

# CDCF Making an Impact

Carbon Finance Delivers  
Benefits for the Poor

May 2013





# Acknowledgments

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# Acronyms

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CBP	Community Benefit Plan	GWh	Gigawatt hours
CDCF	Community Development Carbon Fund	LDC	Least Developed Country
CDM	Clean Development Mechanism	MP	Monitoring Period
CER	Certified Emission Reduction	O&M	Operations and Maintenance
CFUIMS	Carbon Finance Unit Information and Management System	PDD	Project Design Document
CPA	Component Project Activity (within a PoA)	PoADD	Program of Activities Design Document
DM	Deal Manager	PE	Project Entity (Project Developer)
DNA	Designated National Authority	tCO <sub>2</sub> e	Tonne of Carbon Dioxide Equivalent
DOE	Designated Operational Entity (Auditor)	WB	World Bank
EB	Executive Board	UNFCCC	United Nations Framework Convention on Climate Change
ER	Emission Reduction		
ERPA	Emission Reductions Purchase Agreement		
EUETS	European Union Emissions Trading Scheme		





# Executive Summary

The Community Development Carbon Fund (CDCF) supports projects that benefit poor communities and their local environment and that generate emission reductions (ERs) under the Clean Development Mechanism (CDM). By offering project developers premium prices for projects that deliver demonstrable community benefits, the CDCF promotes CDM activities that combine community development and ERs in underprivileged communities. It aims to contribute to a more equitable regional distribution of carbon finance resources and to provide either direct or indirect community benefits. The CDCF portfolio currently includes 22 projects of which 9 provide direct benefits inherent to the CDM project itself and 13 provide indirect benefits through dedicated Community Benefit Plans (CBPs).

This assessment updates an earlier review of the CDCF portfolio with regard to community benefits and their contribution to broader socioeconomic and environmentally sustainable development. It highlights the diverse contributions of CDCF projects in enhancing rural and poor community livelihoods, and identifies the following broad features and trends:

- CDCF projects provide a range of important local community and household co-benefits, including improved health, increased household income and livelihood opportunities.
- Key community outcomes in CDCF projects fall under the following categories: (i) improved local infrastructure (e.g., roads, health clinics, schools, potable water, parks, and community centers); (ii) improved access to cleaner and more affordable energy for heating and/or cooking; (iii) improved livelihoods and employment opportunities; and (iv) improved access to electricity and/or energy-efficient lighting.
- The participatory process of CDCF projects is very high across the portfolio but is strongest in projects: i) that are imbedded in CDM programs that are themselves based on principles of community empowerment; ii) that are demand driven; or iii) with indirect benefits which require intensive community consultations as part of the Community Benefits Plan (CBP) and community terms. Many of these projects involve a range of key stakeholders, including local governments, and are linked to broader local development priorities.

- Most of CDCF projects are targeted toward communities that lack essential infrastructure and services (such as electricity or basic health care) and have per capita incomes that are below the relative poverty line. Despite the pro-poor orientation, however, it is not clear to what extent these projects address the needs of the poorest of the poor in developing countries.
- Most projects demonstrate strong attention to operation and maintenance (O&M) of community benefit investments, but the level of institutional sustainability varies considerably across the CDCF portfolio. The extent of the community benefits provided tends to vary, and it depends on the extent to which additional resources are leveraged for the CBP.
- Among the CDCF projects, smaller scale projects and those in non-industrial sectors offer relatively more opportunities for the poor. The projects that subsidize technologies to make them more accessible to poorer people and finance community benefits plans using carbon revenues offer significant livelihood opportunities.

The assessment also infers a number of key lessons to enhance the effectiveness of delivering community benefits:

- The effectiveness of CDCF projects is maximized when community benefits are intrinsic to the CDM project itself.
- Projects with indirect benefits, effectiveness is maximized when CBPs are integrated within the social corporate responsibility arm of the project sponsor or the broader local development initiatives.
- Beneficiary expectations need to be well managed, particularly with regard to the conditional nature of benefits (tied to ERs). Risk mitigation options should be available to manage ER delivery risk, fund flows and community expectations.
- CBPs establish a clear “results framework” for delivering community activities, complete with benefit outputs, indicators and baselines—an approach that has proven meaningful for stakeholders to demonstrate and showcase the benefits delivered.
- Monitoring and evaluation of CBP outputs should be strengthened and streamlined. Establishing few, simple and meaningful indicators helps ensure efficient and effective monitoring of CBPs. The inclusion of gender-related indicators in the CBP could be more systematic. Community participation in monitoring and evaluation might be a cost-effective option, but should be matched by more rigorous World Bank supervision of CBPs.

## Introduction

This Assessment of Community Benefits and Sustainable Development reviews the key CDCF Community Benefit Plan developments that have occurred since the last report was produced in 2009. It provides project case studies and aims to assess CBP performance to date. The report also identifies and infers key lessons, best practices, and recommendations for delivering carbon and community development projects.

### The Clean Development Mechanism

The Clean Development Mechanism (CDM) of the United Nations Framework Convention on Climate Change (UNFCCC) is one of the flexible mechanisms of the Kyoto Protocol intended to reduce the concentration of greenhouse gas (GHG) emissions in the atmosphere in a cost-effective manner. The CDM allows developed countries to use certified emission reductions (CERs) generated from sustainable development projects in developing countries to meet part of their ER targets under the Kyoto Protocol. Developing countries, in return, receive investments in clean technology and revenues from the sale of these ERs once they are generated and delivered.<sup>1</sup> One CER is equivalent to one ton of carbon dioxide equivalent (tCO<sub>2</sub>e).

### Carbon Finance and Community Benefits

The Kyoto Protocol's flexible mechanisms were developed with the aim of tackling global climate change while at the same time contributing to sustainable development in host countries. Carbon finance is a novel source of revenues for low-carbon projects. While carbon markets are currently experiencing a downturn, they generated an impressive \$215 billion in capital investments until 2012.<sup>2</sup> In addition to mitigating climate change, CDM projects have the potential to produce a range of environmental, economic and social co-benefits in developing countries.<sup>3</sup>

All CDM projects refer to sustainable development impacts in their Project Design Documents (PDDs). For a project to be registered under the CDM, these sustainable development claims must be confirmed and authorized by the host country's Designated National Authority (DNA) as meeting the national

sustainable development goals. As each DNA sets its own sustainable development criteria, however, these can differ substantially between countries.<sup>4,5</sup>

While PDDs make reference to the sustainable development benefits of the project, the sustainable development impacts are either monitored on a voluntary basis by the project sponsors, or can be set as part of the contractual obligations within an ER. The systematic monitoring and auditing of the results is not as diligent, developed or as transparent as it is for the CER portion. To help address this shortfall, the CDM Executive Board recently developed a voluntary tool to highlight sustainable development co-benefits of CDM PDDs and PoAs (known as the SD Tool) as requested by the Conference of the Parties serving as the meetings of the Parties to the Kyoto Protocol (CMP).<sup>6</sup> The SD tool can be used for all CDM project activities (i.e. small-scale, large-scale, afforestation/reforestation) and PoAs as an alternative to the current free-form sustainable development section of the PDD and PoA. The World Bank contributed to a call for inputs in August 2012, drawing mainly on CDCF project experience.<sup>7</sup>

The literature on the sustainable development impact of carbon finance is extensive and varies in methodological approach. Studies are mainly qualitative in nature and based on PDD or DNA data.<sup>8</sup> Although some assessments use limited quantitative data to construct a utility function giving an indication of the sustainable development impacts of different project types, no overall quantitative assessment of carbon finance projects yet exists.<sup>9</sup> Overall, the opinion prevails that the CDM's two fold objectives have been successful to different degrees.

<sup>1</sup> The definition of 'delivery' is specified in the ERPA, and can either be upon receipt of the ER verification report, or upon issuance of certified ERs by the Executive Board of the CDM (CDM EB).

<sup>2</sup> Assessing the Impact of the Clean Development Mechanism Report, commissioned by the High Level Panel on the CDM Policy dialogue, July 15, 2012.

<sup>3</sup> As re-stated in the Rio+20 conference in June 2012, sustainable development is agreed to consist of three dimensions namely social, economic and environmental impact.

<sup>4</sup> Sutter and Parreno, 2007; Alexeew et al. 2010.

<sup>5</sup> Spalding-Fecher et al. 2012.

<sup>6</sup> CMP seventh session, Paragraph 5 of Decision 8/CMP.7.

<sup>7</sup> Call for inputs: [https://cdm.unfccc.int/public\\_inputs/2012/eb69\\_04/cfi/QLL8X8E2NIZ735PA1FNTCU1YQE95RH](https://cdm.unfccc.int/public_inputs/2012/eb69_04/cfi/QLL8X8E2NIZ735PA1FNTCU1YQE95RH)

[https://cdm.unfccc.int/public\\_inputs/2012/eb69\\_04/index.html](https://cdm.unfccc.int/public_inputs/2012/eb69_04/index.html)

<sup>8</sup> Recent reports using the qualitative assessment are a UNFCCC report from 2012 and the CDM Policy dialogue from July 2012 (Spalding-Fecher et al. 2012).

<sup>9</sup> Huang et al. 2012; Sutter and Parreno, 2007; Nussbaumer, 2008; Alexeew et al. 2010.

According to the literature, the social dimension of sustainable development impacts tend to be mentioned less frequently than the economic and environmental impacts. The impacts that are most often claimed in PDDs are job creation, pollution reduction and improved energy security. Comparing the sustainable development impacts of different project types, industrial gas projects and large-scale hydro and wind power projects are most often mentioned as having the lowest sustainable development impact. On the other hand, small-scale renewable energy projects, projects improving access to energy and community-based projects have a higher sustainable development impact. While there is extensive literature on assessing CDM project activities (PDDs) on development, to date, there are no studies available which directly assess the impact of CDM program of activities (PoAs) on sustainable development. Also the UNFCCC PoA Design Document does not require information about sustainable development from the project developer. Due to the large share of PoAs in demand side energy efficiency, PoAs are more likely to increase access to energy than regular CDM projects.

Several studies find that projects can be designed to produce sustainable development impacts. Typically, more meaningful and transformative sustainable development impacts can be leveraged through small scale, household level and rural projects, community-based projects and projects that actively involve local government and local stakeholders. In other instances, projects with limited sustainable impacts (such as large industrial projects) can be designed to use carbon revenues to finance local development projects and this can, as a result, improve its weaker sustainable development impact. There is still debate on whether there is a direct relationship between sustainable development and project types or if the sustainable development outcome depends primarily on project design and implementation.

There is specific literature on sustainable development that focuses on the impact of the CDM on poverty alleviation.<sup>10</sup> It is generally recognized that a subset of projects, in the areas of forestry, small-scale renewables and micro-industry, as well as community and household level projects, provide greater benefits for local communities and contribute more to poverty alleviation. These projects can offer a range of opportunities at the local level, including training, employment and new income and saving opportunities; improved access to clean, safe, and cheap energy for cooking, heating, and lighting; improved air and water quality and improved health and education. Renewable energy access and efficiency projects yield comparatively higher sustainable development benefits for the poorest

<sup>10</sup> Sirohi 2007; Crowe 2013.

regions of the world, but may not impact the poorest of the poor within these regions and communities. The literature agrees mainly that community-based projects which include local stakeholders and outreach to households—through ownership or local empowerment—are more beneficial to low-income households.<sup>11</sup>

The qualitative assessments and studies of claims made in PDDs does not allow for the drawing of any conclusions about which projects are the most beneficial since all projects claim to have some impact. These studies do highlight, however, those areas (social, economic, and environmental) where the projects can best benefit local communities and the environment.

## CDM Project Portfolio

The CDM portfolio is dominated by larger scale industrial projects for which contribution towards sustainable development are often framed in terms of technology transfer and general contribution towards economic growth.<sup>12</sup> Relatively few projects across the CDM portfolio offer local livelihood benefits.<sup>13</sup>

Although CDM portfolio data shows an increasing number of African projects in its pipeline, there is still a clear disparity in the regional distribution of CDM projects, with Africa accounting for a meager 4 percent of all active CDM pipeline projects and programs and least developed countries accounting for 2 percent.<sup>14</sup> The small percentage reflects both the difficulty of attracting private finance in the African and LDC context due to investment risk, as well as existing low levels of emissions emanating from these countries.

