



December 2015 ANNUAL PROGRESS REPORT 2015



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## RENEWABLE ENERGY FOR RURAL LIVELIHOOD (RERL)



## PROJECT PROFILE

About the Project	Geographic coverage of the project	
Project Title: Renewable Energy for Rural Livelihood	National level coverage (Yes/No): Yes	
Award ID:76958	Number of Regions covered: NA	
Web link: <a href="http://www.aepc.gov.np">www.aepc.gov.np</a>	Number of Districts Covered: NA	
	Number of Municipalities Covered: NA	
	Number of VDCs Covered: NA	
Strategic Results		
UNDP Strategic Plan Outcome 1: Growth & development are inclusive and sustainable, incorporating productive capacities that create employment and livelihoods for the poor and excluded		
UNDP Strategic Plan Output 1.5: Inclusive and sustainable solutions adopted to achieve increased energy efficiency and universal modern energy access (especially off-grid sources of renewable energy)		
UNDAF/CPAP Outcome2: Vulnerable groups have improved access to economic opportunities and adequate social protection		
UNDAF/CPAP Output 2.4:Vulnerable groups have increased access to sustainable productive assets and environmental services		
UNDP Output 2.4.1. AEPC's capacity enhanced for scaling up energy services in the rural areas		
Project Duration (day/month/year)	Implementing Partner(s)	Implementation Modality
Start Date: 21 July 2014	1. Ministry of Population and Environment, Government of Nepal 2. Alternative Energy Promotion Centre (AEPC)	National Implementation Modality (NIM)
End Date:30 June 2019		
Project Budget (US\$)		
UNDP Contribution: 2,000,000		
Government Contribution: 30,312,500		
Other Contributions: 24,249,600		
Donor Contributions:		
Donor 1: 3,000,000 (GEF)		
Donor 2:378,000 (Norwegian)		
Donor 3: 99,269 (Korean)		
Unfunded: USD 244,930		
Total Project Budget:	NPR 37,07,812,500(US\$35,312,500)	
Total Project Expenditure till 2015:	NPR 1,61,065,800 (US\$ 1,533,960)	
Budget 2015:	NPR_ 1,23,639,390 (US\$ 1,177,518)	
Expenditure 2015 (Indicative only):	NPR 1,22,835,510 (US\$1,169,862)	
Budget Utilization % (2015)	99.35%	



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## ABBREVIATION

AEPC	:	Alternative Energy Promotion Centre
BFI	:	Banking and Financial Institutions
BoA	:	Business Opportunities Assessment
CESC	:	Community Electrification Sub-Component
CREF	:	Central Renewable Energy Fund
DDC	:	District Development Committee
DEECCS	:	District Energy Environment Climate Change Section
DREMP	:	District Rural Electrification Master Plan
DEEU	:	District Energy and Environment Unit
DFS	:	Detailed Feasibility Study
DP	:	Development Partner
NRREP	:	National Renewable Rural Energy Programme
SHS	:	Solar Home System
SPV	:	Special Purpose Vehicle
PPP	:	Public Private Partnership
UNDP	:	United Nations Development Programme
GEF	:	Global Environmental Facility
RE	:	Renewable Energy
GIS	:	Geographic Information System
ICS	:	Improved Cooking Stoves
IGA	:	Income Generating Activities
IMIREN	:	Interconnected Mini-Grids for Intensive Rural Electrification in Nepal
IOE	:	Institute of Engineering
LGCDP	:	Local Governance Community Development Programme
MHP	:	Micro Hydro Power
MSME	:	Micro, Small & Medium Enterprises
MQAU	:	Monitoring and Quality Assurance Unit
NEA	:	National Electricity Authority
PEUC	:	Productive Energy Use Component
PPA	:	Power Purchase Agreement
PV	:	Photo Voltaic
RCEMH	:	Regional Center for Excellence of Micro Hydro
RERL	:	Renewable Energy for Rural Livelihood
RET	:	Renewable Energy Technology
SESC	:	South Asia Sustainable Economic Cooperation
SPV	:	Special Purpose Vehicle
UNCDF	:	United Nations Country Development Framework
UNESCAP	:	United Nations Economic and Social Commission for Asia and the Pacific
VDC	:	Village Development Committee

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## 1. EXECUTIVE SUMMARY

Renewable Energy for Rural Livelihood (RERL), a joint initiative of Government of Nepal (GoN), Global Environment Facility (GEF) and United Nations Development Programme (UNDP), was launched in July 2014. The main objective of RERL is to support Alternative Energy Promotion Center (AEPCC) of GoN to remove barriers for up-scaling promotion of lesser disseminated renewable energy technologies such as larger micro hydro, mini hydro and large solar photovoltaic (PV) systems to improve livelihood and conserve the environment. RERL is an integral part of AEPCC's National Rural and Renewable Energy Programme (NRREP) and aims to assist it in meeting its ambitious targets of providing electricity access to over 150,000 households by 2017.

As a result of the devastating earthquakes of April/May 2015 in Nepal, RERL has primarily focused its activities in relief and rehabilitation efforts in 2015 apart from some of its originally planned activities. For immediate relief and rehabilitation of the earthquake-affected areas, RERL has installed 8 kW large solar PV systems in 40 institutions. Similarly, RERL has assessed the status of 140 micro hydro projects and 42 solar pumping systems damaged by the earthquake. RERL is supporting rehabilitation of 31 MHPs with the total installed capacity of 755 kW.

In 2015, RERL also provided technical support to AEPCC for the formulation of policy conducive to support wider dissemination of renewable energy projects in Nepal. In this regard, RERL supported AEPCC to draft the Renewable Energy Subsidy Policy that is expected to transform renewable energy sector from a subsidy driven approach to a credit driven one. In order to integrate planning and implementation of rural electrification efforts, RERL supported Gorkha DDC to prepare the District Electrification Master Plan. Similarly, RERL worked with AEPCC to prepare technical standards for grid connection of micro hydro and large solar PV systems. The Technical Standard for micro hydro connection has been approved by Nepal Electricity Authority (NEA) Board paving the way for sustainability of micro hydro. Power purchase agreement for connecting two existing micro hydro plants, in Nuwakot and Dhankuta districts, with the national grid are at advanced stage of negotiation. Likewise, RERL has developed an android based solar calculator to promote household roof top solar systems.

RERL supported Central Renewable Energy Fund (CREF) in 2015 to design financial instruments to mitigate some major risks on project investment for financial institutions and the private sector. This is expected to ensure commercial investment in attractive renewable energy projects. The financial closure of two mini hydro projects – Tap Khola (2,600 households) and Giri Khola (2,000 households) – totaling 500 kW has been initiated.

In order to demonstrate technically sound and financially viable mini hydro, mini grid, large solar PV and large micro hydro projects, RERL supported AEPCC to successfully demonstrated Gulmi mini grid connecting two micro hydro systems in the vicinity benefitting 2,300 households. Similarly, one solar mini grid has been installed in Tanahu under Special Purpose Vehicle (SPV) modality by AEPCC and UNESCAP and a solar-wind hybrid system generating 25 kW power at Bhorleni of Makwanpur district. RERL is providing technical assistance to promote productive end uses in these projects.

In 2015, RERL supported detailed feasibility study of 5 mini hydro projects, 9 micro hydro projects, 5 large solar PV projects and 10 solar mini-grids across the country. In order to ensure



hassle-free tariff collection, RERL has fabricated pre-paid energy meter and installed at Malekhu I micro hydro project in Dhading district.

Regarding innovation on the productive energy use technology front, RERL supported three innovative projects that help fuel switching from firewood to electricity. The equipment used for Khuwa (dried milk) making, Lokta (tree bark for paper making) boiling and nettle leaves drier have been converted to use electricity for improving efficiency and productivity of the equipment as well as to ensure more revenue for the micro hydro plants. RERL has provided technical assistance to install 2 micro hydro operated lift irrigation systems with the financial assistance of Every Drop Matters (EDM) of UNDP and Coca Cola Foundation providing irrigation facilities to 45 households.

RERL has worked extensively with Productive Energy Use Component (PEUC) of NRREP for promotion of productive end-use applications. Altogether 43 women entrepreneurs from 10 districts have been supported for business management capacity development. Likewise, 49 participants have been trained on the mini hydro and solar installation for engineers. RERL also supported to conduct counseling training for Cottage Small Industry Development Board (CSIDB) staff with altogether 20 participants. Similarly, 74 women and 80 men have benefitted from the skill development trainings conducted in the vicinity of micro hydro plants especially on bakery, computer, tailoring, etc.

#### Five key results achieved in 2015

1. **Renewable Energy Policy work:** Renewable Energy Subsidy Policy has been drafted to support wider renewable energy promotion in Nepal. The policy is expected to reduce the initial upfront cost of renewable energy, promote productive use of energy, inject credit into the renewable energy sector, encourage private sector participation as well as improve access to cleaner and modern energy services benefitting particularly women, vulnerable communities and socially excluded groups. This would ultimately support in meeting the long-term Government targets in rural electrification and providing clean energy access.
2. **Relief and rehabilitation of the earthquake-affected areas:** RERL has installed 8 kW large solar PV systems in 40 institutions. Similarly, RERL has assessed the status of 140 micro hydro projects and 42 solar pumping systems damaged by the earthquake. RERL is supporting rehabilitation of 31 MHPs with the total installed capacity of 755 kW.
3. **Grid connection of micro hydro and large solar PV systems:** In order to connect micro hydro plants with the national grid, technical specifications have been prepared in collaboration with Nepal Electricity Authority (NEA). This will allow micro/mini hydro plants and Solar PV systems to be connected to the national grid. This achievement would ensure the sustainability of small project with the aim to promote sustainable and reliable mini-grid systems, RERL supported AEPC to successfully install the Gulmi Mini Grid Project in Wami Taksar, Gulmi district. It interconnects 2 micro hydro plants, one 135 kW and the other 83 kW, and provides reliable electricity to more than 2,300 households in the vicinity through a single system.
4. **Planning for Rural electrification:** District Electrification Master Plan of Gorkha District has been developed which will support the local governments in effective and integrated planning and implementation of rural electrification in the districts.
5. **Innovation:** Regarding innovation on the technology front, RERL supported three innovative projects that help fuel switching from firewood to electricity. The equipment used for Khuwa (dried milk) making, Lokta (tree bark for paper making) boiling and nettle leaves drier have been converted to use electricity for improving efficiency and productivity of the equipment as well as to ensure more revenue for the micro hydro plants. Likewise, RERL supported for local fabrication of digital electronic load controller and pre-paid energy meters. These two technologies will help in grid connection of MHP and timely tariff collection respectively.

## 2. BACKGROUND AND RATIONALE

Pico Hydro (<10kW), Micro Hydro (10 to 100kW) and Solar Home System (SHS) are the most popular technologies among renewable energy power generation in Nepal. However, only a few mini hydro plants were installed in the last two decades. Though Mini Hydro will actually better enable National Renewable Rural Energy Programme (NRREP) to achieve its key goals, including commercial financing, system sustainability and productive applications and contribute to poverty reduction very few mini hydro projects are being promoted as it presents new technical and operational challenges. Similarly, for areas without sufficient hydrological resources, larger PV systems will provide much more potential for economic growth.

NRREP, the base line programme of GEF UNDP RERL, has a five years target of 25 MW additional capacities of Micro Hydro and Mini Hydro. The RERL's efforts will facilitate this target being reached through promotion of larger systems. The target of RERL 10 MW from mini/micro hydro has thus been aligned with NRREP to work in this sector. However, NRREP has not indicated any specific targets for institutional Solar Photo Voltaic (ISPV) and Solar pumping (PVPS). RERL supports AEPC/NRREP in the areas of Mini Hydro, Mini Grid, Solar PV, productive energy uses and Public Private Partnership (PPP) implementation modality.

## 3. PROJECT SUMMARY AND OBJECTIVES

The Renewable Energy for Rural Livelihood (RERL) is funded by Global Environmental Facility (GEF) and the United Nations Development Programme (UNDP). RERL is developed as an integral part of Alternative Energy Promotion Centre (AEPC)'s National Rural and Renewable Energy Programme (NRREP) and thus, assists in fulfilling its ambitious targets. AEPC and donors have adopted a single programme framework. Thus, the NRREP represents the collective baseline activities in the country on renewable energy. The specific Renewable Energy (RE) related components of that programme, particularly on Mini/Micro Hydro and large solar PV systems are included in the GEF-UNDP RERL project baseline activities.

The main objective of RERL is to support AEPC to remove barriers for scaling up promotion of less disseminated larger renewable energy systems such as mini hydro, large micro hydro and large solar PV systems. RERL intends to provide incremental support to NRREP by providing technical assistance for developing sustainable implementation modalities. The core strategies of RERL include demonstration projects, private sector involvement for financing and attainment of financial sustainability through promotion of productive energy use.

### Theory of Change

Nepal has made a significant achievement in development of isolated micro hydro (less than 100 kW with average capacity of 30 kW) and solar home systems. About 15% of the country's population gets electricity from these two sources. On the other hand, Nepal has also developed larger hydropower projects (>1000 kW) to feed into the national grid but there are very limited intermediate renewable energy systems with the capacity lying between the two in the country. RERL was launched by GoN, GEF and UNDP to remove the barriers in policy, financing, sustainability and capacity to promote less disseminated technologies such as mini hydro (>100<1000 kW), large micro hydro (>60-100kW), large solar PV (mini grid, institutional and pumping) and mini grids interconnecting several micro hydropower plants.

RERL is working with AEPC to formulate policies for renewable energy promotion in the country, with DDCs to prepare integrated electrification plans and Nepal Electricity Authority to develop and implement technical standards for grid connection of MHP and Solar PV. It is expected that removing barriers in policy and institutional arrangements will help promote mini hydro and large solar PV systems by attracting private investment. Furthermore, RERL has prepared guidelines and modalities to involve private



companies in mini hydro development through Public Private Partnership modality by forming Special Purpose Vehicle.

To demonstrate financial attractiveness and technical viability of larger RE systems, RERL is working with AEPC/NRREP to promote demonstration projects. RERL has carried out detailed feasibility studies of mini hydro, mini grid, large micro hydro and large solar PV systems in different parts of the country. In case of mini hydro, RERL has been working with local communities to form SPV and with banks to flow credit to these projects. Once demonstration projects are completed, it is expected that the private sector will see the benefits in investing in renewable energy in rural areas and will be willing to develop projects that will benefit rural population with access to modern energy services. To arrive at increased access to modern energy systems, RERL is supporting AEPC to remove barriers, which are discussed below.

