

## PROJECT INFORMATION DOCUMENT (PID)

<b>Project Name</b>	Nepal Village Micro Hydro Carbon Offset Project
<b>Region</b>	South Asia
<b>Sector</b>	SASSD
<b>Project ID</b>	P095978
<b>Borrower(s)</b>	
<b>Implementing Agency</b>	Alternative Energy Promotion Center
<b>Environment Category</b>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> FI <input type="checkbox"/> TBD
<b>Safeguard Classification</b>	<input type="checkbox"/> S <sub>1</sub> <input checked="" type="checkbox"/> S <sub>2</sub> <input type="checkbox"/> S <sub>3</sub> <input type="checkbox"/> S <sub>F</sub> <input type="checkbox"/> TBD
<b>Date PID Prepared</b>	November 1, 2006
<b>Date of Appraisal Authorization</b>	TBD
<b>Date of ERPA Signature</b>	TBD

## 1. Country and Sector Background

Nepal has vast hydro resources, which represent a source of potential wealth. Commercially exploitable hydropower generating potential is estimated to be about 43,000 MW. However, despite this large potential, only about 600 MW has been developed so far. Based on the 2001 census, 40 percent of Nepal's households have access to electricity, but disparity in access is stark. While over 90 percent of the urban population is connected to the grid, it is estimated that only 27 percent of rural households have access to electricity.<sup>1</sup>

The Government's 10th National Plan aims to increase the electrification rate to 55% through both grid extension and non-grid options including micro-hydro and solar. This emphasis on power development followed the adoption of the Hydropower Development Policy in the early 1990s which, combined with changes in electricity legislation and the opening up of the power sector to local and foreign private investments, was intended to make institutions operating in the power sector efficient and creditworthy, as well as increase the participation of the private sector in the provision of electricity services of the people. Under this policy and regulatory framework, Government of Nepal (GoN) has been able to attract some private (foreign) investments in power generation, yet there is an increased recognition that more needed to be done to attract private capital in the sector and to improve the efficiency and creditworthiness of

<sup>1</sup> Nepal Country Strategy on Integration of Energy and Rural Development Policies and Programme -Water and Energy Commission Secretariat of the Government of Nepal, Dec. 2005

Nepal Electricity Authority, the central Government owned grid operator, generator and distributor.

The revised Hydropower Development Policy of 2001 was intended to address many of the outstanding issues preventing achievement of the Government objectives in the sector. It envisaged an increased involvement of private investors in the production, distribution, and management of electricity while recognizing the need for continued institutional and structural changes in the power industry. The revised Policy called for the creation of a more competitive environment for private sector participation, including introduction of more transparent and investment friendly procedures. The development of small hydro projects and district level projects under decentralized schemes in hilly and remote areas were also highlighted as areas to be developed with support of a subsidy scheme implemented by the Alternative Energy Promotion Center (AEPC). Finally, the Policy directed that increased attention be paid to the social and environmental aspects of hydroelectric development to ensure that adverse effects on the environment and communities are minimized.

While progress has been made on several fronts during the initial years of policy implementation, there was a growing realization that increasing access to remote areas through decentralized schemes required additional specialized efforts. Furthermore, implementation of some elements of the hydropower policy, such as private sector participation, were hampered by country economic and security risk, and the lack of adequate domestic capital market, issues which were beyond the control of the power sector itself.

To assist GoN in meeting its sector objectives, the World Bank approved a Power Development Project consisting of a \$75.6 million IDA credit in 2003.

Discussions were initiated with the World Bank in late 2004 to prepare a complementary Carbon Offset project whose revenues would provide additional financial support to AEPC's village micro-hydro program, further increasing rural access to modern energy sources in Nepal.

## **2. Objectives**

The proposed development objectives of the Carbon Offset Project are:

- Reduce global emissions of carbon dioxide.
- Increase access to modern energy from renewable energy sources.