Transaction costs associated with preparing and implementing small-scale projects have widely been acknowledged as another of the key reasons for this regional disparity in carbon finance projects. In order to address this, important regulatory decisions have recently been taken, such as simplified modalities and procedures for additionality demonstration, a framework for developing standardized baselines, and guidelines for the consideration of suppressed-demand.<sup>15</sup> The World Bank has been supporting these various improvements for many years and recently suggested that additional measures should be taken to further simplify the project cycle.<sup>16</sup>

<sup>11</sup> Crowe 2013.

<sup>12</sup> Based on UNEP Risoe data as of April 2013.

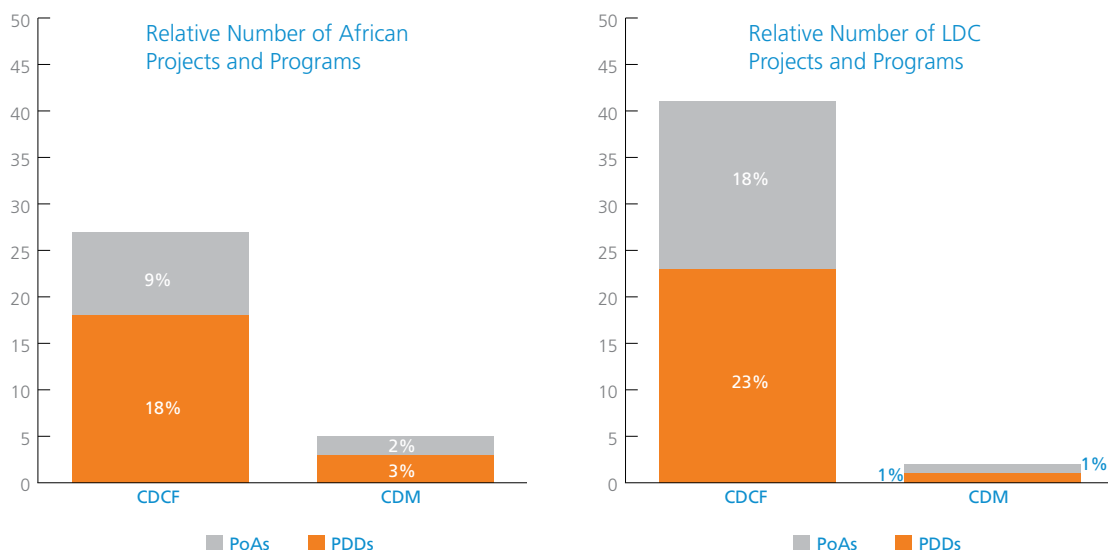
<sup>13</sup> Carbon Livelihoods, social opportunities & risks of carbon finance 2011.

<sup>14</sup> Based on UNEP Risoe data as of April 2013.

<sup>15</sup> <http://cdm.unfccc.int/Reference/Guidclarif/index.html#ssc>.

<sup>16</sup> CDM Reform: improving the efficiency and outreach of the Clean Development Mechanism through Standardization. World Bank, May 2012.

**FIGURE 1: COMPARING CDM AND CDCF PORTFOLIOS<sup>17</sup>**



Note: Active CDM pipeline projects. This does not include rejected, withdrawn, terminated or replaced CDM activities.

## The Community Development Carbon Fund

### Focus on Least Development Countries

Housed within the Carbon Finance Unit of the World Bank, the Community Development Carbon Fund is a public-private initiative mobilizing resources for projects that aim to pioneer small-scale CDM activities and CDM methodologies. The projects are designed to provide tangible community co-benefits—mitigating climate change and improving local livelihoods—for populations in the poorest countries around the world. The CDCF’s mandate is to invest at least 25 percent of the Fund’s resources in green projects located in priority countries (countries designated as Least Developed Countries (LDCs) by the United Nations, or which are eligible for World Bank International Development Association loans).

The overall goal of the Fund is to help expand the reach of the carbon market and to extend the financial, environmental, and socioeconomic benefits of carbon finance to communities in the poorest countries in the world. These are communities (and countries) that may otherwise find it difficult to attract carbon finance due to the higher transaction costs and the risks involved in delivering carbon from small-scale projects.

### THE CDCF AND COMMUNITY CO-BENEFITS

“All projects facilitated by the fund will benefit local communities, either directly or indirectly”

The overarching factor that differentiates the CDCF from other World Bank carbon funds is its mandate to promote CDM-compliant projects that also generate community benefits. CDCF projects offer an opportunity for small communities in developing countries to bridge deficits in infrastructure, services, and employment as investments in clean technologies help achieve both sustainable development and climate change objectives. The CDCF supports projects that combine community development benefits with ERs to create “development plus carbon” credits.

CDCF projects are “high hanging fruits” among CDM project types in the context of complex CDM requirements and procedures.



<sup>17</sup> CDM-wide information is based on UNEP RISOE data.

## CDCF Key Project Features

The key eligibility criteria for CDCF projects are:

1. Each project must lead to improvements in the material welfare of the community or communities involved. Benefits typically arise from the project itself and are part and parcel of a CDCF project (e.g., village or neighborhood electrification, improved air quality, or increased employment and income). In cases where there are limited benefits or no identifiable benefits integral to the project, an additional benefits package may be put together. Examples of additional benefits include health clinics, workshops, potable water, teaching or medical services, and electricity for schools.
2. The CDCF will give preference to small-scale projects as defined by UNFCCC decision 17/CP.7.<sup>18</sup> The amended definition of small projects is: (i) renewable energy project activities shall have a maximum output capacity of 15 MW (or an appropriate equivalent); (ii) energy efficiency improvement project activities that reduce energy consumption on the supply and/or demand side by up to the equivalent of 60 GWh per year (or an appropriate equivalent); or (iii) other project activities that both reduce anthropogenic emissions and directly emit less than or equal to 60 ktCO<sub>2</sub>e annually. Decision 17 also created a non-exclusive list of 14 small-scale project categories and specifies simplified baseline and monitoring methodologies for each category.
3. The CDCF's mandate is to promote projects in the poorest countries and invest at least 25 percent of fund resources in green projects located in priority countries—countries designated as Least Developed Countries (LDCs) by the United Nations and those eligible for World Bank International Development Association loans.

CDCF projects demonstrate a co-benefits approach to carbon finance by linking climate change mitigation to development and to tangible poverty reduction. This approach aims to meet the development needs of poorer countries while simultaneously reducing greenhouse gas emissions. Key categories of co-benefits include:

- Environmental and health co-benefits.
- Economic co-benefits, such as lower electricity/fuel costs and extra income-generating opportunities as a result of increased energy reliability, increased employment, and time saved that can be dedicated to other income-generating activities.
- Social co-benefits, such as building social capital and networks, enhancing social cohesion (especially amongst communities with different ethnic groups), developing

income-generating activities that contribute to the social and economic wellbeing of communities, and enhancing the social status of women and marginalized groups.

- Developmental benefits, such as rural electrification and clean energy access, and improved access to critical infrastructure and services.<sup>19</sup>

## CDCF Key Operational Features

The CDCF became operational in 2003. Participants investing in the CDCF include nine governments and 14 private-sector companies. The World Bank acts as Trustee and purchases ERs generated by its projects on behalf of the Participants.

The first tranche of the CDCF, capitalized at \$118 million, is providing funds for projects applying a wide range of technologies.<sup>20</sup> Most of the CDCF contractual resources are used for the purchase of ERs from the supported projects; a portion (about 4 percent) of these payments, however, is earmarked specifically for community benefit projects.<sup>21</sup> In addition, at least 25 percent of the contractual resources are to be invested in CDM projects in IDA priority countries. Parallel grant resources from donors support technical assistance, capacity building, methodology development, project preparation, and community development activity.

## CDCF Portfolio Status Summary

As of May 2013, the CDCF had contracted 5.9 million ERs from 22 Emission Reduction Purchase Agreements (ERPAs). This includes twenty-seven CDM PDDs and four POAs. These projects are located in fourteen countries across six regions of the world.<sup>22</sup> Furthermore, all CDCF PDDs and three of the four PoAs had been registered under the CDM (with one PoA requesting registration). Eleven CDM activities have issued CERs. Five projects have started receiving carbon payments upon ER verification by a third party auditor; the 17 other projects received payment upon issuance of CERs by the UNFCCC, as per the ERPA provisions.

To date, considerable progress has been made in terms of delivery of community benefits across the CDCF portfolio. Six CBPs, providing indirect community benefits have either been fully completed or are near to completion; two CBPs have started; and the implementation of five CBPs has yet to start, pending ER payments. Eight out of nine CDCF projects that provide for direct community benefits are operational and enhancing community welfare.

<sup>19</sup> Overseas Environmental Cooperation Unit Japan, 2008.

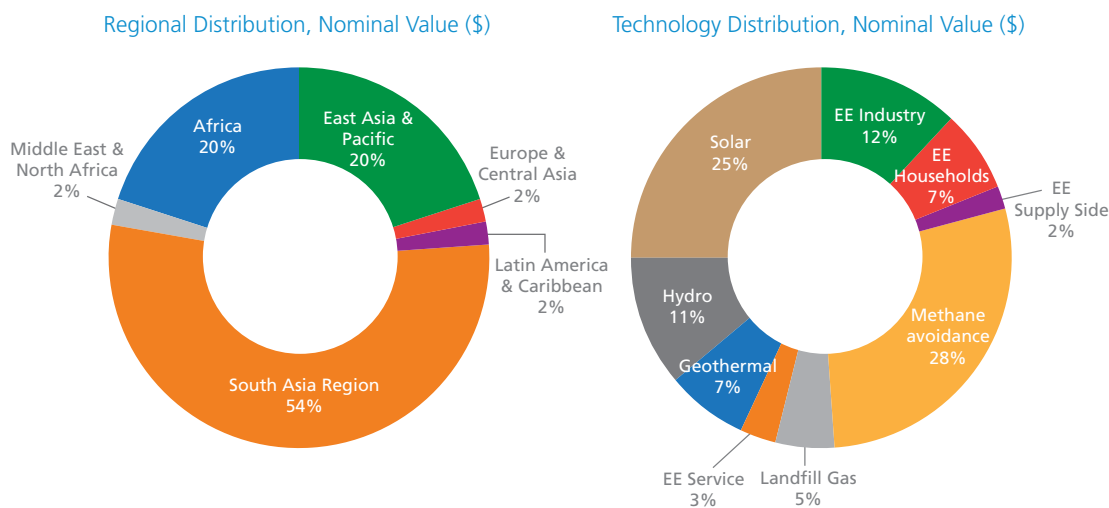
<sup>20</sup> Renewable (Geothermal, Solar, Hydro), Energy Efficiency (Industry, Households, Supply Side, Service), Landfill Gas and Methane Avoidance Type GHG Mitigating Projects. CDCF does not include industrial gas, reforestation (A/R), or other land-based project types.

<sup>21</sup> This percentage estimate would evolve based on actual ER delivery of the CDCF projects.

<sup>22</sup> Latin America and the Caribbean, Africa, Eastern Europe and Central Asia, South Asia, East Asia and the Pacific, and the Middle East.

<sup>18</sup> [http://cdm.unfccc.int/Projects/pac/pac\\_ssc.html](http://cdm.unfccc.int/Projects/pac/pac_ssc.html)

**FIGURE 2: CDCF PORTFOLIO DISTRIBUTION**



### Objective of this Assessment

The key objective of this assessment is to review, update, and identify key insights and lessons learned on community benefits plus carbon based on the CDCF portfolio experience to date. It also aims to infer those preliminary good practices for carbon co-benefits design, operational management, and delivery that merit further investigation and wider application in future CDCF projects. In so doing it will aim to examine:

- The extent to which CDCF projects measurably benefit poor communities, local environments, and local economies both short term and longer term.
- The extent of community dialogue and participation in the design of community benefit plans and in the implementation and monitoring of community benefits.
- The extent of poverty targeting and social inclusion, including vulnerable groups (e.g women, ethnic minorities, and socially marginalized or underprivileged groups).
- Lessons learned, including which aspects of the project are working well and which aren't, what good practices are emerging and their wider implications for local communities; and what needs to be done to improve project design, implementation, monitoring, and evaluation.