RERL is working with CREF to develop innovative financing mechanism such as soft credit, credit guarantee and credit insurance to reduce the risks of the BFIs to invest in RE projects. RERL has already initiated vendor financing mechanism to develop small scale solar pumping for irrigation through CREF. One of the major reasons for lack of private investment in RE sector is low return. To enhance revenue generation from RE projects, RERL is closely working with AEPC to develop mechanisms for promotion of productive energy uses. Moreover, RERL is also supporting women and marginalized communities to benefit from electricity by establishing enterprises and income generating activities.

RERL is working at different levels with various stakeholders to enhance capacities to develop and manage RE systems. From design and installation to operation and management of systems are covered. Besides, RERL is also supporting to develop capacity of AEPC and other governmental organization to promote sustainable RE systems.

#### **4. PROGRAMMATIC REVISIONS**

The major earthquake of April 25 and hundreds of aftershocks have caused large scale destruction in 14 districts of central Nepal. More than 8,700 lives were lost and over 700,000 private buildings and 6,000 public buildings were either totally destroyed or suffered major damages. The Government of Nepal, development partners, civil society, NGOs and volunteers are all working in the relief and rehabilitation. Alternative Energy Promotion Centre (AEPC) has developed a Relief and Rehabilitation Package of renewable energy solutions for the affected communities and individuals. For immediate relief, AEPC has focused mainly on small solar PV systems and improved cooking stoves (ICS). AEPC aims to provide solar home systems or solar lanterns to 500,000 households and ICS to 400,000 households. UNDP-GEF RERL project is supporting AEPC in this endeavor. To complement AEPC's support, RERL has prepared relief and rehabilitation package worth USD 1 M. With the consent of UNDP and GEF, USD 1 M allocated by GEF has been reallocated for relief and rehabilitation. Though this will not affect the physical target of RERL, it changes the implementation modality. With the national scale of destruction left behind by the natural disaster, the affected communities are not in a position to contribute to the relief and rehabilitation efforts while the private sector is not willing to invest in poor areas thus the support under relief and rehabilitation will be through grants and not market led modality. The need for immediate relief and rehabilitation to reduce the sufferings of the already affected communities primarily due to the monsoon soon after the earthquake and also the harsh winter to follow shortly required some quick actions and change of modality of implementation urgently. This would ensure that the affected communities get what is urgently required in quick time and reducing formalities at this grave urgency.

## 5. NARRATIVE ON KEY RESULTS ACHIEVED IN 2015

Table 1: Outcome and Output Statements

Outcome Statement	Output Statement
<b>UNDAF/CPAP Outcome 2: Vulnerable groups have improved access to economic opportunities and adequate social protection</b>	<b>UNDAF/CPAP Output 2.4: Vulnerable groups have increased access to sustainable productive assets and environmental services</b>  <b>UNDP Output 2.4.1. AEPC's capacity enhanced for scaling up energy services in the rural areas</b>
<b>Project Outcome 1: Strengthened legal, institutional and policy environment to support RE and other low - carbon technology development and utilization</b>	Output 1.1: Approved and enforced policy that enables PPP model for mini hydro and large scale solar PV development, including fiscal incentives and sustainability for possible changes in Nepal government structure
	Output 1.2: Methodology and database developed and made available for incorporating mini hydro and large scale solar PV systems into district RE plans
	Output 1.3: Completed training and awareness programme for relevant government agencies and stakeholders on mini hydro and large scale solar PV systems development and productive end use
<b>Project Outcome 2: Increased investment in RE</b>	Output 2a.1: Commissioned mini hydro demonstration projects totaling 1 MW through PPP model
	Output 2a.2: Commissioned mini grid demonstration projects totaling 300 kW
	Output 2a.3: Commissioned large scale solar PV demonstration projects totaling 500 kW
	Output 2b.1: Demonstrated PPP models facilitating cooperation between private sector public sector, and local organizations through establishment of Special Purpose Vehicles (SPV) in three selected mini hydro project (1MW)
	Output 2b.2: Demonstration financially sustainable and reliable mini grid connecting 10 micro hydro system (300 kW)
	Output 2b.3: Demonstration financially sustainable and reliable large scale solar PV system (300 kW)
	Output 2b.4: Operationalized 2 MW of off- grid large micro hydro (over 60 kW) power projects demonstrating cost advantage feasibility, productive end use, and best practice through technical assistance
	Output 2b.5: Completed financial closure of 7 MW of off-grid mini-hydro power projects replicating PPP model through establishment of SPVs, demonstrating cost-advantage, feasibility, productive end-uses, and best practice through technical assistance
	Output 2b.6: Completed financial closure of 2 MW of large scale solar PV systems, demonstrating cost advantage over smaller PV systems, feasibility, productive end-uses, and best practice through technical assistance

<b>Project Outcome 3a: Improved availability of financial investment supports for rural RE and other low-carbon technology applications</b>	Output 3a.1: Established a wholesale financing instrument to incentivize Banking and Financial Institutions (BFIs) for financing domestic manufacturers to meet growing orders and be cost competitive
	Output 3a.2: Established a wholesale financing instrument to incentivize Banking and Financial Institutions (BFIs) to promote commercial financing for mini-hydro and large-scale solar PV projects
<b>Project Outcome 3b: Improved design and packaging of investment support mechanisms for rural RE and other low-carbon technology applications</b>	Output 3b.1: Designed and provided technical support for financing platforms and services for promoting commercial financing for domestic manufacturers
	Output 3b.2: Designed and provided technical support for financing platforms and services for promoting commercial financing for mini-hydro and large-scale solar PV projects
	Output 3b.3: Developed training materials on mini-hydro and large-scale solar PV projects for financing institutions
	Output 3b.4: Created matchmaking platform for mini-hydro and large-scale solar PV developers, financing institutions, and equity investors, and productive end users
	Output 3b.5: Functional enterprises adopting productive use of electricity
	Output 3b.6: Operationalized mechanism to promote financial products for entrepreneurs/end users
	Output 3b.7: Ensured women and marginalized/vulnerable groups own 33% of the functional electricity based enterprises established
<b>Project Outcome 4: Enhanced capacities and skill of various stakeholders in the RE sector</b>	Output 4.1: Established database of technical specifications for the design, manufacture for micro hydro (60+ kW) and mini hydro, installation and after sales service in micro hydro (60+ kW) and large scale solar PV systems
	Output 4.2: Fully trained skilled and technically capable people available for project identification, feasibility studies and detail design of mini hydro projects
	Output 4.3: Fully trained skilled and technically capable mini hydro manufacturers in identified areas and their after sales services
	Output 4.4: Fully trained skilled and technically capable construction and installation teams within companies to improve quality of installed mini hydro projects and large solar PV system
	Output 4.5: Fully trained skilled and technically capable people available for operation, maintenance and business management of mini hydro projects and large scale solar PV systems

## 5.1 Progress towards the UNDAF/CPAP Outcomes

Table 2: Progress on Outcome Indicators

Outcome statement	Outcome indicator	Baseline	Cumulative Target for 2013 - 2017	Total target achieved till 2014	Milestone for 2015, if any	Achievement 2015	Year for the latest data	Source of data
Outcome 2 : Vulnerable group have increased access to economic opportunities and adequate social protection								
Output 2.4 Vulnerable group have increased access to economic opportunities and adequate social protection	# of households benefited from energy services	59,172 households	25,000 additional HHs connected to energy services	21,000 HHs connected to energy services	10 kW solar PV systems installed; Detail Feasibility Study of 1 MW of mini hydro completed; 3,000 additional household connected to energy services	Electricity access has been provided to 3,581 HHs. Out of these, 1,776 directly by RERL and 1,805 by NRREP with RERL TA. )  41 kW large solar PV Systems installed (8 kW directly by RERL under relief and rehabilitation with GEF funding, 18 kW with UNESCAP and 15 kW with GoN funding); Detail Feasibility of 5 MW mini hydro completed	2015	UNDP Nepal Country Programme Action Plan
Output 2.4 AEPC's capacity enhanced for scaling up energy services in the rural areas	Comprehensive Renewable Energy Policy/Act formulated	Rural Energy Policy 2006	UNDP provided technical support to Government's Alternative Energy Promotion Centre in drafting a Renewable	Initial Renewable Energy Policy drafted	Renewable Energy Policy document finalized	RE Subsidy policy submitted to government	2015	UNDP Nepal Country Programme Action Plan

			Energy Policy, which is currently under review					
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### **Progress towards Outcome 1: Strengthened legal, institutional and policy environment to support RE and other low – carbon technology development and utilization**

This outcome focuses on formulation of appropriate policies to encourage promotion of renewable energy in the country. RERL supported extensively in preparing draft revision of RE subsidy policy that has been submitted to GoN for approval. Some of the main barriers in development of mini hydro in Nepal include provision of the government subsidy for plants of less than 100 kW capacity for a long period though it was changed recently. Many sites where more than 100 kW could have been generated were limited to 100kW to be eligible for subsidy. The new draft policy attempts to transform the RE sector from a subsidy driven approach to a market based one and encourages private sector participation. .

Besides, RERL is also working with AEPC to prepare technical standards for grid connection of micro/mini hydro and Solar PV systems. The Technical Standard for micro hydro connection has been approved by Nepal Electricity Authority (NEA) Board. The draft technical specification for grid connection of solar PV has been shared with NEA, the sole national utility for transmission and distribution of electricity. It has finally recognized the need and feasibility of grid connection potentials of RE systems. This is an important milestone in the RE sector that ensures that projects could be more attractive once the grid reaches the project sites and also removes one of the major barriers for wide scale RE promotion in Nepal. RERL is also working closely with AEPC to prepare Renewable Energy Policy that will open up grid connection of small scale RE in the country.

RERL is working with government agencies, including AEPC to help build their capacity in relation to development of mini hydro and large solar PV systems RERL supported DDC Gorkha to prepare District Electrification Master Plan (DEMP) which identifies areas to be electrified by extension of the grid, mini/micro hydro and solar PV systems. It is expected that this document will not only help the DDC to prepare its future plans and allocate resources but also avoid duplication of works supported by AEPC and NEA.

RERL has organized training/orientation on mini hydro and large solar PV for AEPC professionals and DDC engineers. Likewise, to coordinate activities related to productive energy uses with the government's regular programs, district officials of Cottage and Small Industries Development Board were provided orientation on AEPC's processes to access subsidy and other supports.

### **Progress on Output 1.1: Approved and enforced policy that enables PPP model for mini hydro and large scale solar PV development, including fiscal incentives and sustainability for possible changes in Nepal government structure**

RERL prepared **Public Private Partnership Framework and Guidelines** for mini hydro promotion in Nepal which includes formation of a legal entity, Special Purpose Vehicle (SPV), as an essential institutional arrangement for promoting PPP in RE sector. The SPV owns and operates the system jointly by entities within the public and private sectors. This document was widely circulated within AEPC and a workshop was organized to finalize the guidelines.

As the RE subsidy policy of the GoN doesnot clearly spell out support for the private developers of renewable energy systems, **draft revision of the Renewable Energy Subsidy Policy 2015** has been prepared and submitted to the line Ministry after extensive consultations within AEPC, Development

Partners (DPs), concerned government agencies and private sector. The new draft policy encourages private participation and PPP model in the RE sector. It also goes beyond the current practice of providing subsidy for equipment and includes provision for subsidizing services.

RERL worked with Community Electrification Sub Component (CESC) and Regional Centre for Excellence in Micro Hydro (RCEMH) of AEPC to prepare and finalize technical specifications for **interconnection of MHP with the national electricity grid**. The document was discussed extensively with NEA engineers. The specifications were adopted by the NEA board paving way for grid connection of MHP. Two MHPs have been identified for grid connection and are at the stage of Power Purchase Agreement (PPA) negotiation with NEA. These two MHPs are 23 kW Sauryabhum, Nuwakot and 40 kW Leguwa Khola, Dhankuta. Both these plants were installed by the communities with AEPC support and faced problems as the grid reached their catchment areas within a short period of completion.

Likewise, to promote roof top solar, RERL with the Solar Energy Sub-Component (SESC) of AEPC has prepared the draft technical specification, which will be discussed with NEA for grid interconnection in 2016. To promote rooftop solar energy at the household level as well as to minimize the load on the grid, RERL supported AEPC to develop an android-based mobile application to calculate cost of solar systems in the easiest manner. There has been 2,167 number of downloads of this application, and with the fuel crisis more urban households are interested on rooftop solar systems as an alternative energy service.

RERL supported AEPC to develop concept notes on alleviating energy crisis faced by the country. Different **innovative technologies** particularly on Solar PV systems have been proposed to the Government not only to address the present crisis but also to diversify the energy mix of the country and ensure energy security. To promote public awareness on renewable energy, RERL is planning to support AEPC to organize RE Exhibition in January 2016.

**Progress on Output 1.2:** Methodology and database developed and made available for incorporating mini hydro and large scale solar PV systems into district RE plans

RERL has prepared the **District Electrification Master Plan (DEMP)** of Gorkha district. RERL will facilitate and support other 10 DDCs to prepare such plans in 2016 based on this pilot activity. This integrated plan will help the DDCs in planning rural electrification projects including grid extension, mini/micro hydro, solar mini grid and SHS in close collaborations with NEA so as to implement off-grid and on-grid projects such that all households have access to electricity while avoiding duplication.

**Progress on Output 1.3:** Completed training and awareness programmes for relevant government agencies and stakeholders on mini hydro and large scale solar PV systems development and productive end use

RERL has prepared Mini Hydro Detailed Feasibility Study (DFS) guidelines and organized training for engineers from AEPC/NRREP/RERL, District Development Committees (DDC) and Regional Service Centers (RSC). Similarly, RERL organized a training on designing large solar PV systems for private sector and DDC engineers.

RERL supported to conduct training on **Business Management and Counselling Training** for 20 Cottage Small Industry Development Board (CSIDB) staff. The training covered legal registration process, integrated business management concept, AEPC/NRREP/PEUC working guidelines and subsidy for productive energy uses.



