

# Carbon Projects and Potential Source of Revenue for Microfinance Institutions to Accelerate Renewable Energy Lending in Nepal

By: Marco van der Linden, Carbon Finance Advisor: [MarcovanderLinden@snvworld.org](mailto:MarcovanderLinden@snvworld.org)  
and, Ramesh K. Gautam, Microfinance Advisor: [rgautam@snvworld.org](mailto:rgautam@snvworld.org)  
SNV Nepal, Bakhundole, Lalitpur  
P.O. Box: 1966; Tel: 5523444

## **Abstract**

*The Kyoto Protocol required a number of developed countries to limit or reduce their greenhouse gas emissions which could be traded through market-based mechanisms. One of the market-based mechanisms under the Kyoto Protocol is the Clean Development Mechanism (CDM) which allows emission-reduction projects in developing countries to earn emission reduction credits called 'certified emission reduction' or CER.*

*The size of the global carbon market has been growing strongly in the last years. The World Bank estimated the size of the project based carbon markets in 2008 at 7.2 billion. Renewable energy technologies (RET) also have the potential to reduce greenhouse gas emissions and be eligible for carbon trading under the CDM and/or the voluntary market. Different RETs have different potential for reducing greenhouse gas emissions.*

*Currently there are two registered CDM projects from Nepal providing up to US \$ 600,000 as net income annually by the World Bank. Beside two CDM projects one project is in the voluntary market, all three using biogas. The experience with the existing biogas projects has shown that obtaining CDM credits is not an easy process considering time required in developing a project, resources involved and uncertainty in carbon price.*

*Despite several challenges in developing a carbon project, scope for revenue generation to microfinance institutions (MFIs) do however exist. MFIs with larger scale of operations having potential for RET lending on commercial scale can bundle their RETs to develop a carbon project for revenue generation. Besides income to MFIs, users can also be benefited if they are also made part of the income streams, there by creating WIN-WIN situation to help accelerate RET lending.*

## **Introduction**

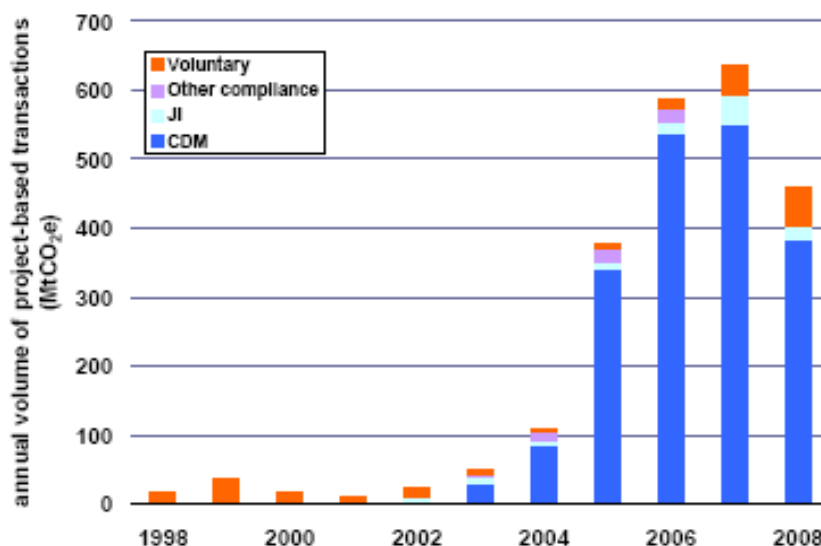
In 1992, the United Nations Framework Convention on Climate Change (UNFCCC) was designed to start actions to reduce global warming and to adapt to the temperature increases that are inevitable. As part of the UNFCCC process, the Kyoto Protocol was agreed in 1997. The central feature of the Kyoto Protocol is its requirement for a number of developed countries to limit or reduce their greenhouse gas emissions. To help countries meet their emission targets, and to encourage the private sector and developing

countries to contribute to emission reduction efforts, the Kyoto Protocol includes market-based mechanisms where emission reductions can be traded, hence turning emission reductions into a commodity and giving it economic value.

One of the market-based mechanisms under the Kyoto Protocol is the Clean Development Mechanism (CDM) which allows emission-reduction (or emission removal) projects in developing countries to earn emission reduction credits called 'certified emission reduction' or CER. Each CER is equivalent to one tonne of CO<sub>2</sub> and these CERs can be sold to developed countries to meet a part of their emission reduction targets under the Kyoto Protocol.