### Methodology and Approach

This updated report builds on the original 2009 version of the CDCF assessment of co-benefits of CDCF project portfolio. It is based on four main components:

1. A document desk review of 22 active CDCF portfolio projects as of May 2013 (Annex 1).<sup>23</sup>
2. Interviews and consultations with World Bank deal managers and other staff working on the respective CDCF projects to assess their overall experience regarding the design and implementation of the projects as well as the successes, constraints, and opportunities in community benefit plan implementation and monitoring.
3. Eight projects (Figure 3) were selected as case studies for a more comprehensive analysis of community benefits performance and insights. Projects were selected based on their location, technology, benefit type, and implementation phase in order to be representative of the overall CDCF project portfolio.
4. A literature review of social and community development and carbon finance.

<sup>23</sup> Documents included PDDs, ER Verification reports, ERPAs, CDCF CBP Synopsis, internal World Bank project supervision mission reports, most recent CBP monitoring reports, The World Bank's report on safeguards review of carbon finance projects in East Asia, CBPs, the Carbon Finance Unit Web site, data from the Carbon Finance Unit Information and Management System, and relevant studies and beneficiary surveys.



**FIGURE 3: CASE STUDY PROJECTS**

#	Project Name	CBP Type	ERPA Type	Region	PDD/POA UNFCCC Registration Status	Sector Type
1	Argentina: Salta Landfill Gas Capture	Indirect	CER	LCR	Registered	Landfill gas flaring
2	China: Shandong Poultry Manure Biogas	Indirect	CER	EAP	Registered	Methane avoidance
3	Kenya: Olkaria II Geothermal Expansion	Indirect	CER	AFR	Registered	Geothermal electricity
4	Moldova: Biomass Heating and Energy Conservation	Direct	VER	ECA	Registered	EE service in public buildings
5	Nepal: Biogas Support	Direct	VER	SAR	Registered	Methane avoidance
6	Pakistan: Community Based Hydropower Development	Direct	CER	SAR	Registered	Hydro run of river
7	Peru: Santa Rosa Hydroelectric	Indirect	VER	LCR	Registered	Hydro run of river
8	Senegal: Lighting Energy Efficiency in Rural Electrification	Direct	CER	AFR	Registered	EE household lighting

## CDCF Performance on Community Benefits

All CDCF projects directly or indirectly benefit local communities. The CDCF emphasizes community dialogue and participation to ensure that individuals, community leaders, existing community organizations, and local government officials agree on the community benefits to be provided and the counterpart contributions required for both investment and recurring costs.

Clean energy, electricity, and energy-efficient lighting projects such as biogas, micro-hydro, and solar typically provide direct benefits in the form of more affordable energy and electricity solutions and energy bill savings. In the case of direct benefits, the community benefits are integral to the CDM project and the target community is readily identifiable.

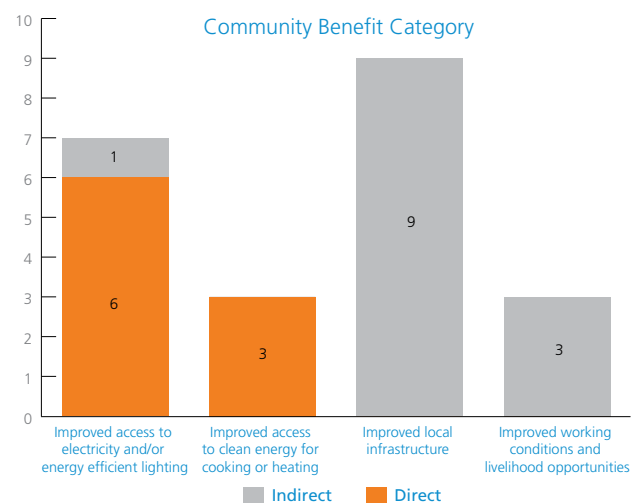
If there are no identifiable community benefits integral to the CDM project, the CDCF identifies and develops additional benefits in consultation with key stakeholders in the community. In addition, a “results framework” is prepared under the Community Benefits Plan, which is an integral part of the Emission Reduction Purchase Agreement. These packages are financed by a price premium attributed to each CER sold to the CDCF to cover the investment and administrative cost of the additional community benefit project. The price premium for additional CBPs typically ranges from \$0.50 to \$1 per ER sold to the CDCF. The overall CBP budget is tied to the delivery of ERs and will ultimately depend on the performance of the CDM project.

### Categories of Benefits

While the community benefits provided by CDCF projects include a broad spectrum of activities, the more common ones are: (i) improved access to energy for heating and/or cooking; (ii) improved access to electricity and/or energy-efficient lighting; (iii) improved local infrastructure (e.g., roads, health clinics, schools, sewage facilities, potable water connections, parks, and community centers); and (iv) improved livelihood and employment opportunities.

Figure 4 illustrates the distribution of community benefits by category. Access to clean energy, electricity, and/or energy-efficient lighting are typically associated with projects with direct benefits; local infrastructure development and livelihood and employment benefits are typically associated with projects with indirect benefits.

**FIGURE 4: COMMUNITY BENEFIT CATEGORIES**



### Improving Access to Clean Energy for Cooking or Heating

Three projects in the CDCF portfolio—Nepal Biogas Project, China Hubei Household Eco-farming Biogas Project, and Moldova Biomass Heating and Energy Conservation Project—focus on the provision of cleaner energy for cooking and heating. All three have direct community benefits and are widely recognized for their positive impacts. Under the Nepal Biogas carbon finance project, the four PDDs included in the portfolio have benefited 59,998 households as a result of the installation of biogas digesters.<sup>24</sup> The Moldova Biomass Heating and Energy Conservation project, meanwhile, has installed 153 efficient heating boilers in schools, hospitals, and kindergartens across 13 municipalities. Under the China Hubei Household Biogas project, 33,000 biogas digester systems have been installed, benefitting 33,000 families in Enshi Prefecture, Hubei Province.

<sup>24</sup> The PDDs were registered in December 2005, December 2005, December 2011, and December 2011 respectively.



### BOX 1: HOUSEHOLD BIOGAS PROJECTS HAVE A MULTIPLIER EFFECT

Clean energy projects have a multiplier effect in the community. The direct effect comes from the availability of reliable energy, while the tangential effect relates to additional jobs and economic activity supplying goods and services to the project. The ongoing rapid spread of biogas technology in Nepal is reducing the reliance on traditional sources of energy and indirectly improving the socioeconomic status of the rural poor. Increased use of biogas has resulted in the reduction of firewood dependency for household cooking, thereby decreasing deforestation. Families have been able to save around \$240 per household on annual fuel expenditures.<sup>1</sup> Increased access to clean energy services has improved women's social, economic, and political status by reducing the time and effort involved in household chores (including the drudgery of collecting wood), providing better health conditions and educational opportunities, expanding income-generating opportunities, and easing participation in public affairs.<sup>2</sup> More than 60 minutes<sup>3</sup> per day that would have otherwise been spent on firewood collection and cooking is now freed up. In Nepal, 33 percent of women spend their saved time in social and other community activities;<sup>4</sup> 57 percent of women from hills and 49 percent from terai now participate in mother's group activities, and approximately one third participate in cooperatives.

<sup>1</sup> UNFCCC, CDM Project Co-benefits in Nepal, 2010.

<sup>2</sup> UNDP 2006, Fact Sheet on Energy, Gender and Sustainable Development, Energia, UNDP, New York.

<sup>3</sup> Government of Nepal, Biogas Users' Survey 2010/2011.

<sup>4</sup> Gautam R, Baral S, Heart S. Biogas as a Sustainable Energy Source in Nepal: Present Status and Future. *Renewable and Sustainable Energy Reviews* 2007.

### Improving Access to Electricity and Energy-efficient Lighting

CDCF projects focusing on electricity and energy-efficient lighting typically have direct community benefits. Projects including the Nepal Micro Hydro, Pakistan Community-based Hydro Power, and Bangladesh Solar Homes Systems provide direct benefits that enhance communities' access to electricity. The CDCF portfolio also includes energy-efficient lighting projects, such as Rwanda CFL Energy Efficiency, India AEL Street Lighting, and the Rural Area Energy-efficient Lighting Program in Senegal. The Community benefits include:

- A total of 36 micro-hydro plants have been completed and are operational in Pakistan. An additional 7 have been completed but are not yet operational, and 10 are currently under construction.

- In Nepal, 262 micro-hydro plants have been installed, reducing kerosene consumption on average by about 80 percent. Access to electricity has spurred economic activity. One of the most noticeable impacts has been in agro-processing, which previously relied on mechanical power.<sup>25</sup>
- Households and farmers benefit from associated savings in traditional fuel and agricultural processing expenses.
- Reductions in indoor pollution - respiratory diseases and eye infections are also reported. In Nepal 88 percent of sampled households reported reductions in in-home smoke after MHP installation.
- Access to electricity also leads to greater use of electrical appliances, such as televisions and radios and household appliances—which often benefit women.

### BOX 2: ELECTRICITY TRANSFORMS LIVES AND COMMUNITIES

Off-grid power generated by Nepal Micro Hydro, Pakistan Community-based Hydro Power, Peru Santa Rosa Hydro Power, and the Bangladesh Solar Home Systems Program provide a large number of rural households and isolated communities with much-needed electricity for lighting, irrigation, milling, and other needs. Improved access to electricity and lighting also increases the productive hours in households, and provides more opportunities for household members—particularly women—to read and do other work.<sup>1</sup> In addition, training for the operation, repair, and maintenance of these projects will result in an increase in the skill sets of local people. As these off-grid renewable energy systems are increasingly managed and operated by the local community, institutions, and/or private entrepreneurs, the project activities will also contribute to local empowerment. The provision of electricity replaces the use of fossil fuels, such as kerosene and diesel, that are traditionally used in rural areas for lighting, thereby reducing household expenditures along with fire hazards and indoor smoke. Focus group discussions with beneficiaries of the Nepal Micro Hydro Project highlighted that one of the most significant impacts of access to electricity for lighting has been that students are now able to study in the evenings; this has improved learning outcomes.

<sup>1</sup> Reddy, B. S. and Nathan, H. S. K. 2013. Energy in the development strategy of Indian households: the missing half. *Renewable and Sustainable Energy Reviews* 18, 203-210.

<sup>25</sup> Nepal Micro Hydro User Survey..

## Improving Local Infrastructure

Improvement in rural infrastructure, including roads, has the potential to bring about transformational changes in the lives and livelihoods of rural poor. Benefits are not entirely local, as they spill over village boundaries and bring about inclusive development. Evidence suggests that rural road investments reduce poverty significantly through higher agricultural production, higher wages, lower input and transportation costs, and higher prices. Improvements in rural roads are also central to improving health and education achievements<sup>26</sup> and, in turn, in reducing gender-based educational outcomes.<sup>27</sup> Nine projects in the CDCF portfolio provide community benefits geared toward improving local infrastructure. These include a range of activities, such as construction of sewage facilities, potable water connections, construction and rehabilitation of local roads, renovations to local schools and health clinics, and construction or rehabilitation of parks and community centers. Interviews with DMs and project reports reveal that improvements in local infrastructure have had significant welfare implications for beneficiary communities. The community benefits include:

- In the China Shandong Minhe Animal Manure Management System GHG Mitigation Project, more than 1,600 people living in the four villages surrounding the project site have benefited from the construction of a 7km concrete road and related facilities, the installation of new drinking water wells, and the construction of a pipeline for bio-slurry transport.
- In the Kenya Olkaria Geothermal project, excavation of the water pan (measuring 100m × 50m × 2m, and 2.5m in depth) benefits approximately 1,500 people and 7,000 livestock daily. The pan is able to hold water for six months. The laying of a 10km waterline has also been completed. In addition, the construction of new classrooms is in progress. Once roofing is completed, school enrollment is expected to increase by 75 students because of improved facilities and more space.
- In the Peru Santa Rosa Small Hydro Power project, the CBP has resulted in the construction of a computer lab, supplied with 16 computers, desks and chairs in the local school. In addition to benefiting approximately 500 students, the lab is used evenings and weekends for adult classes. Thanks to the lab school children and townfolk are exposed to invaluable computer technology and software, as the first in the area, empowering them with new skills in the labor market. Finally, two new classrooms have been built using CBP funding, benefiting 25 boys

<sup>26</sup> Kanbur, R. and Rauniyar, G. 2010. Conceptualizing inclusive development: with applications to rural infrastructure and development assistance. *Journal of the Asia Pacific Economy* 15, 4, 437–454.