## Progress towards Outcome 2: Increased investment in RE

**Outcome 2:** This outcome deals with increased investment in RE by provision of financing mechanisms and demonstration of technically sound and financially viable mini hydro, mini grid, large solar PV and large micro hydro projects. RERL is working with Central Renewable Energy Fund (CREF) of AEPC to establish financing mechanism to initially support demonstration projects. A credit mechanism for financing mini hydro demonstration projects and vendor financing mechanism for small solar PV pumping for irrigation have been established. It is expected that more fund will be available through these mechanisms to upscale RE in Nepal in future.

To identify best projects for demonstration, RERL has undertaken detailed feasibility study of 5 mini hydropower and 9 micro hydropower projects. The most suitable sites will be developed as demonstrations and the rest will be promoted later through NRREP.

In relation to promotion of solar PV systems, RERL has prepared the concept on promotion of solar mini grid for AEPC/NRREP. Furthermore, RERL worked with a private company to identify more than 100 solar mini grid sites using GIS and undertaken detailed feasibility studies of mini grid, solar pumping and institutions to promote as demonstration projects. RERL is working together with AEPC to develop large solar PV mini grids with funding from different sources. The 18 kW solar mini grid servicing 140 households was installed at Dubung of Tanahun district. This system is the first of its kind in Nepal where the community and a private company formed a Special Purpose Vehicle (SPV) to develop and manage the system. AEPC and UNESCAP worked together under Pro Poor Public Private Partnership model to develop Dubung Solar Mini Grid. RERL is supporting the SPV for institutionalization and promotion of productive energy uses to increase revenue generation. Likewise, RERL is working with AEPC to institutionalize the operation and management of the 25 kW solar-wind hybrid system in Bhorleni of Makwanpur developed with the Government of Nepal's funding.

### Progress on Output 2a: Commissioned mini hydro demonstration projects totalling 1MW through PPP model

RERL is working with CREF to identify and establish innovative financing mechanisms to encourage Banking and Financial Institutions (BFI) lending in RE projects. Discussions were held with banks and financial institutions on perceived risks in lending to communities in rural areas for renewable energy projects. One of the key issues raised by BFIs is the uncertainty in recovery of loans in rural areas and thus the requirement for credit guarantee mechanism. Another strongly recommended areas was soft loan that could be recovered more easily. In this regard, RERL is supporting CREF to establish financing mechanism to attract private investment in mini hydro and Solar PV projects. The financial support of USD 200,000 provided by RERL to CREF will be utilized to develop mini hydro demonstration projects. Likewise, RERL provided USD 3000 to CREF to establish a credit guarantee mechanism to promote small scale solar PV pumping for irrigation.

### Progress on Output 2b.1: Demonstrated PPP models facilitating cooperation between sector, public sector, and organizations through establishment of Special Purpose Vehicles (SPV) in three selected mini hydro projects (1 MW)

In order to meet the objective of RERL to demonstrate 1 MW mini hydro projects through PPP modality, RERL supported AEPC/NRREP to carry out detailed feasibility study (DFS) of 5 proposed mini hydropower projects in Solukhumbu, Baglung, Taplejung and Panchthar districts. RERL provided technical assistance to carry out DFS of 2 mini hydropower projects in Rukum district to South Asia Sustainable Economic Cooperation (SASEC) programme of the Asian Development Bank (ADB) under AEPC. All three

programme/projects – NRREP, SASEC and RERL - involved in mini hydro development are working closely to identify best projects for development.

In order to demonstrate PPP model through establishment of SPV, RERL is supporting the community of 398 kW Tara Khola and 360 kW Phawa Khola Mini Hydropower Project to establish SPV and prepare detailed business plan for accessing bank loans. RERL organized interactions between local communities and the CREF Partner Banks to encourage bank financing of Tara Khola, Tap Khola and Giri Khola Mini Hydro projects. However, the financial closure of these projects could not be achieved as the revised RE Subsidy Policy has not been endorsed by the cabinet yet.

RERL is working closely with CREF to develop project concepts and collect necessary documents to present them at the Investors Forum scheduled for March 2016 seeking private developers and investments. Two RERL identified projects; Phawa Khola and Manjo Khola will be presented at the forum.

### **Progress on Output 2b.2:** Demonstrated a financially sustainable and reliable mini grid connecting 300 kW micro hydro systems

RERL is working with District Development Committee Taplejung, Taplejung Electricity Users' Committee and Micro Hydro Functional Groups to develop Taplejung Mini Grid to pool electricity from 8 MHPs to supply to the district headquarters. The project is being developed with the financial assistance of the World Bank under the Kabeli Transmission Project and RERL is providing technical assistance to complete the project in 2016. Furthermore, the transmission system developed under the mini grid will also be utilized by Phawa Khola Mini Hydro to evacuate its power.

RERL with the aim to promote sustainable and reliable mini-grid projects supported NRREP and Regional Centre for Excellence in Micro Hydro (RCEMH) of AEPC to successfully complete the Interconnected Mini-Grids for Intensive Rural Electrification in Nepal (IMIREN) Mini Grid Project in Gulmi district interconnecting 2 micro hydropower plants supported by AEPC -Paropakar Cooperative MHP (135 kW) and Daram Khola MHP (83 kW). With the total installed capacity of 218 kW, the mini grid is benefiting more than 2,300 HHs. With the completion of the project, the community has been using reliable and better quality electricity.



RERL also supported the community of Baglung Mini Grid to revive their mini grid project which was developed with REDP/UNDP funding. The mini grid had faced technical problems due to lightning and the micro hydropower plants were all operating in isolated mode. Now, the system is operating in parallel mode with all 6 MHPs on-line. RERL also plans to support the community for interconnection of the mini grid with the national grid. With the financial support of Clean Start project of United Nations Country Development Framework (UNCDF), RERL is working with the communities to strengthen capacity of the Baglung Mini Grid Cooperative to evolve as a micro-finance institution (MFI) dedicated towards promotion of productive energy uses.

With regards to efforts for grid connection of micro hydro projects, RERL supported the local fabrication of digital electronic load controller that is an essential component for grid connection. RERL is supporting communities of Leguwa Khola MHP, Dhankuta and Syaurebhumi MHP, Nuwakot to interconnect their MHPs with the national grid. Draft Power Purchase Agreements have been prepared and NEA Board approval is awaited before the implementation works commence.

**Progress on Output 2b.3:** Demonstrated financially sustainable and reliable large scale solar PV systems and support and support to install solar PV systems under relief and rehabilitation due to earthquakes (500 kW total)

RERL helped prepare the concept of solar mini grid, which is a centralized system providing electricity access to nearby houses. RERL hired a local company to identify 100 potential mini grid sites using GIS. Later, detailed feasibility studies carried out in 30 sites in Dang, Sindhuli, Baitadi, Kalikot, Tanahun, Sarlahi, Siraha, Surkhet, Morang and Panchthar districts. These projects will generate 26.4 kWp and are expected to benefit 240 HHs and 8 enterprises. To develop these projects RERL has shared the studies with SASEC for financial assistance. On the other hand, RERL is working with DDC Siraha to mobilize communities of Pipra VDC to install a solar mini grid system. The identified beneficiaries belong to the Musahar community, one of the most marginalized groups in Nepal. The community people are very poor and cannot come up with the upfront cost of the solar PV system and are hard pressed to pay their month tariff. A package with soft loan and livelihood promotion activities will be developed to help the poorest people.

RERL is also working closely with another AEPC project funded by United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) under Pro Poor Public Private Partnership (5P) in Tanahun and Makwanpur districts. This system has been developed under PPP model; a private company and electricity users have formed a SPV to install and operate the system. A 18 kWp solar mini grid system has been installed in Baidi, Tanahun district under this project and RERL is providing technical assistance to mobilize the communities and promote productive energy uses. The demonstration of solar PV mini grid is expected to help promote this less disseminated technology in Nepal. Likewise, RERL is supporting 5P in Makwanpur district to form institutions to develop solar pumping systems to irrigate land to cultivate vegetables.

A 25 kW solar wind hybrid system has been installed by AEPC in Bhorleni, Makwanpur. RERL is providing TA and helping in forming suitable institution as well as developing capacities for operation and management.

Solar PV pumping for irrigation has not been supported by AEPC so far. AEPC's focus has been on promotion of pumping systems for drinking water only. RERL is working closely with SESC of AEPC to demonstrate solar pumping for irrigation. If high value crops production is incorporated with solar pumping, a sustainable and clean system could be developed to bring large scale impact on livelihoods of the rural people. RERL is working with DDCs of Makwanpur and Dhading to demonstrate such systems. RERL has also carried out studies in Siraha and Saptari districts to identify potential sites for lift irrigation. Furthermore, RERL has supported 5 household size solar lift irrigation projects in Chitwan district through vendor financing and credit guarantee mechanisms.

One of major challenges faced by the beneficiaries of RE systems is timely collection of revenue. To mitigate this situation, RERL is working with AEPC/NRREP to locally fabricate pre-paid energy meter. Institute of Engineering (IOE) under Tribhuvan University has developed a user friendly, robust and low cost pre-paid meter. Two such meters have been installed at Malekhu I MHP, Dhading for field testing which have been found to be reliable and sturdy. RERL has plans to support AEPC to promote this technology in RE catchment areas. It is expected that installation of such meters will help reduce the cost of tariff collection and prevent non-payments.

**Relief and Rehabilitation:** In order to revive and rehabilitate solar PV pumping systems (PVPS) damaged by the major earthquake, RERL has supported NRREP to carry out rapid assessment of the damages in 42 PVPS projects that provide drinking water 2,500 HHs AEPC plans to rehabilitate these projects with technical assistance of RERL and financial assistance of KfW, Germany. The rehabilitation activities will be carried out in 2016.

Under the relief and rehabilitation activities, RERL has supported to install 41 solar PV systems with the total installed capacity of 15.8 kW in public buildings like DDC, VDC and Municipality Offices, Health Posts, Temporary Learning Centers and Schools.

**Progress on Output 2b.4:** Operationalized 2 MW of off-grid large micro-hydro (over 60 kW) power projects demonstrating cost-advantage, feasibility, productive end-uses, and best practice through technical assistance and rehabilitation of MHP damaged by earthquakes

RERL supported NRREP to undertake DFS of 9 MHPs with the total capacity of 785 kW. These projects will be developed by NRREP.

Relief and Rehabilitation: As discussed above, the budget allocated for this output has been reallocated for rehabilitation of micro hydropower plants. RERL has completed rapid assessment of 140 micro hydro sites damaged by the major earthquakes of 2015. 31MHPs in Gorkha, Dhading, Dolakha and Sindhupalchowk districts, with the total generating capacity of 755 kW and benefiting more than 7,500 HHs have been selected for immediate rehabilitation. RERL is working with DDC to support the beneficiary communities to rehabilitate their micro hydropower plants and bring them back to operation as soon as possible.

**Progress on Output 2b.5:** Completed financial closure of 7 MW of off-grid mini-hydro power projects replicating PPP model through establishment of SPVs, demonstrating cost advantage, feasibility, productive end-uses, and best practice through technical assistance

RERL has carried out detailed feasibility study of 5 mini hydro projects totaling 1,512 kW. Projects totaling 1 MW will be developed as demonstration and the rest will be provided to AEPC for development. As financial closure of none of the projects has been achieved so far, demonstration projects have not been identified.

**Progress towards Outcome 3:** Improved design and packaging of investment support mechanisms for rural RE and other low-carbon technology applications

The main activities to improve investment support for RE and low carbon technologies includes identification of innovative financing mechanisms, instrument and other supports. RERL has supported CREF in identifying gaps in investment in RE systems development in the country, designing and development of financial instruments such as soft credit, credit guarantee and credit insurance for promoting commercial financing to project developers and local suppliers/fabricators through CREF partner banks. It is expected that implementation of such instruments would attract banks and financial institutions to lend to the developers and local manufactures/suppliers as their risks would be significantly taken care of.

RERL is closely working with the Productive Energy Use Component of AEPC/NRREP to develop mechanisms and formats to support potential enterprises and income generating activities (IGA) in RE catchment areas so that the financial attractiveness of projects is enhanced and more developers will be interested to fund large RE projects. This would not only enhance the financial sustainability of RE investment by increasing utilization of electricity and thereby revenue from the projects but also help enhance rural livelihoods. The productive energy use is strongly linked with supportive tariff systems that would provide good opportunity to promote gender sensitization and inclusion of marginalized communities at all stages of enabling environment of productive use through enterprises.

**Progress on Output 3b.1 and 3b.2:** Designed and provided technical support for financing platforms and services for promoting commercial financing for domestic manufacturers and mini hydro and large solar PV projects

RERL reviewed existing challenges in RE financing and development of viable mechanisms to address them so that the BFIs are willing to finance RE projects on commercial basis. High upfront cost of renewable energy applications and relative poverty of rural households has led to a gap in their ability to afford clean energy technologies. Financing for RE has evolved as one of the major opportunities to bridge such financing gaps. Despite having such opportunities, only few BFIs have been able to finance very small amount in RE sector. The main underlining challenges of low amount of lending are due to remoteness, high loan administration cost, and especially poor revenue from the operation of small scale RE systems which cannot serve the bank loan. RERL has supported CREF to develop various financial instruments such as credit guarantee mechanism and loan insurance that can attract BFIs in commercially financing in this sector and also to develop financing mechanisms to support the manufactures of mini hydro and large solar PV system equipment.

RERL is further working with CREF to establish vendor financing mechanism for small PVPS. To encourage private companies to engage in promoting such technologies, a credit guarantee mechanism has also been established with CREF. RERL is providing financial and technical assistance to CREF in this regards.

**Progress on Output 3b.3:** Developed training materials on mini-hydro and large-scale solar PV projects for financing institutions

RERL and CREF are working together to develop training materials to provide orientation to BFIs on mini hydro, large micro hydro, mini grid and large solar PV systems. The training will be carried out in the first quarter of 2016.

**Output 3b.4:** Created matchmaking platform for mini-hydro and large-scale solar PV developers, financing institutions, and equity investors, and productive end users

RERL is working with AEPC, CREF, RE Source, Winrock and ADB to organize an Investor's Forum to attract private fund for developing RE projects mainly mini hydro, large micro hydro and large solar PV systems. The forum could not be organized in 2015 due to the earthquakes and the fallout from energy crisis. It is scheduled for March 2016.