The Carbon Offset project complements the ongoing World Bank Power Development Project by providing additional support for the achievement of its development objectives, in particular the objective of improving access of rural areas to electricity services. The overall development objectives of the Power Development Project are: (a) develop Nepal's hydropower potential in an environmentally and socially sustainable manner so as to help meet electricity demand, (b) improve access of rural areas to electricity services, and (c) promote private participation in the power sector as a way to improve sector efficiency and to mobilize financing for the sector's investment requirements.

The objectives of this World Bank Carbon Offset Project are therefore consistent with the developmental and poverty reduction objectives of GoN.

### **3. Rationale for Bank Involvement**

This Carbon Offset project will facilitate greenhouse emission reductions and support the development of the international market mechanism for trading Emission Reductions (ERs), developed under the framework of the Kyoto Protocol. The Nepal Village Micro Hydro project consists of sale of ERs to the Community Development Carbon Fund (CDCF) which provides carbon finance to small-scale CDM projects in the least developed countries and poorer areas of all developing countries. The CDCF actively seeks to reach countries and communities that are neither presently benefiting from development through carbon finance nor are likely to benefit greatly from it in the future. The CDCF also seeks to support projects which include, as a measurable output, the provision of goods and services that will lead to improvement in the social welfare of the communities involved in the projects.

The sale of emission reduction credits to the CDCF will allow for full implementation of the micro-hydro program by generating additional resources to allow for expanded coverage of the program beyond the original target of 25 districts, and will improve program sustainability by reducing reliance on donor assistance for implementation of future phases of the program.

#### **Higher level objectives to which the project contributes**

The project is consistent with the CAS for Nepal and supports the PRSP, particularly through providing support for the development of the rural economy and by increasing access to modern energy sources.

### **4. Description**

The Project will support the development of micro-hydropower mini-grids to meet the electricity and motive power needs of the rural people of Nepal through provision of subsidy assistance and program technical support. The project will build on the successes achieved under the UNDP Rural Energy Development Program (REDP) by extending electrification activities to 40 districts, including 15 that were not covered under the first phase of that program. It will also bring together the rural electrification activities supported through the micro-hydro component of the World Bank Power Development Project and the donor-financed Energy Sector Assistance Program (ESAP II) to expand the total target level of new micro-hydro installations by 15 MW by utilizing the CDM revenues to help meet un-financed program implementation and subsidy costs.

The project seeks to develop a viable off-grid micro-hydropower market for villages which will not be served by the national grid for at least 5 years. It would offer support on both the demand and supply sides by providing information and social mobilization support, technical training, and investment subsidy (~40% - 70% of initial investment) to communities, and market information and business development support services to micro-hydro construction and supply companies. The micro-hydro plants will be installed by pre-qualified private sector companies who will receive subsidy payments, technical assistance and credit support. The plants will be managed by the communities themselves or by the private sector providers. Meters will be

installed on each unit, and operating costs will be recovered through tariffs based upon installed demand for residential users and energy use for larger rural enterprises.

The program will scale-up the promotion of off-grid micro-hydropower plants less than 100 kW utilizing Peltic systems (up to 3 kW) to supply power for domestic and institutional lighting and larger micro-hydro systems which can power agro-processing mills, saw mills and other electric machinery for small cottage industries. It is anticipated that 15,000 kW from 750 micro-hydropower plants will be installed between 2003 and 2010, providing access to electricity to an estimated 142,000 households. Thirty four schemes generating 589 kW have already been commissioned under this program, although these schemes are not eligible for early start crediting and will thus not claim early start emissions reductions under the carbon offset project.

This project falls under the small-scale CDM project activity with total electricity generation within the limit of 15 MW. The project will lead to reduced GHG emissions by:

- Replacement of kerosene for lighting;
- Replacement of diesel fuel used for agro-processing and other productive use applications.

Average household electricity consumption post installation of the micro-hydro units is estimated to be 27 kWh/month, of which 18 kWh will be used for lighting and 9 kWh will be used for productive uses.

