.e. China and India) and LDCs that have not. These exchanges should also focus on presenting proposals to the UNFCCC that will make the CDM and other funding mechanisms such as the Green Climate Fund compatible with LDCs.

Finally, it should be underlined that this strategy is not foolproof. There are risks that the CDM or future market mechanism will not deliver upon its promise. Hence the strategy must be calibrated to expand in scope and deepen in ambition with signals from the UNFCCC and market players that the CDM is indeed catering to their interest. At the same time, such a strategy will help LDCs play a more proactive role in defining how a future CDM or other market mechanism functions and tailoring its design to LDCs. Actively participating in newly established financial programmes and stakeholder dialogue might be the most important step that LDCs can take to rectify the regional imbalance. More importantly, it will be a step they will take for themselves.



### List of interviewees (Shown in alphabetical order.)

**Mr. Keshav C Das**, Carbon Finance Advisor, SNV Netherlands Development Organisation.

**Mr. Hak Mao**, Head of Vulnerability and Adaptation Office, Climate Change Department, Ministry of Environment, Cambodia.

**Dr. Lu Xuedu**, Advisor on Climate Change and Carbon Market, Regional and Sustainable Development Department, Asian Development Bank (ADB).

**Dr. Tek Maraseni**, Deputy Director (Operation), Australian Centre for Sustainable Catchments, University of Southern Queensland, Australia.

**Mr. Uy Kamal**, Head of GHG Inventory and Mitigation Office, Climate Change Department, Ministry of Environment, Cambodia.

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