**Progress on Output 3b.5:** Functional enterprises adopting productive use of electricity

It has been observed that many micro hydropower plants are not used as to their capacity. Communities in many places take micro hydro as a social enterprise and limit the use of electricity to domestic purposes only. Thus, RERL is working with PEUC of NRREP/AEPC to develop a modality and guidelines for commercial operation of community owned and managed micro hydropower plants. The 83 kW Darna MHP in Achham district has been identified as the most suitable one to pilot this modality. RERL is working with PEUC to help the communities of Darna to carry out public audit, develop power export agreement and build their capacity to operate their micro hydro on commercial basis rather than just a social enterprise.

Another area where RERL is working to promote productive energy uses includes development, testing and promotion of appropriate technologies for fuel switching from traditional biomass to electricity. In this regard, RERL is working on modification and adaptation of end use technologies to address the needs of rural Nepal. In 2015, RERL worked with PEUC for modification of equipment related to khuwa making,



lokta boiling and sisno drying for fuel switching to electricity instead of firewood. These technologies were selected as there is very high demand from entrepreneurs in micro hydro catchment areas.

RERL is supporting AEPC and UNESCAP to promote productive energy uses in the Dubung Solar Mini Grid Project, Tanahun. In this regard, Business Opportunity Assessment (BoA) was carried out to identify potential MSMEs. Likewise, RERL also supported AEPC to identify potential enterprises and income generating activities (IGA) in catchment areas of solar and wind hybrid electrification system in Bhorleni VDC, Makwanpur. RERL is also helping the local community to establish a cooperative to manage the system.

There are hundreds of micro hydro powered agro-processing plants mainly for grinding cereals, de-husking rice and oil expelling. However, the equipment used is not standardized and AEPC is planning to standardize both equipment and services. RERL and PEUC of NRREP are developing technical standards for agro processing equipment. .

RERL supported PEUC to develop video documentary on MSMEs promotion in RE catchment areas. The documentary features different types of productive end-uses promoted by AEPC, impacts on rural livelihood, enterprise development and the processes for AEPC support.

RERL has undertaken detailed feasibility study of 9 potential Lift Irrigation systems in Achham, Rukum and Dhading districts, 5 of these projects in Dhading are being developed with Every Drop Matters (EDM) project of UNDP and Coca Cola Foundation. One micro hydro operated lift irrigation projects supported by EDM are completed and the rest are ongoing. AEPC is planning to sign MoU with the Department of Irrigation to develop the remaining 4 projects.

In 2015, Productive Energy Use Component of NRREP/AEPC supported rural entrepreneurs to establish **657 MSMEs**; RERL provided direct assistance to establish 193 of these, mainly in the Western. 1,796 people are employed by the 657 enterprises, of which 503 are male owned and **154 female owned**.

#### **Progress on Output 3b.6:** Operationalized mechanism to promote financial products for entrepreneurs/end users

RERL is supporting Baglung Mini Grid Cooperative to strengthen its capacity to work as a lending agency to promote productive energy uses in its catchment area. UNCDF has provided financial assistance through its Clean Start Project to undertake activities related to this output. The performance of the cooperative in managing the mini grid will be assessed and a suitable mechanism and necessary capacity development activities will be identified.

#### **Progress on Output 3b.7:** Ensured women and marginalized/vulnerable groups own 33% of the functional electricity based enterprises established

In 2015, RERL supported in training women entrepreneurs on enterprise management. 43 women from Western Development Region and Eastern Development Region participated in the training program. The trained women entrepreneurs have been maintaining accounts and transactions details in a proper manner after the trainings.

Likewise, RERL also supported in providing skill based training to rural entrepreneurs from MHP catchment areas on bakery, computer, tailoring, etc. All together 74 women and 80 men benefited from these training activities. After getting training, they are able to develop the product diversification, improved the product quality, reduce the cost of production and to cater better services.



Some communities in rural areas are so marginalized that they cannot even pay for electricity nor start their own businesses. For such communities, AEPC provides additional financial support to engage in income generating activities. RERL is working with PEUC in some areas to support promotion of income generating activities. In 2015, 1,078 IGA were supported by RERL.

#### **Progress towards Outcome 4: Enhanced capacities and skill of various stakeholders in the RE sector**

Development and sustainable operation of less disseminated RE technologies such as mini hydro, large micro hydro and large solar PV systems requires capacity development at different levels. Capacity of engineers to survey and design such systems, preparation of manuals and guidelines for standard procedures, local fabrication of equipment and installation and operation of projects are areas that need to be strengthened. RERL is working towards developing capacity of various stakeholders. Training programs were organized to enhance capacities of stakeholders so that the project preparation, development, implementation and operation and monitoring and quality assurance costs are reduced and sustainability is ensured.

RERL undertook a gap analysis to identify bottlenecks in local fabrication of equipment for mini hydro. RERL has also supported in development of manuals/guidelines such as MSME development, Large Solar PV Design, selection, installation and operation of agro-processing mills, power output verification, etc. Another area where RERL has actively contributed is in enhancing AEPC's monitoring and quality assurance capacity.

#### **Progress on Output 4.1: Established database of technical specifications for the design, manufacture for micro hydro (60+ kW) and mini hydro, installation and after sales service in micro hydro (60+ kW) and large scale solar PV systems**

Gap Analysis on Mini Hydro survey, design, fabrication, installation and after sales services has been completed. This document helps to prepare a road map for government support to the private sector for mini hydro development.

RERL supported Monitoring and Quality Assurance Unit (MQAU) of AEPC/NRREP to develop **quality assurance mechanism for monitoring mini hydro and large solar PV systems**. The newly developed mechanism has been discussed with AEPC/NRREP sub/components and will be implemented by MQAU. It will help to ensure total quality assurance of RE systems developed with AEPC support.

RERL has prepared **sustainability framework for micro hydro** in consultation with MQAU. The framework identified all relevant dimensions for sustainability, measurable indicators, software to record and analyze and make evidence based decisions. Recently, the framework was pre-tested in Pinthali, Kavre which showed promising results. RERL is also supporting AEPC/NRREP to update pico/micro/mini hydro power output verification guidelines.

**Remote monitoring and control system for large solar PV** has been designed and assembled. This will allow agencies such as subsidy providers, ESPs and local governments to access real time data and monitor the performance of the projects. RERL has supported PEUC to develop Web based monitoring system and trained staff of Regional Service Centers.

#### **Progress on Output 4.2: Fully trained skilled and technically capable people available for project identification, feasibility studies and detailed design of mini-hydro and large-scale solar PV systems**

RERL worked with Water and Energy Consultant of Nepal (WECAN) to train engineers on DFS of mini hydropower projects. 40 engineers from different private companies participated in the training. The training will help engineers to prepare documents following the guidelines prepared by RERL/AEPC.

**Progress on Output 4.3:** Fully trained skilled and technically capable mini hydro manufacturers in identified areas and their after-sales services

RERL supported Monitoring Unit of AEPC to update Power Output Verification Guidelines. The updated guidelines will be useful for mini hydro as well. In the previous version, there is no provisions/guidelines to measure power output from more than 100 kW plants. RERL is also planning to support the monitoring unit of AEPC/NRREP to organize training for engineers to use the guidelines in 2016.

**Progress on Output 4.4:** Fully trained skilled and technically capable construction and installation teams within companies to improve quality of installed mini-hydro projects and large solar PV system

A training programme was organized for private companies involved in micro hydro development on installation. 20 technicians from different companies participated in the training. It is expected that this will support in standardization of MH installation.

**Output 4.5:** Fully trained, skilled and technically capable people available for operation, maintenance and business management of mini-hydro projects and large scale solar PV systems

In 2015, RERL worked with AEPC and Practical Action to provide training of trainers to selected MHP operators with the objective of using them later to train other MHP operators. It is expected that if MHP operators are involved in training other operators the cost of MH operators' will go down and more practical hand-on knowledge will be imparted.

## 5.2 Progress on Project Outputs

Table 3: Progress on Output Indicators

Output statement	Output indicator	Baseline	Cumulative Target for 2013 - 2017	Progress up to 2014	2015 Milestone	2015 Progress	Cumulative progress up to 2015	Means of verification
Output 1.1: Approved and enforced policy that enables PPP model for mini hydro and large scale solar PV development, including fiscal incentives and sustainability for possible changes in Nepal government structure	Policy document on RE is in place	Rural Energy Policy 2006	RE Policy, GESI sensitive subsidy policy, subsidy delivery mechanism and draft RE Act submitted to GoN	-Supported AEPC to initiate RE subsidy policy revision - Draft Technical Standard for interconnection of MHP with the grid prepared	- Finalize RE subsidy policy - Prepare draft Technical Specification for Micro and Solar PV interconnection with the grid	- RE Subsidy policy revision submitted to government - NEA Board approved Technical Standard for interconnection of MHP with the grid - Documents for Power Purchase Agreement between NEA and 2 MHP submitted to NEA - Draft Technical Standard for interconnection of solar PV with grid prepared - Prepared concept documents to address	- RE Subsidy policy revision submitted to government - NEA Board approved Technical Standard for interconnection of MHP with the grid - Documents for Power Purchase Agreement between NEA and 2 MHP submitted to NEA - Draft Technical Standard for interconnection of solar PV with grid prepared - Prepared concept documents to address	Policy document

						to address energy crisis resulting from border blockade prepared and submitted to the GoN	energy crisis resulting from border blockade prepared and submitted to the GoN	
Output 1.2: Methodology and database developed and made available for incorporating mini hydro and large scale solar PV systems into district RE plans	No. of integrated district RE plans prepared	NA	District Renewable Energy Master Plan (DREMP) prepared for 15 DDCs	-ToR prepared -Contract awarded - Methodology finalized	DREMP for 1 districts	District Rural Electrification Master Plan completed for Gorkha district	District Rural Electrification Master Plan completed for Gorkha district	DREMP Report
Output 1.3: Completed training and awareness programs for relevant government agencies and stakeholders on mini-hydro and large-scale solar PV systems development and on productive end uses	No. of trainings conducted	NA	3 case studies prepared and 6 trainings conducted	- 2Training on productive energy use for Cottage and Small Industries Development Board - 1 orientation to DEECCS on RERL, Mini Hydro & Large Solar PV	1 case study on grid-connected solar mini-grid and 5 trainings / workshops	- Large Scale Solar PV Case Study completed - 1 training on design of large SPV for DEECCS - Preparation for Exhibition to create awareness on RE technologies - 1 Training on DFS of Mini Hydro and 1 training on GIS for AEPC completed	- Large Scale Solar PV Case Study completed - 1 training on design of large SPV for DEECCS - Preparation for Exhibition to create awareness on RE technologies - 1 Training on DFS of Mini Hydro and 1 training on GIS for AEPC completed	Case study and training reports, participants list

Output 2a.1 : Commissioned mini-hydro demonstration projects totaling 1 MW through PPP model	No. of mini hydro demonstration projects commissioned	NA	1 mini hydro project initiated	NA	Fund transfer to CREF	RERL is supporting CREF banks for financial closure	RERL is supporting CREF banks for financial closure	Mini-hydro project commissioned documents
Output 2b.1: Demonstrated PPP models facilitating cooperation between private sector, public sector, and local organizations through establishment of Special Purpose Vehicle (SPV) in three selected mini-hydro projects (1 MW)	No. of projects strengthened	NA	5 institutions strengthened including SPVs	- DFS of 9 mini hydro projects initiated	5 institutions strengthened for SPV	<p>- Guidelines for developing mini hydro under PPP model developed</p> <p>-Initiated financial closure of 2 mini-hydro projects (Tap Khola 2,600 HHs and Giri Khola 2,000 ) totaling 500 kW</p> <p>- Institutional support for 2 SPVs on-going (Phawa Khola, Tara Khola)</p> <p>- DFS of 9 mini hydro with total capacity of 2 MW completed Institutional support for 2 SPVs on-</p>	<p>- Guidelines for developing mini hydro under PPP model developed</p> <p>-Initiated financial closure of 2 mini-hydro projects (Tap Khola 2,600 HHs and Giri Khola 2,000 ) totaling 500 kW</p> <p>- Institutional support for 2 SPVs on-going (Phawa Khola, Tara Khola)</p> <p>- DFS of 9 mini hydro with total capacity of 2 MW completed Institutional support for 2 SPVs on-going (Phawa Khola, Tara</p>	<p>SPV registration certificate and</p> <p>SPV commissioning documents</p>

						going (Phawa Khola, Tara Khola)	Khola)	
Output 2b.2: Demonstrated financially sustainable and reliable mini-grid connecting ten (10) micro-hydro systems (300 kW)	No. of mini-grid and grid connection supported - 1 mini-grid interconnecting 2 MHP with capacity of 218 kW in Gulmi completed - 1 mini grid interconnecting 6 MHP with the capacity 106 kW in Baglung revived - Due deliigence of 1 Mini Grid inteconnecting 8 MHP with the total capapcity of ...kW completed and procurement initiated	NA	1Mini-grid interconnecting 10 MHP with 300 kW capacity	- Support for Gulmi Mini Grid construction and Baglung Mini Grid revival initiated	- 1 mini- grid interconn ecting 2 MHP with capacity of 218 kW in Gulmi complete d - 1 mini grid interconn ecting 6 MHP with the capacity 106 kW in Baglung revived - Due diligence of 1 Mini Grid interconn ecting 8 MHP with the total capacity of 616 kW complete d and procurem ent	1 mini-grid commissione d in Gulmi district benefiting 2,300 HHs  Taplejung Mini Grid Development Functional Group established.  Due diligence of TMG interconnecti ng 7 MHP completed. Bid document is being prepared to procure equipment.	1 mini-grid commissione d in Gulmi district benefiting 2,300 HHs  Taplejung Mini Grid Development Functional Group established.  Due diligence of TMG interconnecti ng 7 MHP completed. Bid document is being prepared to procure equipment.	Mini-grid commission ing documents