#### The cost of the above investment projects

Project Cost	US\$ Million	Project Component
Program Cost	26.492	Program Development cost including project appraisal costs, AEPC subsidy, technical assistance, and program management.
Installed costs	26.933	Sponsor's plant investment (loan, labor, other contributions)
Other costs	3.873	HRD, Goods, Incremental operating costs
<b>TOTAL</b>	<b>57.298</b>	

#### 5. Financing

Source:	(\$million)
GoN	2.3
Domestic borrowings/Equity investment	26.9
INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT IDA GRANT	5.5
UNDP	1.6
DANIDA/NORAD	14.3
Carbon Finance	2.3
Financing gap	<b>4.4</b>
<b>TOTAL</b>	<b>57.3</b>

Additional financing will be sought from multilateral sources to fill the current gap.

### **Implementation**

The project will be implemented by the Alternative Energy Promotion Center (AEPC) with technical assistance provided by UNDP REDP program. Funding will be provided by the World Bank, DANIDA/NORAD through the ESAP Phase II program, GoN, equity contributions and in-kind contributions from the communities, and carbon finance revenues.

AEPC will assume overall management of this project. The REDP project support units will provide project implementation support and technical assistance to the participating communities and the private sector providers. Actual implementation of the micro-hydro installations will be managed by local governments, i.e., District Development Committees (DDC) and the Village Development Committees (VDC), and will involve formation of a micro-hydro functional group (MHFG) at each participating community to guide implementation and operation.

AEPC will extend grants and other project support funds to a District Energy Fund (DEF) managed by District Development Committees for financing approved micro-hydro project proposals. Funds are released from the DEF only after the acquisition of land for the power house, securitization of the right of way for the canal and distribution lines, and the collection of collateral for any required local loans. Investment grants or subsidies are then released based on output verification, while other costs such as for social mobilization, training, etc. are paid on an actual cost basis. Expenditure statements submitted through the DDCs to AEPC, who confirms eligibility of expenditures.

### **Partnership arrangements**

The Alternative Energy Promotion Center (AEPC), under the Ministry of Environment, Science and Technology is devoted to the development and promotion of renewable and alternative energy technologies in Nepal. Established in 1996 by a Government Cabinet Order, the objective of AEPC is to popularize and promote the use of renewable energy technology to raise living standards of the rural people of Nepal, to protect the environment and to develop commercially viable alternative energy industries in the country. Acting as an intermediary institution between the operational level NGOs/ private promoters of renewable energy and the policy deciding levels in relevant ministries, AEPC's activities include renewable energy policy formulation and planning and facilitating the implementation of the policies/ plans. The REDP shall provide continuing technical assistance support to AEPC in the implementation of the village micro-hydro project.

The Second Phase of the Energy Sector Assistance Program (ESAP II) is currently under negotiation. ESAP II is planned as a national program, with joint funding to be provided by the Danish International Development Agency (DANIDA) and Norway (NORAD), although the exact contribution allocated towards the micro-hydro components have yet to be finalized. This is expected by November 2006.

## **5. Monitoring and evaluation of outcomes/results**

Monitoring and evaluation will be undertaken through two mechanisms, the World Bank supervision of the ongoing Power Development project and through the specific monitoring plan for Verification of Emissions Reductions that will be developed in the CDM Project Design Document. The monitoring parameters of the CDM program shall include the number of kWh produced by each micro-hydro unit as measured by the individual meters, and the number of households connected to the micro-hydro plant. AEPC will be accountable for overall reporting on implementation progress, preparation of financial monitoring reports, and preparation of audited project accounts. REDP district shall conduct regular monitoring of the installed plants. AEPC shall also conduct enhanced verification and quality assurance activities. A monitoring and verification plan for the community benefits of the program will be developed as required by the CDCF. It will be built upon the existing M&E activities undertaken by AEPC under the World Bank Power Development Project and the annual impact assessment reports.

## **6. Sustainability**

Sustainability of the micro-hydro village electrification systems is primarily linked to the sustainability of the MHFGs, the community mobilization process and the transparency of operation throughout the life of each sub-project. Previous experience with the first phase of the REDP shows that the community mobilization program has been effective, and that system failures have been few in number.