The market-based mechanisms under the Kyoto Protocol, including the CDM, are usually referred to as the regulatory or compliance markets. Parallel to this compliance market a voluntary market has developed that includes all emissions reduction trades that are not required by regulation. This market is largely driven by buyers that purchase credits to offset their own emissions and become carbon neutral. The voluntary market is not a uniform market but exists of different competing schemes and standards which might vary in their scope and requirements.

The size of the global carbon market has been growing strongly in the last years. The World Bank estimated the size of the project based carbon markets in 2008 at 7.2 billion USD. Figure 1 shows the growth in traded volumes in the last years. It can be seen that the CDM is by far the biggest market in terms of volume, however the size of the voluntary market has been increasing significantly in the last years.



**Figure 1: Volumes of transactions in different project schemes (Source: Worldbank, 2009. State and Trends of the Carbon Market 2009)**

## ***Carbon potential of Renewable Energy Technologies***

Renewable energy technologies (RET) have the potential to reduce greenhouse gas emissions and be eligible for carbon trading under the CDM and/or the voluntary market.

Different RETs have different potential for reducing greenhouse gas emissions. The following table provides an overview of some RETs and their potential for reducing greenhouse gas emissions based on existing CDM projects in different parts of the world. It must be noted that the emissions reduction potential can vary greatly between countries or regions, even when using the same technology. This is caused by the fact that emission reductions are calculated based on the energy source that would have been used in the absence of the RET. This energy source can vary depending on region and types of households from firewood to coal and kerosene. The figures in the table are therefore only indicative and might be different when the same technology is applied in Nepal.

**Table 1: Examples of renewable energy technologies and their potential for reducing greenhouse gas emissions**

<b>Technology</b>	<b>Country</b>	<b>Estimated emissions reductions in tonnes per year per installation</b>	<b>Estimated purchase and installation costs of RET in Nepal</b>
Biogas	Nepal <sup>1</sup>	1.96 tonnes per household per year	29,480 NPR
Micro hydro	Bhutan <sup>2</sup>	524 tonnes/year for a 70 kW plant	20,692,000 NPR
Photovoltaic Lamps	India <sup>3</sup>	0.117 tonnes/year for each photovoltaic lamps	3,500 NPR for solar tuki set with 2 lamps
Solar cooker	China <sup>4</sup>	2.1 tonnes/year for a 773.5 W cooker	13,500 NPR

## ***Steps required and actors involved in developing a carbon project***

Developing a carbon project is not easy. There are obviously the normal steps in project development such as feasibility assessment, financial closure etc. Furthermore there are different steps that are required in developing a project as a CDM project. These steps and the different actors involved are described in Figure 2 and this section.

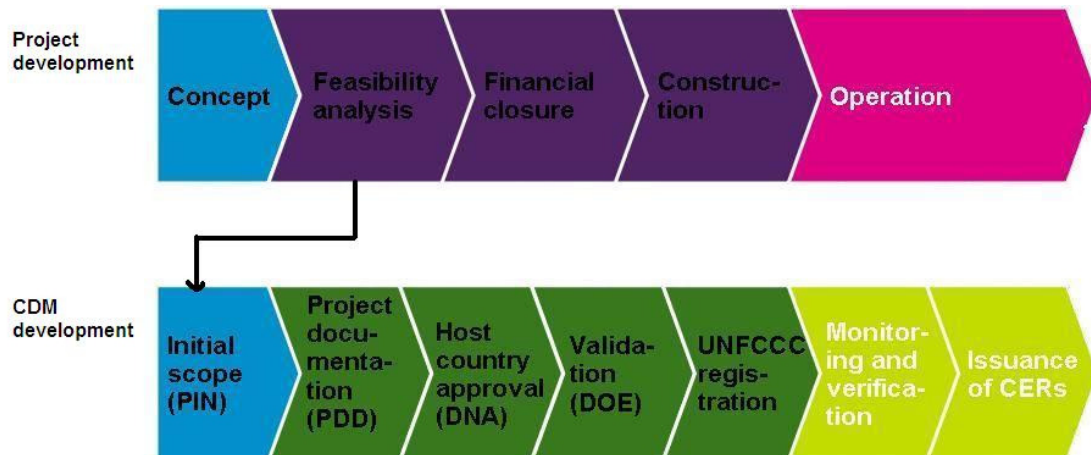
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<sup>1</sup> Nepal Biogas Support Program-PoA