Output 2b.3: Demonstrated financially sustainable and reliable large scale solar PV systems (500 kW total)	Support to pilot large scale solar PV systems , Support to install Solar PV systems under relief and rehabilitation	NA	Solar PV systems with the total capacity of 500 kW installed	- 100 sites for solar PV identified using GIS - 1 Android Mobile App developed - 9 DFS of Solar Mini Grid Prepared	initiated - Rapid assessment of 40 Solar Pumping Systems completed	41 kW solar PV Systems installed - 8 kW directly by RERL under relief and rehabilitation - assisted AEPC to develop business plan for 18 kW solar mini grid under 5P - Assisted AEPC to initiate institutionalization of 15 kW Solar and 10 kW Wind Hybrid system in Makwanpur - Rapid assessment of 42 solar pumping systems completed	41 kW solar PV Systems installed - 8 kW directly by RERL under relief and rehabilitation - assisted AEPC to develop business plan for 18 kW solar mini grid under 5P - Assisted AEPC to initiate institutionalization of 15 kW Solar and 10 kW Wind Hybrid system in Makwanpur - Rapid assessment of 42 solar pumping systems completed	SPV registration and commissioning documents, DFS reports
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Output 2b.4: Operationalized 2 MW of off-grid large micro-hydro (over 60 kW) power projects demonstrating cost-advantage, feasibility, productive end-uses, and best practice through technical assistance	Technical assistance for large micro hydro systems and TA and financial assistance to rehabilitate MHPs damaged by earthquakes	Previously installed MHPs	<ul style="list-style-type: none"> <li>- 2 MW MHP installed and rehabilitated</li> <li>- 25,000 households have access to energy</li> </ul>	<ul style="list-style-type: none"> <li>- DFS of 7 MHPs completed</li> <li>- 17 MHPs generating 617 kW &amp; benefitting 6,131 hh installed</li> </ul>	<ul style="list-style-type: none"> <li>- DFS of 2 MHPs completed</li> <li>- Rapid assessment of 100 MHPs completed</li> <li>- Fund for 31 MHP rehabilitation transferred to DEF</li> <li>- 3000 new households have access to electricity</li> </ul>	<ul style="list-style-type: none"> <li>- 2 DFS completed</li> <li>- 3,581 new households (RERL and NRREP) have access to electricity</li> <li>- Rapid assessment of 140 MHP affected by earthquakes completed.</li> <li>- USD 176,493 for rehabilitation of 31 MHPs, 755 kW, 7,500 hh for immediate rehabilitation transferred to DEF</li> </ul>	<ul style="list-style-type: none"> <li>- 2 DFS completed</li> <li>- 3,581 new households (RERL and NRREP) have access to electricity</li> <li>- Rapid assessment of 140 MHP affected by earthquakes completed.</li> <li>- USD 176,493 for rehabilitation of 31 MHPs, 755 kW, 7,500 hh for immediate rehabilitation transferred to DEF</li> </ul>	MHP operation document
Output 2b.5: Completed financial closure of 7 MW of off-grid mini-hydro power projects replicating PPP model through establishment of SPVs, demonstrating cost-advantage, feasibility, productive end-uses, and best practice through technical assistance	DFS of mini hydro	NA	DFS of 1 MW mini hydro completed		Initiate DFS of Mini Hydro	DFS of 5 Mini Hydro Complete benefiting more than 5,000 hhs	DFS of 5 Mini Hydro Complete benefiting more than 5,000 hhs	Bank loan (financial closure) document

Output 3a.1: Established a financing instrument to incentivize Banking and Financing Institutions for financing domestic manufacture		NA			NA	NA	NA	Financing instrument manual
Output 3a.2: Established a financing instrument to incentivize Banking and Financing Institutions to commercial financing for mini hydro and solar PV		NA			NA	NA	NA	Financing instrument manual
Output 3b.1: Designed and provided technical support for financing platforms and services for promoting commercial financing for domestic manufacturers	Design of financial package for domestic manufacturers	NA	1 gap analysis conducted and 1 financial instrument developed	NA	- Prepare TOR for gap analysis and initiated - Financial instrument	- Gap analysis for financing mini/micro hydro and solar PV projects initiated - Financial Instrument is being developed	Gap analysis completed  Financial Instrument is being developed	Gap analysis report
Output 3b.2: Designed and provided technical support for financing platforms and services for promoting commercial financing for mini-hydro and large-scale solar PV projects	Design of commercial financing instruments	NA	2 instruments developed	NA	2 instruments	Gap analysis completed. Financial instruments being developed.  Credit guarantee mechanism for household scale PV pumping	Gap analysis completed. Financial instruments being developed.  Credit guarantee mechanism for household scale PV pumping	A report clearly mentioning the instruments

						(PVPS) systems established at CREF. Under this activity, 5 PVPS are supported in Chitwan district.	(PVPS) systems established at CREF. Under this activity, 5 PVPS are supported in Chitwan district.	
Output 3b.3: Developed training materials on mini-hydro and large-scale solar PV projects for financing institutions	No. of training materials for bankers	NA	1 training material prepared	NA	1 training material	The training material is being prepared	The training material is being prepared	Training manual, training participant list
Output 3b.4: Created matchmaking platform for mini-hydro and large-scale solar PV developers, financing institutions, and equity investors, and productive end users	No. of platforms created for matchmaking	NA	1 event organized and 1 website developed	NA	1 Investor's Forum	Investor's Forum could not be organized as scheduled due to continuous strike and blockade	Investor's Forum could not be organized as scheduled due to continuous strike and blockade	Workshop proceeding
Output 3b.5: Functional enterprises adopting productive use of electricity	No. of productive use of electricity supported	NA	NRREP Target: - 1300 new productive uses - 2800 productive uses upgraded	- Business Opportunity Assessment in Gorkha - 657 enterprises established by PEUC	- Business Opportunity Assessment carried out in ... energy projects - 1 business model developed (energy as enterpris	- 657 MSME were established by PEUC/NRREP, RERL provided direct technical assistance to establish 193 - Business Opportunity Assessment in Tanahun, Achham and	- 657 MSME were established by PEUC/NRREP, RERL provided direct technical assistance to establish 193 - Business Opportunity Assessment in Tanahun, Achham and	Technology installation detail and related documents

					e) - 1 MSME clusters promoted - 3 innovative technologies piloted - Framework for rural industrial clusters developed	Makwanpur carried out - MHP as an enterprise model developed - 2 innovative technologies for fuel switching from firewood to electricity developed and tested (Khuwa Making, Lokta Boiling), 1 technology under development (Nettle Leaves Drying) - Framework for development of industrial cluster prepared. 2 potential rural industrial clusters identified. Field work on-going in 1 cluster in	Makwanpur carried out - MHP as an enterprise model developed - 2 innovative technologies for fuel switching from firewood to electricity developed and tested (Khuwa Making, Lokta Boiling), 1 technology under development (Nettle Leaves Drying) - Framework for development of industrial cluster prepared. 2 potential rural industrial clusters identified. Field work on-going in 1 cluster in Achham	
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						<p>Achham</p> <ul style="list-style-type: none"> <li>- 9 lift irrigation projects studied. 2 lift irrigation projects (benefitting 45 HH) constructed with EDM funding and 3 under construction.</li> <li>- Draft MoU between AEPC and Department of Irrigation to develop lift irrigation projects prepared.</li> <li>- Locally developed pre-paid meter</li> <li>- Energy consumption pattern of MHPs being studied.</li> </ul>	<ul style="list-style-type: none"> <li>- 9 lift irrigation projects studied. 2 lift irrigation projects (benefitting 45 HH) constructed with EDM funding and 3 under construction.</li> <li>- Draft MoU between AEPC and Department of Irrigation to develop lift irrigation projects prepared.</li> <li>- Locally developed pre-paid meter</li> <li>- Energy consumption pattern of MHPs being studied.</li> </ul>	
Output 3b.6: Operationalized mechanism to promote financial products for entrepreneurs/end users	No. of trainings and orientations to women and marginalized groups	NA	2 trainings orientations conducted	NA	NA	NA	NA	Training report



Output 3b.7: Ensured women and marginalized/vulnerable groups own 33% of the functional electricity based enterprises established	No. of trainings and orientations to women and marginalized groups	NA	2 trainings orientations conducted	NA	2 trainings orientations conducted	- 43 women were from Eastern and Western Development Regions were provided enterprise management training. - 74 women and 80 men benefitted from skill based trainings on tailoring, computer education and bakery.	- 43 women were from Eastern and Western Development Regions were provided enterprise management training. - 74 women and 80 men benefitted from skill based trainings on tailoring, computer education and bakery.	Training report
Output 4.1: Created a knowledge base of technical challenges and opportunities in the design, manufacture (for micro-hydro (+60 kW) and mini-hydro), installation and after-sales service in micro-hydro (60+ kW), mini-hydro and large scale solar PV systems	No. of monitoring and quality assurance mechanism and framework	NA	1 gap analysis, 1 monitoring system, 2 quality assurance mechanism, 1 framework developed, and 1 workshop	- Study on gap analysis initiated - Study on monitoring and quality assurance mechanism initiated - 1 sustainable monitoring framework developed	1 gap analysis, 1 monitoring system, 2 quality assurance mechanism, 1 framework developed, and 1 workshop	- 1 gap analysis on manufacturing of mini hydro components in the country completed. - 2 monitoring and quality assurance mechanism for mini/micro hydro and solar PV developed.	- 1 gap analysis on manufacturing of mini hydro components in the country completed. - 2 monitoring and quality assurance mechanism for mini/micro hydro and solar PV developed.	monitoring and quality assurance mechanism and sustainable monitoring framework

						Sustainability framework tested and 1 workshop organized to finalize. Piloting on 10 MHPs initiated. <ul style="list-style-type: none"> <li>- Remote monitoring system for large Solar PV developed.</li> <li>- Power Output Verification Guidelines of AEPC updated and POV for mini hydro included.</li> </ul> Training for engineers initiated <ul style="list-style-type: none"> <li>- Remote monitoring system for solar PV developed</li> </ul>	Sustainability framework tested and 1 workshop organized to finalize. Piloting on 10 MHPs initiated. <ul style="list-style-type: none"> <li>- Remote monitoring system for large Solar PV developed.</li> <li>- Power Output Verification Guidelines of AEPC updated and POV for mini hydro included.</li> </ul> Training for engineers initiated <ul style="list-style-type: none"> <li>- Remote monitoring system for solar PV developed</li> </ul>	
Output 4.2: Fully trained skilled and technically capable people available for project identification, feasibility studies and detailed design of mini-hydro and large-scale	No. of trainings and manuals for developing skilled and technically capable people	NA	4 trainings and 2 manuals prepared		4 trainings and 2 manuals prepared	- 1 training on design of mini hydro completed. 25 engineers were trained. <ul style="list-style-type: none"> <li>- 10 engineers</li> </ul>	- 1 training on design of mini hydro completed. 25 engineers were trained. <ul style="list-style-type: none"> <li>- 10 engineers</li> </ul>	Training report

solar PV systems						from solar equipment vendors were trained on designing large solar PV installations.	from solar equipment vendors were trained on designing large solar PV installations.	
Output 4.3: Fully trained skilled and technically capable mini hydro manufacturers in identified areas and their after-sales services	No. of new technologies for mini hydro	Old ELC, DLC, and Turbine	2 ELC, 2 DLC and 1 turbine technology designed	- Initiated activities to locally fabricate DLC	2 ELC, 2 DLC and 1 turbine technology designed	- Digital ELC for micro hydro developed and tested in the laboratory.	- Digital ELC for micro hydro developed and tested in the laboratory.	Readymade technology with its features
Output 4.4: Fully trained and technically capable construction and installation teams within companies to improve quality of installed mini-hydro projects and large solar PV system	No. of trainings for installation of large micro hydro	NA	1 training conducted	1 training conducted	1 training conducted	- Training on installation of large micro hydropower plants with 20 participants conducted. - Training manual for design and installation of large solar PV systems is being prepared.	- Training on installation of large micro hydropower plants with 20 participants conducted. - Training manual for design and installation of large solar PV systems is being prepared.	Training manual and report
Output 4.5: Fully trained, skilled and technically capable people available for operation, maintenance and business management of mini-hydro projects and large scale solar PV	No. of people trained in mini hydro, large micro hydro and large scale solar PV system	NA	60 people trained and 3 trainings conducted on RE as business	NA	NA	NA	NA	Training report

## 6. BUDGET AND EXPENDITURE

Table 4: Output wise annual budget and corresponding expenditure

*Amount in USD*

Output	Annual Budget	Annual Expenditure through project	Annual Expenditure through UNDP	Total Expenditure	Budget Utilization%
Output 1.1	31,996.000	14,718.00	15,233.00	29,951.00	94%
Output 1.2	3,000.00	2,679.00		2,679.00	89%
Output 1.3	36,000.00	34,910.00		34,910.00	97%
Output 2a.2	206,000.00	206,000.00		206,000.00	100%
Output 2b.1	25,000.00	23,552.00		23,552.00	94%
Output 2b.2	12,700.00	12,653.00		12,653.00	100%
Output 2b.3	206,639.00	156,612.00	49,859.00	206,471.00	100%
Output 2b.4	235,000.00	232,042.00		232,042.00	99%
Output 3b.2	5,000.00	4,758.00		4,758.00	95%
Output 3b.3	5,000.00	4,758.00		4,758.00	95%
Output 3b.4	11,808.00	11,730.00		11,730.00	99%
Output 3b.5	57,908.00	55,592.00		55,592.00	96%
Output 3b.7	10,965.00	10,885.00		10,885.00	99%
Output 4.1	26,400.00	24,738.00		24,738.00	94%
Output 4.2	22,700.00	22,606.00		22,606.00	100%
Output 4.3	12,967.00	12,576.00		12,576.00	97%
Output 4.4	7,801.00	7,801.00		7,801.00	100%
Programme Support Cost	260,636.00	195,615.00	60,102.00	255,717.00	98%
<b>Total</b>	<b>1,177,520.00</b>	<b>1,034,225.00</b>	<b>125,194.00</b>	<b>1,159,419.00</b>	

Table 5: Sources of funds Budget and Utilization of the project period

*Amount in US\$*

Source of Fund	Funding period (Start - End Date)	Total Project Budget	Expenditure up to 2014	Expenditure in 2015	Total expenditure till 2015	Total Budget utilization %	Budget Balance US\$
UNDP	July 2014	2000,000	352,008	125,194	125,194		1320,992
Donor 1: GEF	July 2014	3000,000		1,034,225	1,034,225		2,267,369
Donor 2 : Korean		99,269		99,269	99,269	100%	
Donor 3: Norwegian	Nov 2015	378,000		0			378,000
Government		30,312,500					
Others		24,494,530					
<b>Total</b>		<b>60,284,299</b>	<b>352,008</b>	<b>1,258,688</b>	<b>1,258,688</b>		<b>3,966,361</b>