<sup>27</sup> Khandker, S. R., Bahkt, Z., and Koolwal, G. B. 2006. The poverty impact of rural roads: Evidence from Bangladesh. World Bank Policy Research Working Paper 3875.

and girls. Unlike the old classrooms, the roofs are not made of asbestos, providing children with cleaner and cooler air in the classrooms.

## Improving Working Conditions and Livelihood Opportunities

Three CDCF projects focus primarily on improving working conditions and enhancing livelihood opportunities. The typical beneficiary of these community benefits include the brick workers and waste pickers on landfills who represent some of the most vulnerable and poverty-stricken groups in developing countries, who are the target beneficiaries for the India FAL-G Brick Project, the Bangladesh HHK Brick Kiln Project, and the Argentina Salta Landfill Gas Capture Project. In addition, almost all CDCF projects have some impact on employment creation at the local level as the construction, operation, and maintenance of CDCF projects typically entail the hiring of local community residents.

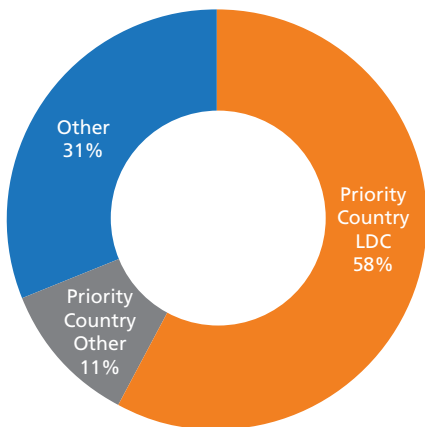
For example, India FAL-G provides stable year-round employment, as compared to the seasonal operation of kilns in the traditional clay brick sector that is affected by monsoons. Community consultations indicate that this stable year-round work is bringing meaningful changes to the lives of the workers. The project is also promoting gender equality as women receive wages similar to their male counterparts. The workers also receive health and accident insurance of about \$2000 per worker and rolling HIV awareness and work safety workshops. Migrant brick workers also benefit from onsite built shelter, washing facilities and filtered drinking water.

## Beneficiaries, Poverty Targeting, and Social Inclusion

Currently, 69 percent of CDCF capital is allocated toward CDM projects located in the world's poorest countries, with more than half in least developed countries (Figure 5). The majority of CDCF projects are aimed at communities that either lack critical services (such as roads, electricity, education and health care) or have very poor service delivery quality, and where the per capita income is below the relative poverty line. For example, in the case of projects in Moldova, Peru, and Argentina, the target communities have access to basic services but the quality of the social services available is very poor. In some projects, such as the Argentina Salta Landfill and India FAL-G, the CBP is explicitly geared toward groups that face high levels of structural poverty (e.g., waste pickers and brick workers). Within the identified poor communities, however, the extent of targeting the poorest of the poor varies, often depending on the measures used to define poverty.

**FIGURE 5: CDCF POOR COUNTRY FOCUS**

Portfolio Priority Country Distribution, Nominal Value (\$)



**BOX 3: POVERTY PROFILE OF THE TARGETED BENEFICIARY COMMUNITY FOR THE INDIA AEL STREET LIGHTING ENERGY EFFICIENCY PROJECT**

The beneficiaries of the India AEL Street Lighting project reside in the municipalities of Amritsar, Mogha, Hissar, Ajmer, Alwar, Indore, Ujjain, Akola, Pimpri Chinchwad, Pune, Solapur, Belgaum, and Hubli Dharwad municipalities. They are the urban poor and slum students attending primary schools managed by the local governments. People living in urban slum communities are characterized as very poor because of their very low per capita annual income (less than \$425); their primary sources of livelihood are day labor, masonry, and menial jobs. Their ability to cope with economic, environmental, and health shocks is highly constrained because of lack of endowments and entitlements. They have limited access to basic social services and economic infrastructure.

Proxies, such as average per capita income, calorie consumption, and access to clean drinking water and other basic services, are commonly used to estimate poverty. Since household-level poverty data is not available, the extent to which CDCF projects are successful in reaching the poor as defined by the World Bank is often difficult to assess. If proxy measures are considered, however, most CDCF projects visibly benefit poor and vulnerable communities.

While community projects are geared toward poor communities, they have not been fully successful in addressing the needs of the poorest of the poor. There is

a lot of heterogeneity and inequality between and within communities. In some CDCF projects, including the solar home system program in Bangladesh and the household biogas project in Nepal, the poorest households are not able to access the technology as both the upfront investment and the operation and maintenance costs are relatively high.

All Community Benefit Plans are designed in consultation with the identified beneficiary communities, including women, to identify priority needs. As a result, some community benefit activities include gender concerns in the design. Certain infrastructure projects, financed by carbon revenues, benefit women in particular. In the CDCF Kenya Olkaria Geothermal Project, for example, the construction and rehabilitation of roads, water wells, and water pipelines has helped reduce the time and physical strain dedicated to collecting water. Under the CBP for the Philippines Roxol Ethanol Project, the construction of schools and provision of education for children has helped free up mothers to allocate time during the day to other income-generating activities. In the India FAL-G CBP separate toilets and washing facilities were built on site for men and women. Some community activities also provide skills training, market information, and access to microcredit programs.

There may be certain carbon finance project technology types that benefit women directly, given their roles and assigned tasks in a household (e.g., wood and water collection, cooking, child-rearing, and feeding of animals). For example, a household biogas CDM project improves women’s health and saves them significant time in collecting firewood and maintaining the fire when preparing meals—time that can be allocated to other income-generating, social, and educational activities (Nepal Biogas project, China Hubei Eco-farming Biogas Project). Meanwhile, access to electricity through micro-hydro or solar home-systems-type projects helps increase income-earning opportunities for poor women. Electricity generated by micro-hydro projects allowed village women to form cottage industries (e.g., sewing in Nepal and milling in Pakistan’s remote mountains).

Increased mechanization, thanks to new and clean CDM technologies, can enable women workers to be competitive with men in traditionally more labor-intensive sectors (e.g., brick working), allowing women to be paid similar wages. The Bangladesh SHS Systems Program employs skilled female labor to assemble the SHS. The India FAL-G Brick and Blocks Project and the Bangladesh HHK Brick Kiln Project hire women at similar wages to men. Greater control over household resources by women through their own earning often leads to more investment in their homes and in their children.

The extent to which CDCF projects promote the inclusion of vulnerable groups in decision-making and the sharing of community benefits is difficult to assess. A vulnerable group is defined as a population that has some specific characteristics that make it at higher risk of falling into poverty than others living in areas targeted by a project. Vulnerable groups include the elderly, mentally and physically disabled people, at-risk children and youth, HIV/AIDS-affected households, ethnic minorities and, in some societies, women. The Nepal-Micro-hydro Project, for one, is specific in addressing gender and social inclusion issues in the management committee and functional groups. Unlike Nepal-Micro Hydro, however, most CDCF projects do not have explicit mechanisms to include marginalized groups in decision making, and there is very little disaggregated data available to evaluate the extent to which vulnerable group have actually benefited.

## Stakeholder Engagement

Community participation is an important means of enhancing communities' sense of ownership in CDCF projects. In addition, participation in public life makes community members more self-confident in their ability to take greater control over other aspects of their lives and engenders more thoughtfulness about community preferences and priorities. It further provides an opportunity to become more sociable—while at the same time contributing to a greater sense of social integration and cohesion; this is critical for societies to prosper economically and for development to be sustainable.

The specific requirements for community participation and consultation depend on the type of community benefit. The level of community dialogue and participation is very high in projects that are embedded in ongoing programs that are themselves based on principles of community

empowerment. These include the Moldova Biomass Heating and Energy Conservation Project, the Nepal Micro Hydro Project, and the Pakistan Renewable Energy project. In these projects, community participation is intensive at all stages; communities are involved in planning and prioritizing sub-project investments, contributing toward the costs of the investment, supervising the construction, and operating and maintaining the sub-project. As a result, these programs provide communities substantial control over planning and investment decisions.

Due to the demand-driven nature of some CDCF projects, such as Nepal Biogas, Bangladesh Solar IDCOL, and Bangladesh Solar Grameen, households have complete control over decision making. Entrepreneurs working with the community conduct extensive social mobilization campaigns and provide information about and promote the use of biogas and/or solar power. Furthermore, capacity building and training programs are delivered to end users to maximize the use of the plant and to operate and maintain it.

Projects with indirect benefits are required to prepare an additional CBP that requires strong participatory process of the local communities. In the China Guangrun Hydro Project, for example, community consultations were held with each village to identify priority needs as well as Yezhou Township Government and the Jianshi County Religious Affairs Bureau. The CBP design was ultimately folded into the local government's poverty alleviation goals. In the case of Argentina-Salta Landfill Gas Capture Project, a CBP was prepared in consultation with the waste pickers. In the Kenya Olkaria II Geothermal Expansion Project, the beneficiary communities of Maasai, Luo, and Kikuyu actively participated in the identification of community benefits.

### BOX 4: GOOD PRACTICE EXAMPLE FROM PAKISTAN COMMUNITY-BASED MICRO HYDRO

The program in Pakistan builds on the successes achieved by the Aga Khan Rural Support Program (AKRSP) in micro-hydro development. Individual project development is carried out through a three-part process of dialogue with local communities around identification, mobilization, and implementation. In the First Dialogue, communities are briefed about the nature of the hydro-power project, the intended outcomes, and the mutual obligations of AKRSP and the communities. It is the policy of AKRSP that at least 75 percent of the member households of the community must exhibit support for the project before qualifying for technical and financial assistance. Once there is initial agreement, AKRSP technical staff work with community representatives to assess

the available water resources, survey potential sites, and prepare cost estimates as part of the full feasibility study. Survey results and cost estimates are then presented to the full meeting of the Village Organization (VOs) as the Second Dialogue; detailed terms of partnership are discussed and an agreement reached. After the agreement is reached, a general meeting of the beneficiary community is called in the village to initiate the project (Third Dialogue). Once the micro-hydro plant is constructed, the community in charge of the installed unit collects revenues to service debt and covers operations and maintenance costs by selling electricity to participating households.

Monitoring and evaluation of benefits helps communities understand what works, what does not, and why. Most important, it provides an opportunity to make appropriate adjustments to achieve the desired goals and objectives. Monitoring and evaluation processes that involve local communities are particularly valuable as they enable project stakeholders to be heard, to draw on local and expert knowledge, and to create “ownership” of the evaluation findings. While it is too early to assess participatory monitoring and evaluation in most CDCF projects, the extent to which communities participate in monitoring and evaluating the delivery of benefits appears to be limited to the projects with indirect benefits. While all CDCF projects are required to have progress reports for CBPs, there are no systematic monitoring and evaluation mechanisms in many of the projects to allow communities to participate in monitoring the delivery of benefits.

## Operational Challenges and Good Practices

Drawing from the more recent experience of the CDCF portfolio, a major implementation challenge is that CBP financing is tied to the performance of the CDM operation itself. Given the CDCF’s ambitious project selection criteria, the challenging portfolio risk characteristics, and CDM project cycle delays, actual ER volumes are often delivered several years after the design of the CBP. The delays in the flow of funds often results in a delay in the implementation of CBP activities. In the case of the Peru-Santa Rosa Project, for example, the construction of a community center is still pending; it will only start after the next ER payment comes through.

Another implementation challenge is that the ER volumes delivered are often lower than originally estimated at the time of CBP design and financial planning. Thus, while CBPs clearly assign funding for operation and maintenance of community activities, the available funding in the end may be less than originally planned given lower ER volumes purchased (or even ERPA cancellation). This funding gap can impede on project sustainability and even negatively affect the relationship between the project entity and beneficiary communities. Inconsistent deadlines can also result in the delay of CBP implementation. In the case of Argentina Salta: Land Fill Gas Capture Project, the lack of consistency between CBP implementation and administrative deadlines adversely impacted issues ranging from the issuance of ID cards to the obtaining of budgets for the procurement of materials and equipment.