However, there are a number of areas where processes (and therefore sustainability) would be further enhanced, e.g, (i) further strengthening of the community mobilization process, (ii) improve the formalization of micro-hydro functional groups; (iii) improve procurement practices; and (iv) improve the benefit monitoring and evaluation process. Moreover, an enhanced benefit monitoring and evaluation program is being implemented as part of the World Bank Grant program, with the secondary aim of providing early feedback of system failure and malfunction.

Extensive training for the O&M staff (two operators and one manager selected from the local community) assigned to each system is being provided through the World Bank project, in both technical aspects of system operation and in bill collection, disconnection for non-payment, record keeping, accounting, etc. O&M staff are engaged prior to commencement of construction, are required to sign pledges that prevent them from leaving for other opportunities once training is completed, and are required to assist with system construction, plant installation and commissioning.

## **7. Lessons Learned from Past Operations in the Country/Sector**

The Carbon Finance Project will incorporate lessons learned from the initial implementation results of the Power Development Project and the previous phases of the UNDP REDP project. Recent experience in Nepal has demonstrated that delivery of infrastructure services to rural communities is more effective and sustainable when beneficiaries are able to actively participate in project planning and design. Accordingly, the village electrification component adopts a community-driven approach, which involves the community through every stage of the

development process including, *inter alia*, organization development, woman's empowerment, skills enhancement, capital formation, technology promotion and environmental management.

## 8. Environmental Issues and Safeguard Policies

The environmental impacts of micro hydro projects are generally small, with the main impacts being (i) the partial de-watering of a section of riverbed from the intake until water is returned to the river downstream of the powerhouse, and the consequent effect on aquatic life in the dewatered section; (ii) potential ground / soil erosion caused by flushing flows discharged from sedimentation basins and by overflows at the forebay, (iii) potential ground instability caused by canal/pipe construction and leakage from canals; (iv) cutting of forest cover to make way for construction works, and (v) cutting of trees for use as power poles. Considering the small size of these sub-projects, it is not anticipated that there will be any road construction. In the unlikely event there are unanticipated impacts, the EMPs developed for each sub-project will address the problems with suitable mitigation measures.

<b>Safeguard Policies Triggered by the Project</b>	Yes	No
<a href="#">Environmental Assessment (OP/BP/GP 4.01)</a>	[ X ]	[ ]
Natural Habitats ( <a href="#">OP/BP 4.04</a> )	[ X ]	[ ]
Pest Management ( <a href="#">OP 4.09</a> )	[ ]	[ X ]
Cultural Property ( <a href="#">OPN 11.03</a> , being revised as OP 4.11)	[ ]	[ X ]
Involuntary Resettlement ( <a href="#">OP/BP 4.12</a> )	[ ]	[ X ]
Indigenous Peoples ( <a href="#">OD 4.20</a> , being revised as OP 4.10)	[ ]	[ X ]
Forests ( <a href="#">OP/BP 4.36</a> )	[ X ]	[ ]
Safety of Dams ( <a href="#">OP/BP 4.37</a> )	[ ]	[ X ]
Projects in Disputed Areas ( <a href="#">OP/BP/GP 7.60</a> )	[ ]	[ X ]
Projects on International Waterways ( <a href="#">OP/BP/GP 7.50</a> )	[ ]	[ X ]

## 9 List of Factual Technical Documents

World Bank Nepal Power Development Project, Project Appraisal Document, 2003  
 Rural Energy Development Programme, Project NEP/02/001, Annual Progress Reports 2003/5  
 Energy Sector Assistance Program (ESAP I) Progress Reports, Ref. No. 104.Nepal.802, 2003/5  
 Nepal Micro-Hydro Carbon Finance Document, December 2005  
 Nepal Micro-Hydro Promotion by Alternative Energy Promotion Centre (AEPC), CDM-SSC-PDD (Version 02), September 2006

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