## Narrative on Progress related to Budget and Expenditure

Output and Progress
Output 1
<ul style="list-style-type: none"> <li>• Draft RE subsidy Policy prepared and submitted to MoSTE, GoN</li> <li>• GESI sensitive guidelines for PPP modality prepared</li> <li>• Draft Technical specification for grid connection of solar PV systems prepared and shared with Nepal Electricity Authority</li> <li>• District Electrification Master Plan of Gorkha prepared</li> <li>• Case Study on grid connected solar mini grid completed</li> <li>• Workshop organized with Fair Trade Group to establish market linkages for products produced in MH catchment areas</li> <li>• Exhibition on RE technologies organized</li> </ul>
Output 2
Output 3
<ul style="list-style-type: none"> <li>• 2 financial instruments for developers and manufacturers related activities initiated</li> <li>• Training materials for orientation for BFIs on mini hydro and large solar PV systems prepared</li> <li>• CREF and RERL Websites designed and operational</li> <li>• Financial assistance to CREF provided to organize a match making forum to attract private investment in mini hydro development</li> <li>• Activities related to commercial operation of micro hydro initiated</li> <li>• Khuwa making machine, sisno dryer and lokta boiler modified to operate on electricity instead of firewood</li> <li>• 100 entrepreneurs from MH catchment areas trained on enterprise development and management</li> <li>• Framework for development of Rural Industrial Cluster prepared</li> <li>• Women entrepreneurs trained on enterprise management</li> <li>• Study on impact of productive energy use on women initiated</li> </ul>
Output.4
<ul style="list-style-type: none"> <li>• Gap analysis on mini hydro development completed</li> <li>• Solar PV monitoring system assembled</li> <li>• Quality Assurance Mechanism for micro hydro and solar PV prepared</li> <li>• Sustainability framework for micro hydro prepared and pilot testing initiated</li> <li>• Design manual for LSSPV and hybrid systems prepared</li> <li>• Training on DFS of mini hydro for engineers completed</li> <li>• Training on design of LSSPV for engineers completed</li> <li>• POV guidelines prepared</li> <li>• Training for engineers on POV initiated</li> <li>• Micro Hydro installation training completed.</li> </ul>

## 7. CROSS CUTTING ISSUES

Towards achieving the national goal of building an equitable and gender inclusive society by ensuring equal rights to women and men of all castes, creed and regions in the social, political and economic aspects of national development, AEPC/NRREP is promoting GESI sensitive renewable energy projects and productive end-use applications. RERL is supporting AEPC/ NRREP to mainstream Gender and social inclusion (GESI) in RE projects, particularly mini hydro, large micro hydro and solar PV systems.

In 2015, RERL supported in training women entrepreneurs on enterprise management. Skill based trainings were provided to rural entrepreneurs from MHP catchment areas on bakery, computer, tailoring,

etc. All together 96 women and 332 men benefited from these training activities. 34 new women-led enterprises have been established and/or upgraded in micro hydro catchment areas.

In addition, RERL supported to establish 208 Micro Small and Medium Enterprises (MSME) in Western Region of which 34 MSME were owned and operated by women. Likewise, 948 IGA plans for women and marginalized groups were prepared with RERL support.

RERL is undertaking a study to demonstrate impacts of productive end uses on livelihoods of women.

### **7.1 Targeting and voice/Participation of Target groups**

The project document of RERL identifies Gender Equality and Social Inclusion (GESI) as one of the key objectives of the project. The objective with regards to GESI is to build an equitable and gender inclusive society by ensuring equal rights of women and men of all castes, creed and geographical regions in the social, political and economic aspects of national development. The key issue is to provide equal access to resources and opportunities to women and men in all the population groups as their right to basic needs and livelihood. Nepalese society is characterised by gender and social systems following a patriarchal value system which determines roles and relationship between women and men and between different groups. In energy distribution too, it influences share, ownership and benefits to women and men in different ethnic groups and between disadvantaged groups. RERL project is being implemented to overcome such gender and cultural constraints to ensure equal access in renewable energy sector through mainstreaming GESI. Hence, the ultimate target groups of the project include both women and men especially of disadvantaged groups and communities. Although the representation of women and vulnerable communities are ensured in development projects, men dominate the decision-making processes at the household and institutional level. RERL project requires strong representation of women and other disadvantaged communities by creating an environment for wholesome participation in decision making to address strategic gender needs through development of rules and procedures in the projects. AEPC has made special provision to provide additional subsidy to women and people from disadvantaged groups. Gender sensitive guideline on public private partnership is one such set of procedures that assist to address such needs. Similarly, incorporating gender responsive provisions during formulation of RE policies is another aspect that the project is focussing on. Affirmative provisions for women and disadvantaged communities have been included in the RE Subsidy Policy document of the Government. Similarly, financial and capacity building support has been provided to 43 women led enterprises in the vicinity of the RE systems promoted by the project.

### **7.2 Gender Equality, Women's Empowerment, and Social Inclusion**

The objective of RERL project with regards to gender equality, women's empowerment and social inclusion is to build an equitable and gender inclusive society by ensuring equal rights to women of all castes, creed and regions. In the current context, the project is equally emphasizing on the empowerment of women to engage in energy and non-energy based enterprises. Women have been encouraged to own and manage businesses and be involved various stages of production and marketing. Women have been provided positive discrimination for overall development. This seems all the more important given the fact that large number of men of households have migrated abroad for earnings. Therefore, gender sensitization is sought after by the project at every stages of business promotion from awareness creation to capacity building and business establishment and operation. In promoting energy-based enterprises for sustainability of mini hydro and large-scale solar projects, GESI is integrated through at least 33% participation of women and other disadvantaged groups in capacity building opportunities, owning businesses and priority in employment opportunities. RERL has given further thrust by provisioning financial support to women and marginalized groups in demonstration projects.



In terms of achievements of the project till date, the following figures elaborate on the mainstreaming of GESI. RERL has conducted 17 different trainings on business management and skills development during this year which has benefitted 332 males and 96 females.

S.N.	Training	No.	Male	Female	Total
1	Business Development Trainings	9	162	32	194
2	Skill Development Trainings	5	53	42	95
3	Other Trainings	3	117	22	139
	<b>Total</b>	<b>17</b>	<b>332</b>	<b>96</b>	<b>428</b>

Similarly, RERL has supported 208 different micro and small enterprises/entrepreneurs in 10 districts of Nepal. The enterprises supported include saw mills, bakery industries, grill industries, grinding/rice mills, meat shops, computer and other technical institutes, paper industries, photo studios, fresh houses and other rural energy-based industries. Out of the total supported enterprises, 116 are micro enterprises while the remaining 58 are small enterprises. A total of 34 female-led enterprises are established and supported.

S.N.	Enterprises	Janjati		Dalit		Others		Total
		Male	Female	Male	Female	Male	Female	
1	Micro enterprises	42	0	15	0	59	24	140
2	Small enterprises	29	0	4	0	25	10	68
	<b>Total</b>	<b>71</b>	<b>0</b>	<b>19</b>	<b>0</b>	<b>84</b>	<b>34</b>	<b>208</b>

### 7.3 Scaling up

Ensuring scaling up and replicability of the activities has been a major focus during the project design. It has been attempted to ensure scaling up and replication in various ways. Firstly, the project is completely aligned with the objectives and priorities of the Government and integrated into the Government's single programme modality under NRREP. Secondly, the project has supported and assisted in formulation of national policy documents, establishment of financing mechanisms, capacity building and focused on productive energy uses. RERL is helping to demonstrate that off-grid mini hydro development as a viable sector for private-public partnership. Thirdly, the project ensures that no additional subsidy is provided on top of the facilities provided by the Government. The project has supported AEPC in revising policies or regulations in areas where there is a need for revision. The revision of the RE Subsidy Policy is one such attempt to incorporate the changing scenarios of RE needs and demands. Fourthly, the project is promoting private-led project development and operation under PPP modality through the formation of SPV. Since all financial transactions are market based, the modality is both sustainable and replicable. Lastly, the progression of phases from demonstration to post demonstration has been carefully taken into account during individual project planning and implementation. RERL is leading the way in promoting innovative concepts and modalities through demonstration projects that have wider scale promotion potentials showing the way for future RE sector direction. It is also expected that after completion of the RE projects, the expertise will have been internalized within AEPC. Furthermore, the innovative financing instruments will also have internalized within BFIs and service providers will have internalized capacity building and business development services for further replication.

### 7.4 Capacity Development

RERL is working on development of capacities at all levels for promotion of less disseminated renewable energy technologies such as mini hydro, large micro hydro, mini grid and large solar PV.

RERL in collaboration with different partners has provided training to 20 MH operators and 20 installers from the private sector. Likewise, engineers from DDC, AEPC, NRREP and private companies were provided training on design of mini hydro and large solar PV systems.

At the institutional level, RERL's focus is mainly in developing capacity of AEPC. RERL actively supported AEPC to revise subsidy policy and to draft RE policy, energy crisis mitigation concepts and enhancing monitoring capacities. RERL has developed manuals and guidelines for DFS of mini hydro and large solar systems to ensure all AEPC promoted systems follow the same standards procedures

Development of various financial instruments after consultations with BFIs and the continuous orientation and exposure about RE systems to the BFIs has enhanced the capacities of banks and financing partners to gain more confidence in investing into large commercial RE systems. The interest shown by some banks in flowing credit into mini hydro projects in Baglung, Taplejung and Jumla is an evidence of the growing confidence although final approvals of such lending is yet to be realized particularly due to lack of CREF funding availability as committed during the whole formation process. Similarly, discussions and awareness raising activities targeted at potential energy service providers have been on-going with some progress noticed at operating energy as business. This is expected to bring about commercialization into the sector thus ensuring financial and technical sustainability of the promoted systems. At the local level, potential entrepreneurs with particular focus on women-led businesses have been strengthened and supported as a result of RERL interventions.

## 7.5 Sustainability

RERL is implemented under the existing energy programme of the Government and is helping to remove barriers to large scale RE promotion in the country. This would leverage and strengthen the RE promotional activities in Nepal through AEPC. The strengthening of AEPC and its RE-related activities through formulation of conducive policies, designing of financing instruments for commercialization of RE systems, development of PPP modality of implementation and improving productive energy use of RE systems all focus on financial sustainability measures that the project is undertaking.

## 7.6 South-South and Triangular Cooperation

With the financial support of Gyeongsangbuk – do Provincial Government of Korea and UNDP Nepal, RERL and DDC, Dhading are working to provide clean energy solutions to the marginalized Chepang community in Mahadevsthan – 4, Dhading. DFS has already been carried out and the bidding process for procurement, installation and operation will be initiated in August, 2015. RERL is also supporting a school in the same VDC for e-learning system. Government of Nepal approved curriculum for certain grades is available in soft version with a lot of audio visual aids. It is hoped that with the aid of these facilities, pupil will comprehend science and mathematics better.

### Electronic Load Controller (ELC) Technology Transfer to Cameroon

A representative of Cameroon's micro hydro installer companies' association was looking for electronic load controller (ELC) technology. AEPC/RERL shared related technical papers and design concepts to them. In addition, RERL coordinated meetings between leading ELC manufactures of Nepal and the Cameroon team. Cameroon representative was impressed with the in house technology in Nepal and is interested to transfer the technology to Cameroon manufacturers to locally fabricate ELC in the country.

## The Energy and Resources Institute (TERI)

With a view to provide impetus to rooftop solar PV systems uptake in India, The Energy and Resources Institute (TERI) has recently taken an initiative, called Solar PV for all (SPV4ALL: [www.spv4all.org](http://www.spv4all.org)). Under this novel initiative, TERI has developed a first-of-its-kind cloud based open source Web-GIS tool for estimating rooftop solar power potential along-with an Android-based mobile application for creating consumer awareness and promoting Solar PV systems. Alternative Energy Promotion Centre (AEPCC) has taken initiative for development of similar technology in Nepal and TERI is giving technical support in this regards. At the outset, significance of such tool and mobile application would have utmost importance for accelerated deployment of environment friendly solutions in Nepal. RERL has recommended TERI's "SPV4ALL" to be considered under Mobile for Good (M4G) Awards 2014 (Main Category) by Vodafone Foundation.

## 7.7 Knowledge Management and Products

- Technical standards for grid connection of micro hydro and solar PV systems prepared
- Concept note on solar mini grid prepared and disseminated
- Android App to calculate size and cost for roof top solar prepared and disseminated
- Concept note on replacement of fossil fuel use by renewable prepared
- Innovative financing of RE through Vendor financing and credit guarantee mechanism initiated
- Institutional arrangement for solar wind hybrid system initiated
- Documentary on productive energy use prepared
- LSSPV design manual prepared

## 7.8 Partnerships

**Dhading Solar:** 140 Chepang households of Ward No. 3 of Mahadevsthan VDC in Dhading district have been living in extreme poverty due to remoteness and lack of resources. It is reached by 5 hours' walk from Talti Bazaar. Subsistence agriculture is the main occupation of the people. However, they do not grow enough to meet their own needs. The community lacks even the basic infrastructure such as electricity, tapped drinking water, irrigation, health and education. In this background, UNPD Nepal and RERL developed a proposal to support the Chepang community in Mahadevsthan VDC to have access to energy through solar photovoltaic systems in collaboration with UNDP Seoul Policy Centre and Bangkok Regional Hub (who linked UNDP Nepal team to the Gyeongsangbuk-do provincial government of South Korea). Gyeongsangbuk-do provincial government of South Korea showed interest on the RE work that UNDP was promoting in collaboration with the Government of Nepal and now has agreed to provide financial assistance to the above mentioned project. Under this initiative Chepang households will get access to electricity for lighting, water pumping, grain grinding and the local school will get computer and internet access.

**Lift Irrigation:** RERL has supported the communities of different micro hydro catchment areas in Dhading district to install and operate 6 micro hydro powered lift irrigation systems. With the availability of additional water, the farmers are engaging in high value vegetable production. Besides RERL, financial resources were mobilized from DDC, Dhading, VDCs and the beneficiary households to undertake these projects. In similar manner, RERL supported COMSAC, an NGO registered in Dhading to prepare a proposal to access Every Drop Matters (EDM) Fund. The proposal has been accepted by EDM steering committee and implementation commenced from early 2015.