Sustainability at the institutional level is more varied across the CDCF portfolio; it strongly depends on the enabling environment and the extent to which additional partnerships and resources are leveraged. This assessment highlights that sustainability of community benefits is primarily dependent on two factors: (i) technical sustainability of investments; and (ii) sustainability at the institutional level.

Technical sustainability involves effective operation and maintenance. Both projects with direct and indirect benefits demonstrated strong attention to O&M. In the Nepal Biogas Project, for example, even after 4-5 years of operation very few users reported any technical problems with their systems. Most CDCF projects have also made efforts to ensure that there are adequate financial resources to support O&M. For example, funds received by the Moldova Biomass and Energy Efficiency project for ERs generated have been designed to finance maintenance, repairs, and other relevant activities at the beneficiary institutions.

Among the projects with indirect benefits, CBPs that are co-financed by local administrations (e.g., CDCF projects in China and Argentina) are also more likely to be sustainable as they are able to integrate the CBPs within a comprehensive local development framework. Finally, the capacity of the project sponsor and the level of community commitment are also strong determinants of sustainability. CBPs with a strong commitment of support from the PE and local authorities have greater prospects for sustainability. The China-Animal Manure Livestock Waste Management Project, for example, demonstrates relatively higher levels of sustainability because of the firm commitment on the part of the PE toward the sustainability of the CBPs. The PE has assigned a dedicated person responsible for CBP monitoring, and is committed to maintaining the roads and the water system infrastructure and providing free fertilizer and training in the future.

## Case Studies

As part of the assessment eight CDCF projects were selected as case studies for a more comprehensive analysis of community benefits. Projects were selected based on their location, technology, benefit type, and implementation phase in order to be representative of the overall CDCF project portfolio. Figure 6 provides a summary description of the selected projects.

**FIGURE 6: CASE STUDY PROJECT INFORMATION**

#	Project Name	CBP Type	Sector Type	Project Sponsor Type	Key Community Benefit
1	Argentina: Salta Landfill Gas Capture	Indirect	Landfill gas flaring	Public Sector: Municipality	Improved working conditions and livelihood opportunities for waste pickers
2	China: Shandong Poultry Manure Biogas	Indirect	Methane avoidance	Private Sector Company	Construction of local infrastructure; improved local agricultural production
3	Kenya: Olkaira II Geothermal Expansion	Indirect	Geothermal electricity	Public Sector: State-owned utility	Construction and rehabilitation of local infrastructure
4	Moldova: Biomass Heating and Energy Conservation	Direct	EE service in public buildings	Public Sector: Coordinating Agency	Improved heating service in public buildings
5	Nepal: Biogas Support	Direct	Methane avoidance	Public Sector: Coordinating Agency	Access to cheaper, safer and more reliable energy for cooking in poor rural homes
6	Pakistan: Community Based Hydropower Development	Direct	Hydro run of river	Nongovernmental Organization	Access to electricity for poor isolated rural households and communities
7	Peru: Santa Rosa Hydroelectric	Indirect	Hydro run of river	Private Sector Company	Construction and rehabilitation of local infrastructure
8	Senegal: Lighting Energy Efficiency in Rural Electrification	Direct	EE household lighting	Public Sector: Coordinating Agency	Provision and installation of energy efficient lighting (CFLs) in rural areas

### 4.1 Argentina Salta Landfill Gas Capture Project

This project aims to reduce greenhouse gas emissions by capturing and flaring gas generated at the sanitary landfill of the city of Salta, Argentina. It aims to displace 10,287 tons of carbon dioxide equivalents (tCO<sub>2</sub>e) per year which would otherwise have been released into the atmosphere. The project is administered by the Municipality of Salta to improve landfill operation and overall waste management for the

city. The CDM project was registered in March 2009, and the flaring system was commissioned in December 2012.

The project's Community Development Plan targets the informal waste pickers, who separate, classify, store, and sell recyclable materials (mostly plastic and paper) from the municipal solid waste landfill. The informal waste recyclers



are a highly vulnerable group; they have minimal formal education, many unmet basic needs, and are trapped in structural poverty. The main objective of the CBP is to improve their working conditions and the commercial returns from their livelihood activities. The Municipality has started implementing aspects of the community benefit activities by collaborating with and leveraging resources from various municipal, provincial, and other public and private bodies.

***To what extent does the project benefit local communities?***

The project has indirect benefits geared toward improving livelihood opportunities and working conditions for the waste pickers at the Salta landfill. The waste pickers have been organized into three cooperatives, and members have received permits to formalize their work at the landfill. Workers also benefit from 24 hour access to the landfill, allowing them to work according to their own schedules. Key CBP deliverables include shelters for the workers; a paper compactor room; a multiuse room and kitchen; toilets; and a yard for waste discharge. Two health and sanitation centers with running water have also been built for the workers to freshen up before and after work. The CBP has also led to the administration of yearly vaccines to prevent diseases and waste pickers have been provided with safety gear (boots, refractory vests, gloves, and breathing masks). In addition, workshops and training sessions have been held in order to improve waste-handling skills.

***Have the beneficiaries participated in identifying the community benefits and in subsequently monitoring the delivery of benefits?***

The Municipality of Salta conducted a socioeconomic survey among the waste recycling workers as well as a series of consultations in the design of the CBP. The CBP has broadly responded to the identified priority needs of the beneficiaries. Beneficiaries are actively participating in the implementation of the CBP, and regularly propose new ideas and solutions to address the problems they face.



*Consultation with waste pickers.*

***Does the project benefit the poor and the vulnerable?***

The CBP is generating important benefits in the poorest community—the informal waste pickers, who rely on the sale of landfill pickings as their sole source of income and who work in very difficult and unhealthy conditions. By involving and organizing informal waste pickers, many of whom are women or indigenous people, the project has presented great opportunities for poor and vulnerable groups to improve their livelihood by providing training, formalize their jobs with local government, and enhanced quality (and value) of their recycled goods, that are now sheltered from wet weather and processed with the compactor.



*View of paper and cardboard collected at the landfill, exposed to inclement weather before refuse was protected.*

The vulnerable workers also benefit from significant improvement in their working conditions and health and safety. To address disease and sanitation concerns associated with waste handling, workers can now wash their hands in the newly constructed washing facilities, have access to toilets and a health center where they receive yearly vaccines to prevent diseases. Waste pickers have also been provided with safety gear (boots, refractory vests, gloves, and breathing masks) as well as training on workplace safety and hygiene. The project is benefiting 141 full-time workers; the benefits indirectly extend to the families of these workers, most of who live in the barrios<sup>28</sup> adjacent to the landfill.

***What are the key implementation successes and challenges?***

The Municipality recognizes the beneficial work of the waste recyclers in the management of urban solid waste and is thus interested in improving their working conditions so that they can recover a greater amount of recyclable material. According to the Municipality of Salta, however, the

<sup>28</sup> Shantytown, part of town containing dilapidated or poorly constructed buildings



*Paper compactor at Salta landfill.*

deadlines for CBP implementation are not consistent with the Municipality's administrative deadlines. This inconsistency has adversely impacted issues ranging from the issuance of ID cards for the waste pickers to the obtaining of budgets for the procurement of CBP related materials and equipment.

## 4.2 China Shandong Animal Manure Livestock Waste Management

This CDM project aims to mitigate GHG emissions by improving animal manure management systems at 16 chicken farms in northern China. The project is being implemented by Shandong Minhe Livestock Co., Ltd, a family run private company that counts chicken farming as its core business. The CDM portion of the project includes a chicken waste treatment facility, biogas production, and electricity generation that is sold to the national grid (displacing electricity that would otherwise be generated from coal-fired power plants). The bio-slurry bi-product is used as an organic fertilizer for local agriculture. The project aims to reduce yearly emissions by 66,400 tCO<sub>2</sub>e. To date the CDCF has made two ER payments upon CER issuance, of which about \$100,000 has been earmarked for CBP activities.

A Community Benefits Plan additional to the main project targets the poorest communities in the vicinity of the large biogas digester and the electricity generation plant. The three CBP components include 1) construction and improvement of local infrastructure; 2) provision of free organic fertilizer; and 3) provision of training on bio-slurry use. The infrastructure

component includes the construction of seven kilometers of concrete road, the construction of two drinking water wells and pumping systems for two villages, and the construction of a 2 kilometer bio-slurry and water pipeline that carries liquid bio-slurry directly from the biogas digester plant to the cherry fields of one of the beneficiary villages. The CBP has been fully implemented thanks to advanced resources from the PE.

### ***To what extent does the project benefit local communities?***

Improvements in critical local infrastructure, free organic fertilizer, and new training have led to significant improvements in living standards and household incomes in the four villages. Noticeable improvements in road conditions, the quality of drinking water, and in fruit and cropland quality and yields, have also been observed.

Seven kilometers of roads between these villages have been significantly improved; going from dirt to concrete, and made both wider and more weather resistant. Households and farmers report that they benefit from less traffic (especially during the harvest period), from vehicle access to crops, and from better and faster access to markets for the sale of their farm products; all of this helps local development. The deep water wells and pump systems built in two villages have provided critical clean water for drinking (human and livestock), cooking, washing, and cleaning. Households now benefit from a reliable, more pristine water source than originally provided by the hand-powered water pumps that drew on poor quality, low-lying underground water. The improved infrastructure has also led to marked cost and time savings for villagers. Rather than going to market by ox cart to seek buyers, farmers can now wait for buyers to come to their homes by vehicle to purchase farm goods. Households—and especially women—now spend less time procuring water from distant wells; they simply turn on the tap.

Classroom and field training on bio-slurry use has been provided 2-4 times per year since 2009 to all four villages. The training is conducted by Minhe staff, staff from the local education center, and a local university professor, and is supplemented with printed materials. This training has helped farmers optimize the benefits of using organic fertilizer on various crop types. The training sessions are also an opportunity for the PE staff to receive feedback from the beneficiaries.

Among other benefits, the ongoing provision of free organic fertilizer and training on fertilizer use has resulted in significant increases in local agricultural crop quality and yield as well as in reductions in the use of traditional fertilizer (down 70 percent) and pesticides (down 30 percent). Furthermore, plant pests and diseases have dropped by



50 percent since the introduction of organic fertilizer. Households reported increased income thanks to the larger quantities sold, higher prices per unit, and increased savings on fertilizer and pesticides. As a result, bio-slurry is now widely accepted and used by the villagers.



*Good roads in Miaojiagou village allow vehicles to access fields directly and go straight to market—saving farmers time and energy.*

***Have the beneficiaries participated in identifying the community benefits and in subsequently monitoring the delivery of benefits?***

Priority needs were identified in consultation with the beneficiary communities and other relevant stakeholders, including village leaders, residents, and local government officials. A field survey was conducted to identify priority needs; about 150 villagers took part. Of these 34.9 percent were women. Beneficiaries continue to provide feedback on the delivery of benefits and maintenance of infrastructure, either through their community leaders or during the training sessions. CBP implementation has been systematically monitored and reported to the CDCF as part of the annual supervision led by the WB team.



*Community participation and feedback at field-based training sessions.*

***Does the project benefit the poor and the vulnerable?***

At the outset, 10 local villages in the vicinity of the biogas and electricity plant were considered as potential beneficiary groups of the CBP. Four of these villages were identified as having relatively higher poverty levels, including a lack of basic and critical infrastructure and limited educational opportunities. During the design phase of the CBP, care was taken to incorporate the opinions of women and the vulnerable.

More than 1,600 people living in the four poverty-stricken villages have benefited from the successful implementation of the CBP. As a result of CBP activities, these villages now have improved local infrastructure, better access to markets, and higher agricultural productivity. All three have contributed to improvements in the quality of life, the livelihoods of the rural poor, and local development.

***What are the key implementation successes and challenges?***

The CBP is helping to enhance the livelihoods of the poorest households in the area around the project site, and has successfully improved access to markets and clean drinking water. Part of this success is due to a dedicated PE which advanced its own resources to implement the CBP, assigned a dedicated person responsible for CBP monitoring and other aspects, and remains committed to the community projects.

The company CEO noted that the quantitative CBP indicators and monitoring of benefits have been very useful in demonstrating the actual benefits provided to the local villagers. These benefits and the associated process have helped strengthen communication channels, cooperation, and trust among the company, the local community, and the government, which will be helpful for future projects.