<sup>2</sup> e7 Bhutan Micro Hydro Power CDM Project

<sup>3</sup> Rural Education for Development Society (REDS) CDM Photovoltaic Lighting Project

<sup>4</sup> Federal Intertrade Pengyang Solar Cooker Project in China



**Figure 2: Steps in CDM project development**

*Step 1: Project design and documentation*

Prospective projects need to show that they meet all the requirements for being CDM-eligible. The first step in this process is to prepare a Project Design Document (CDM-PDD) describing the anticipated project. This PDD has to use a predefined format and be completed in accordance with guidelines provided by the UNFCCC.

As part of the project design, project participants will need to describe what would have happened in the absence of the project (business-as-usual), how the project is reducing emissions compared to business-as-usual and how these emission reductions will be calculated and monitored. For this, the project will need to have to use a formerly reviewed and approved methodology which contains the required steps for these assessments and calculations.

*Step 2: Approval from the host country.*

CDM transactions can occur between a project and a government of a developed country or between the project and a company in a developed country. In both cases, all countries involved in a CDM transaction (either directly or because the company buying the emissions reductions is located in the country) will need to give approval to the project activity. Specifically the host country of the project will need to confirm that the project contributes to the sustainable development of the country, based on criteria that are designed by the country itself.

*Step 3: Validation of the project design*

Validation is the process of independent evaluation of the project design by an accredited third party to ensure the project meets CDM requirements.

*Step 4 Registration of the project activity*

If a project is validated and it meets the CDM requirements, a project can be registered. Registration is the formal acceptance by the Executive Board, the UN body in charge of the CDM, of a validated project as a CDM project activity. Registration is the prerequisite for the verification, certification and issuance of CERs related to that project activity.

*Step 5: Monitoring and verification*

The project should be implemented as described in the PDD. The project participants are responsible for monitoring the emissions reductions from the project according to a monitoring plan which is part of the PDD. Verification is the periodic independent review by an accredited third party of the actual monitored emission reductions that have occurred as a result of a registered project activity during a certain period of time. This is based on the data provided by the project.

*Step 6: Verification of the project activity and issuance of the CERs*

Based on the report of the accredited third party and a certified statement, the Executive Board (see step 4) will decide if CERs will be issued for this project which can subsequently be sold to a buyer.

The above steps represent the requirements of the CDM. Voluntary markets usually have their own standards and approaches but the general steps are very similar as described above. Some steps might be simplified or non-existing such as the need for approval from the countries involved.

### ***Experience with CDM projects in Nepal***

Currently there are two registered CDM projects from Nepal and one project in the voluntary market, all using biogas. The buyer for the CDM projects is the World Bank, providing up to US \$ 600,000 as net income annually. Several other possible CDM and voluntary projects are currently being developed including more biogas projects, improved water mill programme, improved cooking stoves, industry fuel switching and micro-hydro projects.

The experience with the existing biogas projects has shown that obtaining CDM credits is not an easy process. Each of the registered CDM project only covers about 9,000 plants out of the total installed number of plants in Nepal of more than 200,000. However changes in CDM regulations and changes in the calculation methodology prevented the registration of more projects covering other plants. The changes in calculation methodology between 2005 and 2009 also led to lower emissions reductions per plant being awarded. Where the two registered projects could claim up to 5 tonnes per plant per year, the current project being developed assumes 1.98 tonnes per plant per year leading to lower carbon revenues.

The two registered projects took a long time to get their emission reductions verified. In spite of this lengthy process, CERs have not been received yet because of issues around monitoring of the plants and the emission reductions.