**Kabeli Transmission Project:** Alternative Energy Promotion Center (AEPCC) is implementing the World Bank funded Renewable Energy Component of the Kabeli Transmission Project. RERL is supporting AEPCC

to undertake all the activities under this Programme. RERL will assist AEPC to install a 350 kW mini hydropower plant and a mini grid interconnecting the plant with existing micro hydropower plants.

**Practical Action:** RERL and Practical Action and CESC/NRREP collaborated to organize TOT for MH operation. This is a first of its kind training for MH operation. The trainees will later work as resource persons and help decentralize and localize MH management and operation training.

RERL will work with Practical Action and DDCs to implement financially viable solar Pumping system in Dhading and Makwanpur. Detailed feasibility study of these projects has been completed by PA.

## 8. LESSONS LEARNED

As RERL was launched only in July 2014, the activities undertaken are mostly in their initiation phases and only a limited number of the field level activities have been undertaken.

## 9. IMPLEMENTATION ISSUES AND CHALLENGES

2015 has been a difficult year for project implementation, first, due to the devastating earthquakes, followed by the energy crisis. In consultation with GEF, RERL programme activities were changed to address the immediate and pressing need of relief and rehabilitation of renewable energy projects destroyed or damaged by the earthquakes. Though the output in kW targeted by RERL has not been changed, the implementation modality has been severely affected. RERL project document envisages private sector involvement in solar PV and large micro hydro projects, however, in the current context, private involvement in relief and rehabilitation is not possible and the communities have been so badly affected that they will not be able to generate equity and the Banks will not provide loan. Thus, all relief and rehabilitation activities are being done under grant scheme.

However, relief activities were adversely affected by the energy crisis the country is facing. To overcome the difficulties in importing equipment, RERL locally procured and delivered relief materials particularly solar PV systems. Likewise, delay in formation of Reconstruction Authority by the GoN has created uncertainty on relief and rehabilitation activities. It is not clear yet where the authority will work and how many renewable energy projects will it support.

Delay in approval of revised RE subsidy policy has adversely affected development of demonstration projects. RERL supported AEPC to draft the revision but the document has not yet been approved by the Cabinet. As the subsidy rates for mini/micro hydro and solar PV have been increased in the proposed draft, the developers and the communities are awaiting government decision before going for financial closure of projects.

NRREP has not been carrying out field level activities since the beginning of the current Fiscal Year (July 2015). Recently, the implementation modality adopted by NRREP has come under immense scrutiny and has been criticized by some of the development partners but the way forward has not been finalized yet. As NRREP is the baseline project of RERL and the main objective of RERL is to support NRREP to realize its ambitious targets, delay in completion of the field levels activities will adversely affect RERL progress.

RERL is closely working with CREF to establish innovative financing mechanisms to attract private investment in RE projects. Several meetings and interactions have been organized with Handling and Partner Banks of CREF, they all seem to be hesitant to lend to rural communities. This may affect financial closure of some demonstration projects being supported by RERL.

## 10.A SPECIFIC STORY

**Problem / Challenge faced:** There are two governmental organizations involved in rural electrification in Nepal. Nepal Electricity Authority is involved in rural electrification through grid extension, whereas AEPC is mandated for off-grid renewable energy solutions like mini/micro hydro and solar PV systems. As there is a lack of coordination between these two organizations, it has been observed that the national grid reaches micro hydro catchment area before the end of the project life. This leads to conflict among the beneficiaries and the revenue generated by MHP is adversely affected.

**Project Interventions:** AEPC is trying to address this problem through two strategies. First, by inter-connecting micro hydro with the national grid and second, coordinated rural electrification. RERL is supporting AEPC in both these areas.

NEA had some issues on interconnection of micro hydro with the national grid mainly; safety and management complexities. RERL helped AEPC to prepare Technical Specifications (TS) for grid connection of micro hydro taking into consideration NEA's concerns. The TS was discussed extensively between AEPC, NEA, NMHDA and other stakeholders. NEA Board approved the Technical Standards paving way for interconnection of MHP with the national grid.

**Result (if applicable):** Any micro hydro is yet to be connected with the national grid. RERL is working with AEPC and the communities of two micro hydropower plants to prepare documents for Power Purchase Agreement with NEA. Both the communities have submitted their documents and are waiting for NEA's response to move ahead.

**Lessons Learned/ reliability:** NA

**Innovations/novelty factor:** Interconnection of micro hydro requires some technical innovations. Once the PPA is signed, RERL will work with the communities to procure equipment and installation.

## 11.PRIORITIES FOR 2016

- Support the earthquake victims of 2015, RERL will complete solar PV based Relief and Rehabilitation activities in 2016 and support micro hydro rehabilitation.
- Carry out midterm evaluation
- RERL will also support communities in Taplejung to install a mini grid.
- Several mini hydro projects will be supported for financial closure.

**Indicate any major adjustment in the strategies, targets or key outcomes and outputs planned in the project.**

- As USD 1 M has been allocated from GEF fund to relief and rehabilitation activities, some outputs also have to be changed. RERL will work to achieve the physical targets of demonstrating 500 kW large solar PV systems and 2000 kW of large micro hydro through relief and rehabilitation as agreed by GEF. The innovative financing mechanism as envisaged in the project document will not be application in this case as the support will be all grant based.

**Estimated budget required, if significantly different from original project budget/plan**

- The annual budget for will be about USD 2 M, out of which USD 0.7 M will be for relief and rehabilitation works.

## 12. RISK AND ISSUE LOGS

Table 6: Risk Log Matrix

S.N	Description	Category (financial, political, operational, organizational, environmental, regulatory, security, strategic, other)	Likelihood of risk (scale of 1 to 5 with 5 being the most likely) <b>A</b>	Impact (scale of 1 to 5 with 5 being the highest impact) <b>B</b>	Risk factor (A x B)	Mitigation measures if risk occurs	Date risk is Identified	Last Updated	Status
1.	Delay in approval of RE subsidy Policy and Act  (As the developers and communities are waiting for subsidy policy before financial closure, there is likelihood of delays in demonstration project implementation)	Financial	3	5	15	RERL has supported AEPC to prepare draft of Renewable Energy Policy. Stakeholder meeting was organized to get GON and DP comments. The Policy has to be approved by the Cabinet before it can be implemented.	October 2015	December 2015	No Change
2.	Limited exposure in larger systems (mini hydro, mini grid and larger solar PV) under public private partnership	Financial, Regulatory	5	3	15	Private participation in rural electrification is a new idea in Nepal. Moreover, PPP model in rural areas is completely new for Nepal. Attracting private sector in such situation is very challenging. RERL plans to organize	14 October	December 2015	Increased interest in RE technology in urban areas

	and unfavorable subsidy policy for private sector and larger systems					<p>Investor's Forum to bring rural projects to the attention of the private sector and banks.</p> <p>After the blockade of border points and the consequent energy crisis, interest in RE has grown tremendously. Some private companies have indicated tentative interest towards investment in RE systems for larger consumers in urban areas.</p> <p>RERL is planning to support AEPC to organize RE exhibition in January 2016 to increase awareness on RE technologies.</p>			
3.	NRREP co-financing in mini hydro and large solar PV projects (As NRREP has not allocated specific target and budget for mini hydro and large solar PV installations,	Financial	2	5	10	<p>RERL is working in close collaboration with the related NRREP components to identify projects to be developed as demonstrations.</p> <p>RERL is also working with SASEC of AEPC to identify projects to be developed with ADB funding.</p>	March 2015	December 2015	2 mini hydro projects are being developed with SASEC funding



	the subsidy required to develop demonstration projects is not clearly spelled out.								
4.	Earthquake, Landslide		5	5	25	Earthquakes have devastated large parts of the country. To support the GoN's effort to provide relief and rehabilitation, RERL has reallocated USD 1 M.	May 2015	December 2015	Solar PV systems installed in 40 institutions (DDC, VDC, Health Post, Schools, Temporary Learning Center)
5.	Political Instability (After the promulgation of the new constitution in September 2015, Nepal has witnessed prolonged political disturbances that have led to loss of lives and blockade of the border points. This has adversely affected in	Financial, Regulatory, Operational, Security	5	5	25	RERL with UNDP's suggestions has made changes in its AWP to include mainly those activities that can be done even in the current situation.	September 2015	December 2015	RERL delivery for 2015 was 99.25%

	several fronts. Import of equipment, rise in cost in general, security threat during travel, etc.)								
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### 13.PROGRESS AGAINST ANNUAL WORK PLAN 2015

UNDAF Outcome 2: Vulnerable groups have improved access to economic opportunities and adequate social protection

UNDAF Output 2.4: Vulnerable groups have improved access to sustainable productive assets and environmental services

UNDP/CPAP Output 2.4.1: Alternative Energy Promotion Centre's capacity enhance for scaling up energy services in rural areas

EXPECTED OUTPUTS	PLANNED ACTIVITIES	TARGET FOR PLANNED ACTIVITIES	Annual achievement of Target	Annual achievements of Target in %	Donor name	Approved budget (from the AWP)	Amount spent	% of expenditure against the approved budget	Remarks (if targets not fully achieved)
UNDAF Output 2.4: Vulnerable groups have improved access to sustainable productive assets and environmental services									
UNDP/CPAP Output 2.4.1: Alternative Energy Promotion Centre's capacity enhance for scaling up energy services in rural areas									
	Activity 1.1.1 Support preparation and adoption of policy that enables PPP model for mini-hydro, micro-hydro mini-grid, and large-scale PV development, thus attracting the private sector to such projects	* 1 Draft policy document * 2 Stakeholder Consultation Workshop * Final GESI sensitive PPP guidelines * SE4ALL	* 1 Draft policy document * 2 Stakeholder Consultation Workshop * Final GESI sensitive PPP guidelines	100%	GEF	12,372	12,175.00	98%	
			* SE4ALL	100%	UNDP	15,233	15,233	100%	
	Activity 1.1.2 Support preparation and adoption of policy for future grid connection of off-grid mini-hydro, micro-hydro mini-grid, and large-scale solar PV systems	* 1 Technical Specifications * Workshop to finalize Technical Specifications	* 1 Technical Specifications * Workshop to finalize Technical Specifications	100%	GEF	2,543	2,543	100%	
	Activity 1.2.1 Prepare methodology for integrating mini-hydro projects and large-scale solar PV systems into district energy plans.	* District Electrification Master Plan for 5 DDC * Orientation on DREMP preparation for DDCs/DEECCS * Upgraded NEA owned Mini Hydro	NA	100%	GEF	2,860	2,679	94%	

	Activity 1.3.1 Identify and prepare case studies for mini-hydro and large-scale solar PV systems.	* Case Study on grid connected solar mini grid * Functional status of ISPS & PVPS	* Case Study on grid connected solar mini grid * Functional status of ISPS & PVPS	100%	GEF	16,839	16,843	100%	
	Activity 1.3.3 Prepare and conduct training	* 2 Trainings * 1 Event * 2 Workshops	* 2 Trainings * 2 Workshops	100%	GEF	16,135	16,087.00	100%	
				100%	UNDP	2,000	1,980.00	99%	
<b>Sub Total Activity Result 1</b>						<b>67,982</b>	<b>67,540</b>		
<b>Annual Target : Design 1 MW electricity from Mini Hydro</b>	Activity 2a.2.1 Provide financial support to the demonstration mini-hydro projects, as per government policy, through the CREF	* Grant for CREF to finance mini grid	* Grant for CREF to finance mini grid	100%	GEF	211,600	211,563	100%	
<b>Sub Total Activity Result 2a</b>						<b>211,600</b>	<b>211,563</b>		
	Activity 2b.1.1 Update the feasibility study of the selected Mini-hydro demonstration projects to make it bankable	* DFS of mini hydro project * 5 Environment Assessment * 5 institutions * 5 Mini Hydro Projects	* DFS of mini hydro project * 5 Environment Assessment * 5 institutions * 5 Mini Hydro Projects	100%	GEF	22,520	22,282.00	99%	
<b>Annual Target : Support NRREP to initiate 1 MW mini hydro projects</b>	Activity 2b.2.1 Support establishment of a Special Purpose Vehicle	* 1 SPV	* 1 SPV	100%	GEF	1,962	1,955.00	100%	
	Activity 2b.2.2 Provide technical assistance for construction of the project	* 1 mini grid	* 1 mini grid	100%	GEF	10,720	10,697.00	100%	Technical assistance for Gulmi&Baglungminigrid
	Activity 2b.3.1 Prepare a shortlist of potential project sites selected based on a set of criteria and select sites in consultation with relevant stakeholders	* 100 sites identified	* 100 sites identified	100%	GEF	450	418.00	93%	

	Activity 2b.3.2 Conduct detailed feasibility study of selected demonstration projects	* 20 DFS	* 20 DFS	100%	GEF	8,900	8,729.00	98%	
	Activity 2b.3.3 Support establishment of suitable institutional arrangement for development and management of large solar PV projects including SPV model	* 5 institutions	* 5 institutions	100%	GEF	123	123.00	100%	
	Activity 2b.3.4 Provide technical assistance for installation of the project	* 2 feasibility study * 1 integrated solar drinking water & irrigation System * 1 schools have e-learning technology * Solar Home System 27, Solar Mini Grid * large SPV Village Electrification * 1 System	* 2 feasibility study * 1 integrated solar drinking water & irrigation System * 1 schools have e-learning technology * Solar Home System 27, Solar Mini Grid * large SPV Village Electrification * 1 System	100%	GEF	132,132	131,734	100%	
	Activity 2b.3.9 Support for EQ relief and rehabilitation for Solar	* 250 Systems * 500 Systems * 40 Systems * 9 DDCs * 20 Systems	* 250 Systems * 500 Systems * 40 Systems * 9 DDCs * 20 Systems	100%	GEF	66,693	66,373	100%	
	Activity 2b.4.1 Assist NRREP to implement the projects	* 1.8 MW large MHP	* 1.8 MW large MHP	100%	GEF	2,813	2,813	100%	
	Activity 2b.4.2 Assist AEPC/NRREP for DFS	* 20 large MHPs	* 20 large MHPs	100%	GEF	27,103	26,935	99%	
	Activity 2b.4.3 Assist AEPC/NRREP for monitoring of energy consumption pattern of mini/micro hydro projects	* 1 Assessment			GEF		-		
	Activity 2b.4.3 Relief and Rehab package for micro hydro	* 100 MHPs	* Rapid assessment completed	100%	GEF	204,300	203,819.00	100%	