*Beneficiary farmers in fields, pruning cherry trees and adding free organic fertilizer.*



*Cherry tree plantations and other crops.*



*Woman with access to running water in household, sourced from deep well and water pumping system, financed by carbon credits.*



*Thanks to free organic fertilizer and training, farmers are reaping higher yields and quality cherries which can fetch a higher price on the market and boost household incomes.*

### 4.3 Kenya Olkaria II Geothermal Expansion Project

The Kenya Olkaria Geothermal project aims to reduce emissions by generating additional renewable electricity at the existing geothermal power plant—displacing electricity that would otherwise be generated by fossil-fuel-based power plants. As per the PDD, this would result in a reduction of 149,632 tCO<sub>2</sub>e per year. Part of the carbon revenues received from the sale of CERs to the CDCF are earmarked for implementing a Community Benefits Plan.

The CBP targets the Maasai, Luo, and Kikuyu tribes—some of the poorest communities in the vicinity of the existing geothermal plant. The CBP components include construction and improvement of local infrastructure (i.e., a livestock water pan, six new school classrooms, and road repairs), a water pipeline extension to the community health center, and employment of local youth.



*Olkaria II Geothermal Plant.*



*Olosingate Water Pan stores water during the dry season—“Water is Life”.*

### *To what extent does the project benefit local communities?*

With an advance payment provided by the CDCF, implementation of the CBP is almost complete. Excavation of the livestock water pan, which is able to hold water from March to August, is complete; approximately 1,500 people and 7,000 livestock are benefiting daily. The installation of the water pipeline from Tank Mpya to Maiella is also complete, and the primary school classrooms at the Oloirowua Primary and Ngaambani Nursery Schools are near completion.



*Children and livestock in the village.*



*The construction and rehabilitation of roads, water wells, and water pipelines has helped local tribes reduce the time and physical strain dedicated to collecting water, benefiting women and children in particular.*





*Oloirowua Primary School under construction.*

***Have the beneficiaries participated in identifying the community benefits and in subsequently monitoring the delivery of benefits?***

A CBP for the project was designed in consultation with local communities. KenGen (the PE) and provincial administration experts helped identify priority water and education projects. Project sustainability is factored into the design of the CBP, which lays out very specific activities and provides a clear “results framework” and timeline. Most of the activities are related to construction of infrastructure. Strong community involvement and buy in has so far been observed. Inclusive consultations have instilled a greater sense of ownership among the stakeholders, and the projects are being implemented with significant contributions of local labor and materials. Each of these projects promotes a sense of ownership and provides participants with a genuine stake in ensuring sustainability.

***Does the project benefit the poor and the vulnerable?***

The Maasai, Luo, and Kikuyu communities living in the vicinity of the plants are the main beneficiaries of the CBP. These

tribes depend mainly on subsistence farming and livestock for their livelihoods. People in these communities had to travel over four hours a day to collect water. In addition, schools were both distant and inadequate. The benefits accruing to the communities include (i) the availability of clean water; (ii) shorter travel distances to fetch water, especially for women (on average, down from 10 km to less than 2 km); (iii) a reduction in the number of school dropouts; (iv) an increase in new students attending school; (v) a drop in the incidence of waterborne diseases; and (vi) increased food security. Household incomes are also expected to increase as a result of these benefits.

***What are the key implementation successes and challenges?***

An influx of refugees has put a severe strain on already-limited services and resources in the project area. In addition to this pressure, the influx of new inhabitants could also increase the risk of abuse or misuse of newly constructed infrastructure. The new inhabitants may not have the sense of ownership that exists among those who have been part of the project from the beginning.

#### 4.4 Moldova Biomass and Energy Efficiency

Most public buildings in Moldova are currently being supplied with heat from inefficient and outdated boilers via an extremely deteriorated heat distribution network inherited from Soviet times. The CDM project aims to reduce emissions by installing new efficient heating systems in public buildings across Moldova that aim to increase the overall heating efficiency by up to 90 percent. The CDCF will purchase about 180,000 tCO<sub>2</sub>e. The project includes three registered PDDs.

##### ***To what extent does the project benefit local communities?***

A total of 153 energy-efficient boilers have been installed in public buildings across Moldova. Community benefits are inherent to the CDM project itself, providing ER revenues to each sub-project entity as well as significantly improving heating in schools, kindergartens, hospitals, and cultural centers. The more reliable and efficient heating technology allows for longer periods of heating (from 60 to 167 days per year), higher room temperatures (from 13 to 18 degrees Celsius), and reductions in smoke as compared to the outdated and highly inefficient coal boilers. Beneficiaries report significant health improvements: a reduction in respiratory diseases and increased heating comfort in schools and other public buildings that has resulted in higher attendance, better retention rates and fewer incidences of illness during the cold winter months.

##### ***Have the beneficiaries participated in identifying the community benefits and in subsequently monitoring the delivery of benefits?***

The project provides direct community benefits, and a requirement for annual reporting is embedded in the overall monitoring system. Beneficiary institutions thus inherently participate in the both CER monitoring and the benefits monitoring. The indicators and “monitoring results framework” were agreed to as part of the ERPA commercial terms. These indicators were recently simplified to reflect actual practice and to accommodate the project developer’s capacity constraints.

##### ***Does the project benefit the poor and the vulnerable?***

The project is benefiting rural poor communities across Moldova. Thanks to more reliable and higher heating temperatures during the cold months, public buildings such as schools and hospitals, have reported longer school days and higher student attendance as well as significant health improvements for children, teachers, medical staff and patients as well as boiler operators.

##### ***What are the key implementation successes and challenges?***

In terms of sustainability, all beneficiary institutions reported that they had a dedicated technician, retrained on a yearly basis, for the operation and maintenance of the boilers. The sub-project entities benefit from a yearly stream of carbon finance revenues from the CFU of Moldova for the ERs generated, which is often used to pay for the salary of the boiler technician and small repairs, and other relevant activities at the beneficiary institutions. Funds required for more extensive maintenance and repairs are provided for in the local municipal budget on an as-needed basis.

This has been a challenging project, complex in terms of CDM methodologies, the number of sites scattered across the country, and volume generation. One of the key challenges for this project has been significant ER under delivery, relative to the original estimates, and relatively small annual ER payments. Supplemental grant funding was provided to help ensure the financial viability of the coordinating managing entity.

Another, more recent, challenge has been a political decision to change the ownership structure of public schools. This has required changes to more than 100 ER revenue-sharing agreements between the sub-project institutions and the coordinating managing entity for the CDM project.



*Before and After: New, efficient and programmable gas boiler heater versus inefficient Soviet coal boiler heater.*



*School staff consultations.*



*Hospital staff and patients benefit from higher indoor temperatures during cold winter months.*

*Rural children enjoy warmer schools.*



## 4.5 Nepal Biogas Program

### Project Description

The program aims to reduce GHG emissions by providing rural households with a clean energy-efficient option for cooking through the installation of small biogas plants across rural and remote areas of Nepal. The program is part of an ongoing nationwide program, funded by international donors and coordinated by the Alternative Energy Promotion Center of Nepal with the support of the Biogas Sector Partnership Nepal (BSP-Nepal).<sup>29</sup> Four registered PDDs under the Nepal Biogas carbon finance project are included in the CDCF portfolio. About 60,000 household-level biogas plants have been installed in rural Nepal under these four PDDs, amounting to about 170,000 emissions reduced annually. CDCF ER payments started flowing in late 2007.

The community benefits are intrinsic to the CDM project itself. Under the program, families make the decision to install and operate biogas plants in their backyards, often near the animal den, where cow dung and human waste is manually churned in a digester. Biogas plants displace traditional fuel sources for cooking—fuel wood, kerosene, and agricultural waste—and introduce the proper treatment of animal and human wastes. They also produce a high-quality organic fertilizer.



*Traditional firewood stove producing harmful indoor smoke.*

### To what extent does the project benefit local communities?

As a result of the project, approximately 60,000 rural Nepalese families have gained access to free, clean, and safer cooking fuel. According to the latest biogas user survey and interviews with and site visits to rural households:

- Families have increased health and safety due to a significant reduction in indoor smoke, fumes, and heat from customary cooking methods. Families also benefit from improved sanitary conditions in and around the house, in particular when connecting the latrine to the biogas digester (animal and human waste).
- A major benefit for women is the reduction in time and energy spent in collecting firewood (or making dung cakes) for cooking. The free methane gas allows poor villagers to cook more efficiently and easily, in less time, and with more comfort (less heat is produced compared to traditional furnaces and cooking methods).
- Rural villagers achieve economic benefits thanks to the supply of free, continuous, and sustainable biogas for cooking and organic fertilizer from the residual bio-slurry for agricultural crops. By producing energy from the animal waste villagers already have in their backyards, the cost of continually producing the energy and higher quality organic fertilizer source is almost zero when compared to the (increasing) cost of fire wood or gas for cylinders (for slightly wealthier households).
- The project is supporting forest conservation goals by substituting biogas for non-renewable biomass (e.g., firewood).



*Rural Nepalese woman cooking with free, cleaner, and safer biogas at home.*

<sup>29</sup> As of July 2011, BSP has successfully installed 241,920 biogas plants in over 2,800 villages and all 75 districts. Alternative Energy Promotion Center: What is Biogas? 2013.



*Woman churning animal waste in biodigester to create clean gas for cooking.*

***Have the beneficiaries participated in identifying the community benefits and in subsequently monitoring the delivery of benefits?***

The project relies on social mobilization campaigns that are carried out by private companies and NGOs to raise awareness about the benefits of biogas plants. The field staffs of the private companies play a major role in this process as information dissemination is primarily through direct marketing by the service providers. Word of mouth has been instrumental in motivating people to install biogas plants. All the beneficiaries receive training on the use of their biogas plants and have easy access to the company for after-sales services. The project also has a rigorous monitoring system that includes a household biogas user survey that elicits direct feedback from consumers.

***Does the project benefit the poor and the vulnerable?***

The program targets very poor, geographically isolated, and socially marginalized groups in rural Nepal, including the Dalits and Janajatis,<sup>30</sup> who can neither access nor afford the use of propane and other modern cooking fuels. More than 16,000 Dalits, Janajatis, and conflict-affected families have benefited. However, as revealed in the biogas user survey, the highest percentage of plant owners are Brahmin/Chhetris (75 percent), often considered a better-off community within the rural Nepalese context. They are followed by Janajatis (17 percent) and Dalits (4 percent).<sup>31</sup> The poorest of the poor rural Nepalese households are not benefiting as much as expected because, for a biogas plant to function optimally, the number of cattle owned by the household matters—and the poorest households

are often excluded from ownership of cattle and land. To help address this, microcredit programs are being promoted to enable the poorest of the poor to afford the technology.

The major beneficiaries of the program are the women and children in rural areas who would otherwise spend considerable amounts of time collecting firewood and being exposed to serious indoor air pollution and fire hazards. Benefits include reduced fire hazards and avoided indoor smoke; more comfort (less carrying, exposure to significant reductions in heat compared to traditional furnace and cooking methods, and reduced eye infections and lung issues); and recouped time (from no longer having to collect firewood, make dung cakes, start up the fire, or nurse the blaze).

***What are the key implementation successes and challenges?***

This program has been one of the longest-running development initiatives in Nepal. The prospect for sustainability of the 60,000 units is deemed high, given that it is folded into a nationwide program that provides a strong enabling environment and is run by an experienced public sector agency (242,000 plants already installed across Nepal). Furthermore there is a high level of after-sales services provided by the biogas companies. Moreover, in terms of emission reductions, the CDM activities are delivering well, which points to the fact that the plants are in place, functional, and operating in line with PDD expectations.



*Nepalese women at community consultations on household level biogas.*

<sup>30</sup> Often referred to as Indigenous and lowest caste groups.  
<sup>31</sup> AEPC. Biogas Users' Survey 2010/2011.



## 4.6 Pakistan Community-based Hydro Power

### **Project Description**

Through the installation of 90 micro- and mini-hydropower plants in Northern Areas and Chitral, the project provides electricity to 51 remote rural communities and 150,000 households in Pakistan. According to the PDD, it will reduce emissions by about 78,000 tCO<sub>2</sub>e annually. The micro- and mini-hydropower plants are constructed, managed, and operated by the communities themselves—backed with technical support in the design and construction phases from the Community Infrastructure Section of the Aga Khan Rural Support Program (AKRSP). To date, the PDD is CDM registered and about 36 plants have been constructed and are in operation.