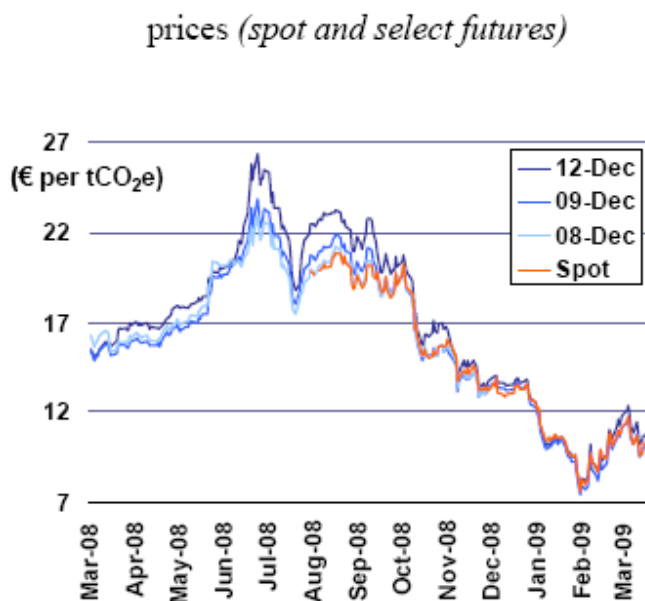
## ***Challenges in accessing the carbon market***

Accessing the carbon market has a number of challenges which are discussed in this section.

### **Carbon price volatility**

Carbon prices are volatile and mainly dependent on political decisions. This makes them more difficult to predict since there are no real fundamentals for the market price. Figure 3 shows the volatility in CER prices in the spot market and of selected futures over a one year period. The current spot price for CERs is about 1250 NPR.

The price of carbon varies not only over time but also between different markets. The price in the voluntary market is usually lower than in the CDM, however specific voluntary projects with high sustainable development benefits can also fetch higher prices.



**Figure 3: Price volatility of CERs**

This risk can be managed and addressed in several ways including fixed price contracts with buyers, pooling projects together and other financial solutions.

### **Timelines**

The time to develop a CDM project and move it through the project cycle can be significant. The time from the development of the PDD until registration can be up to a year, even longer under a worst case scenario. This creates uncertainty and a long period between some of the investments, for example project development and validation, and the time when carbon revenues start arriving as CERs. This challenge can be addressed

through innovative ways of financing and cooperation between microfinance institutions (MFIs) and carbon investors, allowing stakeholders to bring part of the payments forward to support the first investments and overcome the time gap.

### **Risk of non-delivery**

The carbon market is a performance-based mechanism. This means that payments are usually only made once actual CERs have been issued. There are several risks that might affect the delivery and issuance of CERs. First there is the regulatory risk arising from the CDM process itself and possible changes that might occur in this process over time. This is illustrated by the example of the biogas projects in Nepal that was discussed earlier. Secondly there is the risk that technologies do not deliver the CERs expected because of maintenance and performance problems. Managing these risks involves putting into place stringent quality assurance and quality control procedures and creating incentives for RET users to invest in continuous operation and maintenance of the technologies.

### **CDM process and associated transaction costs**

Developing a carbon project can be a complicated process which requires specialized knowledge that either needs to be developed in-house or obtained through a specialized consultant. In addition to the normal steps in developing a project, the CDM creates a number of additional steps (see figure 2) which require specific documentation and actions. The transaction costs associated with these steps and obtaining CDM status consist, among other things of project assessment costs, document preparation costs, costs of validation and verification by an independent entity, legal costs for preparing contracts for the sale of CERs, monitoring costs and possibly fees to be paid to the UN (depending on the host country). These costs might vary from 25,000 USD to more than 100,000 USD, depending on the size of the project and the project type. This means that a lot of carbon projects only become financially interesting if they deliver a minimum number of CERs. Some investors are looking for projects that—as a minimum—deliver 50,000 CERs per year, but in general 15,000 – 20,000 CERs per year is considered as a minimum to make a project. From table 1 it is clear that in order to reach this minimum number, quite a lot of RETs will need to be bundled, for example 10,000 biogas plants or 38 micro-hydro installations.

This usually goes beyond the capacity of one MFI. This challenge therefore can partly be addressed through cooperation between MFIs and bundling RETs into bigger projects. Furthermore, a new approach is currently available under the CDM called “programme of activities” or PoA. This PoA approach allows the inclusion of an unlimited number of activities in an umbrella-type programme coordinated by a public or private entity, therefore reducing transaction costs per RET and allowing for economies of scale. An analysis by South Pole Carbon Asset Management shows that for a biogas programme aiming to install several large biogas plants in different farms in India, the origination costs per CER could drop from 4.6 EUR per tonne under the normal CDM to as low as 0.62 EUR per tonne under the PoA approach, with the expectation that the price difference would be even bigger for domestic biogas installations.

Besides lowering the transaction costs, the PoA approach is also expected to shorten the timeliness for obtaining CERs and decreasing the risk of non delivery deriving from regulatory risks. Hence the PoA approach has the potential to open CDM markets for smaller players, sectors and countries.

## **Carbon finance - potential source of revenue for MFIs**

There are currently 15 microfinance banks and 45 financial intermediary NGOs (FI-NGOs) operating in Nepal extending financial services to their clients. Furthermore, 16 cooperatives – licensed by the central bank for limited banking transactions, about 5,000 savings and credit cooperatives and more than 10,000 other cooperatives are also providing financial services to the rural communities. For these banks, FI-NGOs and some cooperatives with larger operations, carbon revenue can be an interesting concept since it has the potential to address some of the traditional risks associated with RET lending by bringing in extra revenues and capital that can be used as a source of insuring payback of the loan.

However, in order to obtain carbon revenues, new challenges and risks need to be addressed. For most of the cooperatives, direct involvement in the carbon market might not be feasible due to their limited microfinance operations in general and renewable energy lending in particular. But, for microfinance banks and selected FI-NGOs enough room exists for carbon projects. Currently about one million clients are served by microfinance banks and FI-NGOs. Even if it is assumed out of a total of a million clients only 40 percent have the potential to qualify for RET services such as biogas and solar home systems<sup>5</sup>, 400,000 RETs can be installed to existing clients of these MFIs. Considering supply constraints both on financial and technical aspects, even if 10 percent of the total potential is targeted for micro-lending, 40,000 RETs can be set up in a year. Experience in biogas lending has shown that if MFIs are committed to go for RET lending, and if the supply side (construction companies or suppliers) are matched up with the demand, about 1,000 biogas plants can be built in a year by an MFI<sup>6</sup>. For those MFIs who have their client base of more than 20,000, meeting this target should not be a daunting task. However, firm partnerships with construction companies and suppliers is inevitably essential to go for RET lending on commercial scale.

Keeping in view of the possibility for revenue generation, it is estimated that if 2-3 percent income margin can be tapped from carbon projects, it is highly likely they will add value to MFIs by generating additional revenue of about Rs. 500-750 thousand a

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<sup>5</sup> Though micro-hydro is another potential area for carbon project, MFIs lending in micro-hydro sector has not yet begun as MFIs are mostly located in the Terai region where micro-hydro project does not exist.

<sup>6</sup> Sahara Nepal Savings and Credit Cooperative in Jhapa district and Paschimanchal Grameen Bikas Bank in Rupandehi district have demonstrated that lending on 1,000 biogas plants in a year is feasible (Source: Annual Progress Report Biogas-Sector Partnership Nepal).



year<sup>7</sup>. This amount can be used by the MFIs to mitigate risks associated with RET lending by covering loan-loss provision costs, if needed. Similarly, users can also benefit by having some share from carbon revenue which will enable them to cover repair and maintenance costs of their RETs. With this WIN-WIN situation to all the key players – MFIs through increased income, RET users through ensured after sale services and suppliers through assured market – this can help accelerate RET lending in future. To make this happen, support from the government side is however equally important.

## ***Conclusion***

Although it might not be feasible for an individual MFI to develop a carbon project, through bundling several portfolios together, the CDM or other carbon market mechanisms can be a source of revenue for MFIs.

Carbon revenue therefore can be a viable component of RET lending since it has the potential to address some of the traditional risks associated with RET lending by bringing in extra revenues and capital that can be used as source of insuring payback of the loan. However, in order to obtain carbon revenues, new challenges and risks need to be addressed that require increased cooperation between MFIs, creation of innovative financing and risk sharing mechanisms between different actors in the market and increased capacity to access foreign capital markets.

SNV is currently exploring ways to link MFIs in Nepal to the global carbon market and increase RET lending in Nepal by matching demand and supply of technologies, increasing cooperation between MFIs and creating innovative financing and risk sharing mechanisms between different actors.

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<sup>7</sup> If an MFI lends for installation of 1,000 biogas plants at the rate of Rs. 25,000/plant (based on norms set by Alternative Energy Promotion Centre, the key institution providing bulk loan to MFIs for biogas plants), total loan disbursement will be Rs. 25,000,000. Income margin of 3 percentage point from carbon project will add revenue by about Rs. 750,000 per year to the MFI.