The project provides direct community benefits by lowering energy costs displacing state-subsidized diesel fuel use for power generation at the household level.

### **To what extent does the project benefit local communities?**

Power generated through the mini-grids powered by micro- and mini-hydropower projects are providing a large number of rural, non-grid-connected households access to electricity for domestic uses such as cooking, heating, and lighting. It is also creating opportunities for economic development and poverty alleviation through value added to agriculture and forestry products, the local gems industry, and tourism services. Electricity provides power for milling, small enterprises, irrigation, and other needs. In addition, the projects are resulting in local community health benefits derived from displacing air pollution from diesel generators and reducing household energy costs thanks to lower use of kerosene, oil, batteries, and fossil fuels. Improved access to renewable electricity is expected to help decrease the pressure on forests and natural habitats of rare plants and animal species presently threatened by excessive cutting of wood and shrubs for cooking and heating in winter.

### **Have the beneficiaries participated in identifying the community benefits and in subsequently monitoring the delivery of benefits?**

Great emphasis is put on ensuring that the communities are involved in all phases of decision making and take responsibility for the project. Each community that installs a micro-hydropower plant actively participates in the planning, construction, management, and operation of the plant. The local community-based village organizations are also responsible for setting tariffs and have to ensure that enough money is available to cover the costs of both regular maintenance and larger repairs. The level of community participation in this project is extremely high as the entire process is community and demand-driven. (See Box 4: Good Practice Example, page 12)



*Construction of micro hydro unit by community-based organization*

### **Does the project benefit the poor and the vulnerable?**

The micro-hydropower sites are located in extremely remote and rural communities that do not have access to basic infrastructure services. Northern and Chitral areas of Pakistan are typically rugged and mountainous, located at the confluence of four of the world's highest mountain ranges: the Himalayas, the Karakoram, the Pamirs, and the Hindukush. The project area covers over a million people, most of whom live in extreme poverty.

Access to electricity benefits women by reducing their workload thanks to the ability to use household appliances. Routine household chores typically assigned to women are now less labor-intensive and time consuming. Women are using the time saved to make handicrafts and clothes, which they can then sell to increase their household income. This has led to a rise in their status within the household<sup>32</sup> and strengthened their traditional roles.<sup>33</sup>



*With electricity, rural women have more opportunity for productive uses of their time.*

<sup>32</sup> Aga Khan Rural Support Program (AKRSP) (2000): A Synthesis of the Findings from the Impact Studies on Power Generation Projects. Gilgit.

<sup>33</sup> Aga Khan Rural Support Programme (AKRSP) (2002): Harnessing the Elements. Successes in Mountain Infrastructure and Engineering. Islamabad.

### **What are the key implementation successes and challenges?**

Community benefits are inherent to the project itself. Moreover, active community participation and systematic involvement of stakeholders throughout the project implementation process has created a sense of ownership within the community which is crucial for the long-term sustainability of the project. A community committee is also directly responsible for establishing tariffs, collecting electricity bills, and ensuring that there are enough funds available to cover regular maintenance and repair costs.

Both the communities and the program staff have demonstrated a very high level of commitment. The program also demonstrates the importance of having both a strong project implementer and a strong enabling environment. This type of community-led project requires a lot of technical assistance and capacity-building. There were project implementation delays due to devastating floods in August 2010 that interrupted progress on construction of the new plants and to the limited seasonal availability of farmers in the communities that built the micro-hydropower plants.

## **4.7 Peru Santa Rosa Small Hydro Project**

### **Project Description**

The Santa Rosa Hydropower project is the first small-scale CDM project to be developed in Peru. It is being implemented by a private company—GCZ Ingenieros. It comprises three small hydro plants (1.1 MW, 1.5 MW, and 1.5 MW) and sources its water flow from existing irrigation infrastructure. The Santa Rosa Irrigation canal is more than 35 kilometers long and passes through various agriculture towns and villages, including Sayán, Andahuasi, and La Merced. According to the PDD, the project is expected to generate about 17,000 tCO<sub>2</sub>e annually. It is CDM registered and has been receiving ER payments from the CDCF since 2007.

A Community Benefits Plan, financed by a price premium, targets one of the poorest communities in the vicinity of the Santa Rosa project (La Merced Village) as well as a local orphanage and rescue center for poor and vulnerable children and adolescents (the San Andres Achalay Foundation Center).

### **To what extent does the project benefit local communities?**

The project has indirect community benefits. The CBP comprises two main components: the provision of free electricity to the San Andres Center and implementation of four infrastructure projects in La Merced. The CBP


components have been mostly completed, with only the construction of a community center for La Merced pending the next ER payment.

Two new classrooms have been built that accommodate 25 students each. A computer laboratory supplied with 16 computers, desks, and chairs has also been constructed. Students from the fourth grade and up receive computing and Microsoft Office classes on a regular basis. Adult villagers from La Merced have access to computers and training during evenings and weekends. Teachers interviewed noted that the computer lab, the first in the area, provides invaluable exposure and access to computer technology, thereby enhancing educational and vocational training opportunities for the village of La Merced and empowering the beneficiaries with new skills for the labor market.

Free and reliable electricity generated by the Santa Rosa 1 hydro plant has been provided to a local San Andres orphanage since 2006—benefiting 50 children and 20 dedicated staff. The electricity is being used for lighting, entertainment, and the powering of carpentry machinery for vocational training.

In addition, more than 500 families benefit from cleaner irrigation water thanks to the installation of a trash rack cleaner in the irrigation canal and regular maintenance of the local irrigation canal. The project developer contracted with a local firm to remove solid waste from the canal, which supplies water to the hydro plant, and finances weekly maintenance of the canal.



*Thanks to the newly constructed computer lab, school children and villagers  are exposed to computer technology and software, empowering them with new skills in the labor market.*



*New classrooms in La Merced: Unlike the old classrooms, the roofs are not made of asbestos, providing children with cleaner and cooler air in the classrooms.*



*50 vulnerable children and 20 staff in the San Andres orphanage benefit from free electricity generated by Santa Rosa Small Hydro plant.*



*The local school serves children from the poor mountain community.*

***Have the beneficiaries participated in identifying the community benefits and in subsequently monitoring the delivery of benefits?***

The CBP activities were identified through consultations with local stakeholders and beneficiary representatives from La Merced. A meeting was held with various village representatives and a representative of the Peruvian Designated National Authority (DNA). The community subsequently signed an agreement with the project sponsor that outlined the commitments of the project sponsor and the community. Community stakeholders, such as Electrica Santa Rosa, local government authorities, school authorities, and town residents are actively involved in the implementation and monitoring of the CBP.

A CBP monitoring template was shared with the PE to provide guidance on how to collect both quantitative data and more qualitative information on progress, achievements, and challenges. More specifically, the monitoring template lists key questions to pose to beneficiaries and provides a matrix that lists the performance requirements as per the CBP's results framework.



### ***Does the project benefit the poor and the vulnerable?***

The benefits identified in the CBP are geared toward the poorest and most vulnerable in the vicinity of the project. La Merced community is composed primarily of agricultural workers with limited formal education and low incomes and was identified as the poorest community located in the vicinity of the project. Thanks to the CBP, local children and residents now have access to infrastructure conducive to effective learning (adequate classroom space) and exposure to computer technology. Similarly, the provision of free electricity benefits a local orphanage and rescue center for poor and very vulnerable children and adolescents.

### ***What are the key implementation successes and challenges?***

This project has been receiving ER payments since 2007. However, ER volumes monitored (and therefore the associated CBP payments) have been lower than originally anticipated. Moreover, the CDM project experienced long periods for ER verification (auditing) due to the need to process changes in the registered PDD. Consequently ER revenues, earmarked for CBP activities, were also lower and received irregularly, delaying the implementation of some CBP activities. The company is committed to corporate social responsibility and has now hired a full-time social mobilization expert to manage community expectations and development initiatives in its other projects.

“Through this project I have learned the importance of having good relations with the community. Some other companies in this area are now following our example, and trying to give back to the community.”

*Director GCZ Ingenrios*

## **4.8 Senegal Rural Area Energy Efficient Lighting Program**

### ***Project Description***

This registered CDM Program of Activities (PoAs) promotes the use of compact fluorescent light bulbs (CFLs) in Senegal’s rural electrifications initiatives.<sup>34</sup> About 150,000 newly electrified rural households in distinct regional concessions in Senegal are covered under the PoA, leading to measurable reductions of 40,000 tCO<sub>2</sub>e per year. The project is being implemented by Agence Senegalaise d’Electrification Rurale (ASER), which is an autonomous public entity to coordinate and monitor the implementation of a nationwide rural

<sup>34</sup> The program is undertaken in connection with a nationwide, rural electrification plan that aims to increase electricity access in Senegal’s rural areas from 16 to 50 percent.

electrification plan.<sup>35</sup> The CFL distribution schedule under the PoA is ongoing but installation schedule is behind due to delays in the rural electrification works for the first Component Project Activity (CPA).

The program provides direct community benefits by distributing an expected 1.5 million energy efficient light bulbs to newly electrified rural households and buildings in participating concessions in Senegal. The benefits are inherent to the project itself. Sustainability of the program has been incorporated into the overall design. ASER finances the upfront cost (\$8 per bulb) of high quality CFLs that maximize bulb lifetime and minimize waste. Revenues from the emission reductions generated under this program will be paid to ASER to recover over time its upfront investment costs and for management of the program. ASER will share a minimum of 15 percent of the CDM revenues with concessionaires as an incentive and to cover the monitoring costs incurred in implementation of the CPA. The sustainability of the CFL program and the benefits to poor rural communities will depend on the progress in rural electrification, the penetration rate of the CFLs to these newly electrified villages, and the tariff structures for electricity.

### ***To what extent does the project benefit local communities?***

The nationwide rural electrification plan is leading to a significant improvement in the living conditions of local communities. These include reduced indoor pollution, better health conditions in homes, increased safety thanks to the lower incidences of thefts and nighttime assaults, and reduced pressure on forests for fuel wood for lighting.

The CFL project is expected to directly benefit communities by providing wider access to energy-efficient lighting to about 150,000 rural households. High-quality, low-priced CFLs, which are 75 percent more energy-efficient than incandescent lights, will benefit rural poor, newly electrified users. The benefits will include energy savings, lower electricity bills, and mitigation of the impacts of higher electricity tariffs.

The introduction of 1.5 million CFLs will directly reduce the pressure on electricity demand, especially during peak loads, reduce the pressure on investments in additional capacity, and reduce utility losses in supplying electricity to low-tariff and low-collection customers. This PoA will thus contribute to the economic sustainability of rural electrification in Senegal through a more efficient use of electricity.

<sup>35</sup> PPER : Programme Prioritaire d’Electrification Rurale.

***Have the beneficiaries participated in identifying the community benefits and in subsequently monitoring the delivery of benefits?***

A stakeholder consultation was conducted by the DNA at the PoA level in the context of the nationwide program of activities. Stakeholders, included the National Committee for Climate Change and the various associations and nongovernmental organizations involved in rural development and the protection of the in Senegal. As part of the CDM program, a baseline survey was conducted for electrified villages in the concessions of Saint Louis-Dagana-Podor, Kébemer-Louga-Linguère and Mbour, to assess the number of lamps per household, the lamp technologies and models, and household awareness of efficient light bulbs. The number of CFLs to be installed is based on the design of the Rural Electrification Plan, which relies on a detailed demand analysis including user's capacity to pay for the service. Village awareness campaigns are to be done in each CPA before implementation begins, followed by less intensive awareness campaigns to be carried out on an annual basis.

The CPA implementers will be responsible for data collection; ASER will be responsible for the preparation of the monitoring reports. Each village and household/building included in each CPA will be identified using geo-coordinates for villages and unique identification client numbers for households/buildings. In addition, the serial number of each CFL installed in each household will be recorded.

***Does the project benefit the poor and the vulnerable?***

As part of Senegal's national rural electrification program, this project targets rural households where two third of the

population is considered below the poverty threshold. CFLs are otherwise not available in rural areas as importers and retailers are mainly located in urban centers. Therefore, the upfront investment for the purchase of the more expensive CFLs is being fully financed by ASER either directly or through a subsidy paid to the concessionaires; this removes a major barrier to getting these light bulbs into poorer households. The CFL program also helps make electricity services affordable for poor households by reducing electricity consumption compared to incandescent light bulbs—further reducing electricity usage and costs.

For over 60 years I have lived in this community without light, and we depended on the stars at night for light and sun in the day time. We could not do much to improve our economic activities and the lives of the children. But thanks to Allah we now have electricity and our children are in school, our health clinic is working, there is less illness in the village, and our cattle are secure at night.

*Chiekh Secka Chief of the Village*

***What are the key implementation successes and challenges?***

This is the first program of activities to be registered in Senegal and, more broadly, in West Africa. It is also one of the first registered PoAs that applied the CDCF-developed simplified methodology for LDCs. The CFL distribution schedule under the PoA is ongoing but behind due to delays in the rural electrification works for the first CPA.



## Key Findings and Lessons Learned

A key purpose of the Community Development Carbon Fund is to support pilot projects that test various approaches to providing community co-benefits from carbon finance. This updated portfolio review demonstrates that these CDCF projects lead to improvements in access to basic infrastructure and services for some of the poorest communities while also contributing more broadly to socially and environmentally sustainable development. Indeed, CDCF projects have provided a range of important co-benefits, including improved health, environmental, and economic outcomes at the local and household level. While CDCF projects have provided clear benefits to local communities, the assessment also reveals that there are certain aspects of CBP implementation that can be strengthened in order to enhance the effectiveness of these projects in delivering these community co-benefits.

### Benefits

- Projects that generate direct community benefits, especially household energy access projects, should be actively promoted. Carbon co-benefits are maximized when the benefits are inherent to the CDM project itself. Direct benefits are more efficient to deliver, minimize transaction costs, and have the potential to produce the strongest development impacts. The delivery of direct co-benefits is also less risky because it is not tied to emissions reduction payments.
- Risk mitigation options should be available for projects that deliver indirect community benefits in order to manage ER delivery risk, fund flows, and community expectations. Delivering community benefits through CBPs has inherent risks because success is dependent on, and vulnerable to, the successful generation of emissions reductions in a context of complex and stringent CDM requirements and procedures and a difficult investment environment in priority countries. This could be addressed by providing seed grant financing to implement at least a portion of the priority community projects independently of the CDM risks; this funding could then be complemented by results-based ER resources once the CDM project is at the delivery phase. Alternatively, rather than designing the CBP prior to ERPA signature, the contract could commit the PE to undertaking the CBP preparation and implementation in consultation with communities only after there is more certainty about CDM project performance (i.e., after the first monitoring report has been prepared).
- Renewable energy projects located in rural and isolated areas provide a valuable opportunity for transformational development impacts in the poorest communities and a profound impact on multiple aspects of human development. These projects can play an important role in mitigating climate change, addressing energy poverty, and boosting development if implemented on a sufficiently large scale. As part of this effort to scale up, more needs to be done to enhance the efficiency of the CDM and to account for the LDC need for growth in energy services, given the current significant unmet energy demand. Furthermore attention needs to be made on reaching the poorest of the poor, through the design of the investment operation itself.

### Beneficiaries

- CDCF projects have benefited some of the world's poorest communities and its most vulnerable groups, by

targeting ethnic minorities, rural and isolated households, and those communities that have very limited or no basic infrastructure and public services. While CDCF projects do not directly provide funding targeted at women—and therefore do not systematically track gender-related indicators—the CDCF experience shows that carbon finance can generate direct and/or indirect co-benefits that can significantly benefit women, in terms of empowerment, health and workload reduction (and time saved can then be allocated to other economic, educational, and social activities). Household and micro-lending components have provided opportunities for empowering vulnerable groups (such as women, waste pickers and brick workers). The assessment shows, however, that systematic and targeted outreach to the poorest of the poor within beneficiary communities remains challenging.

## Stakeholder Engagement

- Public participation and consultation: CDCF projects with CBP components are strongly based on intensive community consultation and active community involvement and input. This has helped to garner community's buy-in and to ensure transparency in the design and implementation of the programs. Most CDCF projects have been developed in close collaboration with a range of local stakeholders, including government agencies, private enterprises, nongovernmental organizations, and the local beneficiary communities. These projects help to enhance social capital, awareness and voice by requiring community members to come together.
- Effective and regular communication throughout the project: Effectively managing beneficiary community expectations from the onset of every project is critical. This is especially true in cases where there may be a significant lag time between stakeholder consultations and the implementation of any CBP activities. Assigning a dedicated social expert from within the company, the local government, or the implementing agency has proven to be a useful strategy for effectively managing community expectations; the key is to designate someone who understands the beneficiary community and is adept at communicating in a language and tone that resonates with that community. A failure to manage local communities' expectations may undermine the long-term sustainability of any gains achieved under CBPs.

## Operational Challenges and Good Practices

- Mainstreaming CBPs in corporate social responsibility programs: The CDCF experience shows that private sector project entities who are backed by corporate social responsibility departments and have familiarity with the local communities in the project area have fared better in terms of managing community expectations, leveraging resources, and maximizing synergies with local NGOs, universities, and governments. These projects have, as a result, tended to be more successful in providing co-benefits. This is perhaps the main factor in the implementation of a very successful CBP that is more likely to realize transformational changes in the lives and livelihoods of the poorest, helping to empower local populations through capacity building and micro-lending
- CBP monitoring, reporting, and verification: An important component of CDCF projects is that each CBP establishes a clear results framework for delivering community activities. It contains a matrix listing community benefit outputs, indicators, and a baseline for monitoring implementation. Because the CBP payment is tied to the delivery of ERs, monitoring and yearly reporting is critical under the commercial terms of the CDCF ERPAs. To facilitate this process, project entities are given a CBP monitoring template that includes both quantitative and qualitative CBP indicators. Some private project sponsors of CDCF projects have reported that the CBP participatory approach and the CBP monitoring indicators have proven to be very valuable for the company, both in terms of developing a cooperative and trusting relationship with local communities and in showcasing the benefits delivered.
  - Supervision of Carbon Finance projects is undertaken as part of the CDM project cycle and CDM requirements, and World Bank safeguards supervision is undertaken annually. Supplementary site visits are conducted by CDCF social specialists to monitor and validate the delivery of community benefits. In addition, CBP revision missions have been undertaken for a number of projects in order to align confirmed CBP resources and community benefit needs and to streamline CBP indicators to simplify monitoring in line with the capacity of the project entity.
  - The CDCF experience also shows that placing effort on developing few, simple, and meaningful indicators helps ensure efficient and effective monitoring of CBPs. Because the specific community benefits indicators are developed on a project-by-project basis, each CBP is ultimately unique. Thus, the ability to make comparative studies across the CDCF portfolio is limited. Developing a “CBP Indicator Menu” according to type of benefit could be explored.

- The poverty alleviation and sustainable development impacts of projects with direct benefits could be enhanced by designing operations that are themselves based on principles of community empowerment. Involving the community directly in the planning, implementation and operation of the CDM project helps enhance the ownership, sustainability and development impact of the beneficiaries themselves.

The CDCF experience with piloting “carbon plus development” projects has been very valuable. It is clear that carbon markets can work to enhance revenue streams and savings to rural communities who otherwise have limited sources of income. The CDCF experience is demonstrating that these initiatives are not only mitigating climate change but also improving life on the ground for rural and poor communities: creating job opportunities and new revenue streams; strengthening road and school infrastructures; improving health; access to electricity; and strengthening the human, social, and financial capital of local communities. Experience shows that balancing various trade-offs, maximizing synergies and reducing the carbon finance risk of delivering community benefits needs to be enhanced. The ‘low hanging fruit’ of *carbon plus development* CDM projects are those that provide direct and inherent community benefits and should be promoted most actively, to target the poorest people. Efforts to further simplify the CDM project cycle and reduce transaction costs and uncertainty with ER revenues must also be scaled up. Similarly, CDCF projects providing direct community benefits exhibited very good practice in establishing clear indicators, identifying data source(s) and methodology for data collection (including frequency), and designating responsibility for the collection of such information, greatly facilitating effective monitoring and evaluation.





# ANNEX 1: CDCF Portfolio and Community Benefits Summary

#	Project Name	CBP Type	ERPA Type	Region	Activity Type	Registration Status	Sector Type	Key Community Benefit
1	Argentina: Salta Landfill Gas Capture	Indirect	CER	LCR	PDD	Registered	Landfill gas flaring	Improved working conditions and livelihood opportunities for waste pickers
2	Bangladesh: Brick Kiln	Indirect	CER	SAR	PDD	Registered	EE Industry Building materials	Improved working conditions and livelihoods of brick workers
3	Bangladesh: Installation of Solar Home Systems (Grameen)	Direct	CER	SAR	PoA	Registered	Solar Solar PV	Access to electricity for rural households; employment
4	Bangladesh: Installation of Solar Home Systems (IDCOL)	Direct	CER	SAR	PoA	Registered	Solar Solar PV	Access to electricity for rural households; employment
5	China: Guangrun Hydropower	Indirect	CER	EAP	PDD	Registered	Hydro Existing dam	Construction and rehabilitation of local infrastructure
6	China: Hubei Ecofarming Biogas	Direct	CER	EAP	PDD	Registered	Methane avoidance Manure	Cheaper, safer and more reliable energy for cooking in poor rural homes
7	China: Shandong Poultry Manure Biogas	Indirect	CER	EAP	PDD	Registered	Methane avoidance	Construction of local infrastructure; improved local agricultural production
8	Honduras: La Esperanza Hydroelectric	Indirect	VER	LCR	PDD	Registered	Hydro Run of river	Improved local electricity access and employment. CBP provides for infrastructure
9	India: FaL-G Brick and Blocks PDD1, 2, 3, 4	Indirect	VER	SAR.	PDD	Registered	EE Industry Building materials	Improved working conditions and livelihoods of brick workers
10	India: Energy Efficient Streetlighting	Indirect	CER	SAR.	PDD	Registered	EE Service Street Lighting	Provision of equipment and materials to schools in participating municipalities
11	Kenya: Olkaira II Geothermal Expansion	Indirect	CER	AFR	PDD	Registered	Geothermal Geothermal electricity	Construction and rehabilitation of local infrastructure

#	Project Name	CBP Type	ERPA Type	Region	Activity Type	Registration Status	Sector Type	Key Community Benefit
12	Kenya: Optimization of Kiambere Power Station	Indirect	CER	AFR.	PDD	Registered	Hydro Existing dam	Construction and rehabilitation of local infrastructure
13	Kenya: Redevelopment of Tana Power Station	Indirect	CER	AFR.	PDD	Registered	Hydro Existing dam	Construction and rehabilitation of local infrastructure
14	Moldova: Biomass Heating and Energy Conservation	Direct	VER	ECA	PDD	Registered	EE Service in public buildings	Improved heating service in public buildings
15	Nepal: Biogas Support	Direct	VER	SAR	PDD	Registered	Methane avoidance	Access to cheaper, safer and more reliable energy for cooking in poor rural homes
16	Nepal: Micro Hydro	Direct	CER	SAR	PDD	Registered	Hydro Run of river	Access to electricity for poor isolated rural households
17	Pakistan: Community Based Hydropower Development	Direct	CER	SAR	PDD	Registered	Hydro Run of river	Access to electricity for poor isolated rural households and communities
18	Peru: Santa Rosa Hydroelectric	Indirect	VER	LCR	PDD	Registered	Hydro Run of river	Construction and rehabilitation of local infrastructure
19	Rwanda: CFL Energy Efficiency	Direct	CER	AFR	PDD	Registered	EE Households Lighting	Installation of energy efficient lighting (CFLs)
20	Senegal: Lighting Energy Efficiency in Rural Electrification	Direct	CER	AFR	PoA	Registered	EE household lighting	Provision and installation of energy efficient lighting (CFLs) in rural areas
21	Uganda: Municipal Waste Composting	Indirect	CER	AFR.	PoA	Registered	Landfill gas Landfill composting	Construction of local infrastructure
22	Yemen: Loss Reduction in Electricity Distribution Systems	Indirect	CER	MNA.	PoA	In Registration	Energy distribution Efficient electricity distribution	Construction and rehabilitation of local infrastructure

\*Data as of May 2013