Sub Total Activity Result 2b						477,715	475,878		
<b>Annual Target : Supported CREF to design financial instruments for financing RE projects</b>	Activity 3b.2.1 Design of the commercial financing instruments for Mini-hydro and Large-scale solar PV projects and select fund administrator	* 2 instruments	* 2 instruments	100%	GEF	4,800	4,758.00	99%	Contracted
	Activity 3b.3.1 Design training materials for bankers to understand challenges and opportunities in Mini-hydro and Large-scale solar PV projects	* 1 Training material	* 1 Training material	100%	GEF	7,600	7,530.00	99%	
	Activity 3b.4.1 Organize appropriate events to bring together Mini Hydro developers and Large-scale solar PV Projects, equity investors, and potential lenders	* 1 Event	* 1 Event	100%	GEF	7,000	7,000	100%	
	Activity 3b.4.3 Develop a web-based portal that allows developers, lenders and investors to interface and exchange information.	* 2 Website designed & developed	* 2 Website designed & developed	100%	GEF	4,808	4,730	98%	
	Activity 3b.5.1 Prepare guidelines for identifying and assessing existing and potential enterprises	* 1 Business Model Developed	* 1 Business Model Developed	100%	UNDP	4,812	4,796	100%	
<b>Annual Target : Supported CREF to design financial instruments for financing RE projects</b>	Activity 3b.5.2 Support the RE project developers (SPVs) in preparing business plan for promoting productive use of electricity	* 2 MSME clusters promoted * 1 product/subsector supported	* 2 MSME clusters promoted * 1 product/subsector supported	100%	UNDP	5,994	5,951.00	99%	

	Activity 3b.5.3 Develop locally based Enterprise Development Facilitators (EDFs) and Business Development Service Providing Organizations (BDSPOs)	1 workshop/Training organized for developing BDS	* 1 workshop/Training organized for developing BDS	100%	UNDP	120	120	100%	
	Activity 3b.5.4 Support existing entrepreneurs for switching to electric energy	3 Innovative Electricity based technologies piloted/tested	* 3 Innovative Electricity based technologies piloted/tested	50%	UNDP	23,100	23,109.00	100%	Due to transportation, installation not completed
	Activity 3b.5.5 Conduct exploration study for identifying potential and feasible enterprises in the project area	1 Potential Rural Industrial Clusters identified	* 1 Potential Rural Industrial Clusters identified	100%	UNDP	3,030	3,030.00	100%	
	Activity 3b.5.8 Provide capacity building support to existing entrepreneurs for smooth operation of the business, business expansion/growth and productivity improvement	* 100 entrepreneurs trained * 1 visual documentary for PEU	* 100 entrepreneurs trained * 1 visual documentary for PEU	100%	UNDP	18,645	18,585.00	100%	
	Activity 3b.7.1 Provide financial support training/orientation to potential women and marginalized entrepreneurs to switch to electricity and to establish new enterprises	* 2 training/ orientation	* 2 training/ orientation	100%	UNDP	7,965	7,965.00	100%	
	Activity 3b.7.2 Study on impact of PEU on women	* 1 Study	* 1 Study	0%	UNDP	3,000	2971	99%	
<b>Sub Total Activity Result 3b</b>						<b>90,874</b>	<b>90,545</b>		-
	Activity 4.1.1 Conduct a study on Identification of technical challenges and opportunities in design, manufacture, installation and after-sales service for Mini-hydro and Large-scale solar PV systems	* 1 Gap Analysis * 1 monitoring system * 1 Training on PEU Monitoring * 2 quality assurance mechanisms * 1 framework * 1 Workshop	* 1 Gap Analysis * 1 monitoring system * 1 Training on PEU Monitoring * 2 quality assurance mechanisms * 1 framework * 1 Workshop	100%	UNDP	24,795	24,738	100%	



	Sub Activity 4.2.2.1 Organize training for engineers on Mini Hydro DFS	* 1 Training	* 1 Training	100%	GEF	4,250	4,291	101%	
<b>Annual Target : Supported NRREP to organize training on RE systems</b>	Activity 4.2.3 Support NRREP in developing project development, system design and integration manuals for large-scale solar PV systems	* 2 Manual of LSSPV	* 2 Manual of LSSPV	100%	GEF	9,000	8,917	99%	Contracted
	Activity 4.2.4 Support NRREP in conducting capacity building trainings for consulting firms, systems integrators, and relevant service providers for Large-scale solar PV projects	* 2Training	* 2Training	100%	KOREAN	10,260	10,158	99%	
	Activity 4.3.2 Collaborate with and support Mini-hydro manufacturers in acquiring new technologies	* 1 Manual * 1 Training	* 1 Manual * 1 Training	100%	GEF	12,604	12,755	101%	Contracted
	Activity 4.4.3 Support AEPC/NRREP to organize training for installation of Large-Micro Hydro	1 Training	* 1 Training	100%	UNDP	7,801	7,801	100%	
	<b>Sub Total Activity Result 4</b>					<b>68,710</b>	<b>68,660</b>		

**ANNEX 1: List of Mini Hydro Detail Feasibility Study**

S.N.	Schemes	District	Location	Output kW	HHs
1	Bom Khola	Solukhumbu	Chaurikharka	184	402
2	Taman Khola	Baglung	Taman	268	987
3	Phawa Khola	Taplejung	Sanwa	360	388
4	Monjo Khola	Solukhumbu	Chaurikharka	300	500
5	Tadi Khola	Nuwakot	Ghyangphedi	400	3800
<b>Total</b>				<b>1,512</b>	<b>6,077</b>

**ANNEX 2: List of Micro Hydro Detail Feasibility Study**

S.N.	Schemes	District	Location	Output kW	HHs
1	Ganigad MHP	Achham	Sokard	93	613
2	Ganigad MHP	Doti	Pokhari	75	760
3	Ikadigad MHP	Achham	Babla	73	503
4	Bolde Bhudhi Ganga MHP	Bajura	Baramtola	100	797
5	Bhumiraj Khola MHP	Bajhang	Deulikot	100	1079
6	Karnasi Thuligad	Doti	Laxminag	100	655
7	Gannigad II MHP	Baitadi	Kotpatara	100	496
8	Gannigad III MHP	Baitadi	Kotpatara	100	539
9	Saradagad MHP	Baitadi	Sigad	44	510
<b>Total</b>				<b>785</b>	<b>5,952</b>

### ANNEX 3: List of Completed Solar Mini Grid

S.N.	Schemes	District	Location	Output kW	HHs	Remarks
1	Dubung SMG	Tanahun	Baidi	18	140	Financial Assistance of UNESCAP (5P)
2	Bhorleni Solar Wind Hybrid System	Makwanpur	Bhorleni	15	120	Financial Assistance of GoN/AEPC
<b>Total</b>				<b>33</b>	<b>260</b>	

### ANNEX 4: List of Detailed Feasibility Study of Solar Mini Grid

S.N.	Schemes	District	Location	Output kW	HHs	Remarks
1	Jubitha Solar Mini Grid	Kalikot	Jubitha	3.6	54	RERL Support
2	Lalidiyar Solar Mini Grid	Sarlahi	Lalidiyar	10.8	59	
3	Melkhuna Solar Mini Grid	Surkhet	Melkhuna	7.2	54	
4	Sijuwa Solar Mini Grid	Morang	Sijuwa	3.6	19	
5	Pipra Pra Pi Solar Mini Grid	Siraha	Pipra Pra Pi	1.2	54	
6	Gutu Solar Mini Grid	Surkhet	Gutu	30	96	
7	Kera ghari DC Solar Micro Grid	Dang	Keraghari	1.25	15	
8	Basti Khola DC Solar Micro Grid	Dang	Basti	1.25	14	
9	Chilikot DC Solar Micro Grid	Dang	Lhilikot	1.5	15	
<b>Total</b>				<b>60.4</b>	<b>380</b>	

### ANNEX 5: List of Institutional Solar PV Systems

S.N.	Name of the Institution	District	VDC	Size (Watt)	No. of HHs	No. of People	Cost per unit
1	Kaumpur Health Post	Dhading	Kumpur	300	2208	2208	149,543
2	Sunaula Bazar Health Post	Dhading	Sanaula Bazar	300	1402	1402	149,543
3	Khalte Health Post	Dhading	Khalte	300	1486	1486	149,543
4	Nalag Health Post	Dhading	Nalag	300	1743	1743	149,543
5	Salang Health Post	Dhading	Salang	300	1232	1232	149,543
6	Dhola Health Post	Dhading	Dhola	300	864	864	

							147,368
7	Maidi Health Post	Dhading	Madi	300	1970	1970	147,368
8	Khari Heath Post	Dhading	Khari	300	947	947	147,368
9	Tripureswhor Health Post	Dhading	Tripureshowr	300	1535	1535	147,368
10	Jyamrung Birthing Centre	Dhading	Jyamrung	300	783	783	147,368
11	Katunje Health Post	Dhading	Katunje	300	1302	1302	147,368
12	Sathi Ghar Birthing Centre	Kavre	Panchkhal	300	2766	12339	148,585
13	Chandeni Mandan Health Post	Kavre	Chandeni Mandan	300	782	3265	148,585
14	GairiBisauna Birthing Centre	Kavre	Gairibisauna Deupur	300	1203	5374	148,585
15	Baluwapati Deupur Health Post	Kavre	Baluwapati Deupur	300	1292	6023	148,585
16	Nayagau Deupur Health Post	Kavre	Nayagau Deupur	300	951	4417	148,585
17	Mangaltar Birthing Centre	Kavre	Mangaltar	300	792	792	149,133
18	Walting Health Post	Kavre	Walting	300	529	529	149,133
19	Bhimkhori Health Post	Kavre	Bhimkhori	300	1143	1143	149,133
20	Mechchhe Birthing Centre	Kavre	Mechhe	300	506	506	149,133
21	Pokhari Narayan Sthan Helth Post	Kavre	Pokhari Narayan Sthan	300	584	584	149,133
22	Tukucha Helth Post	Kavre	Tukucha Nala	300	1194	1194	147,223
23	Khopasi Health Post	Kavre	Khopasi	300			147,223
24	Devitar Health Post	Kavre	Devitar	300	639	639	147,223
25	Mahankal Health Post	Kavre	Bhugdev	300	722	722	147,223
26	Shikhar Ambote Health Post	Kavre	Shikhar Amobote	300	746	746	147,223
27	Kushadevi Helth Post	Kavre	Kusadevi	300	1722	1722	147,223
28	Jiri Birthing Centre	Dolakha	Jiri	300	1616	1616	147,794
29	Jhyaku Health Post	Dolakha	Jiri	300	914	914	147,794
30	Phasku Health Post	Dolakha	Pasku	300	949	949	147,794

31	Singati Birthing Centre	Dolakha	Singati	300			147,794
32	Jhule Health Post	Dolakha	Jhule	300	445	445	147,794
33	Saraswati Secondary School	Lalitpur	Sankha VDC	300	462	2272	-
34	Kunchowk VDC	Kunchowk	Sindhupalchowk	300			153,950
35	Jiri Municipality	Dolakha	Jiri	800			395,883
36	DDC: Dolakha	Dolakha	Charikot	800			395,883
37	DDC: Nuwakot	Nuwakot	Nuwakot	800			398,780
38	DAO: Nuwakot	Nuwakot	Nuwakot	800			398,780
39	Melamchi Municipality	Sindhupalchowk	Melamchi Municipality	800			395,111
40	Chautara Municipality	Sindhupalchowk	Melamchi Municipality	800			395,111
41	DDC: Sindhupalchowk	Sindhupalchowk	Melamchi Municipality	800			362,835
<b>Total</b>				<b>15,800</b>	<b>35,429</b>	<b>61,663</b>	<b>7,639,155.1</b>

#### ANNEX 6: List of Rapid Assessment of Micro Hydro projects Damage by Earthquake

S.N.	Name of the Institution	District	VDC	Size (kW)	No. of HHs
1	Bhusinga Khola	Okhaldhunga	Bhusinga	75	750
2	Silkhu Khola	Okhaldhunga	Singhadevi	30	300
3	Salpu Khola II	Okhaldhunga	Ragani	18	180
4	Manglakharka Sisnephedi	Okhaldhunga	Khijiphalante	26.5	265
5	Juke Dovan Likhu Khola	Okhaldhunga	Yasum	88	880
6	Phedi Khola	Okhaldhunga	Kalikadevi	43	430
7	Thulo Khola	Okhaldhunga	Phulbari	50	500
8	Pokali Khola	Okhaldhunga	Pokali	17	170
9	Khanikhola Maireli II	Ramechhap	Dimipokhari	13	130
10	Milti Khola I	Ramechhap	Daduwa	16.5	165
11	Pati Khola Khudurki	Ramechhap	Gupteshwor	17.5	175
12	Baaz Khola	Ramechhap	Kubukasthali	13	130
13	Tingla Khola	Ramechhap	Priti	15	150
14	Dumja Khola	Ramechhap	Gupteshwor	18	180
15	Phalate Khola	Ramechhap	Himgangs	10	117
16	Pokudovan Khola	Ramechhap	Bijulikot	45	623
17	Phedi Khola	Ramechhap	Daduwa	22	226
18	Para Khola	Okhaldhunga	Chhy anum	12	138
19	Thotne Khola	Okhaldhunga	Mamkha	15	205
20	Para Khola II	Okhaldhunga	Mulkharka	13	149

21	Molung Khola IV	Okhaldhunga	Kuntadevi	46	609
22	Molung I Khola	Okhaldhunga	Chhyanum	26	394
23	Rumdu Khola	Okhaldhunga	Manebhanjyang	12	169
24	Simlebesi Dhurseni Khola	Okhaldhunga	Mahadevpur	15	120
25	Thotne Khola II	Okhaldhunga	Diyale	57	528
26	Nibu Khola VI	Okhaldhunga	Lumphabung	12	120
27	Lingchur Pokting Khola	Okhaldhunga	Bigutar	32	400
28	Pnkhu Khola	Okhaldhunga	Waska	30	436
29	Molung kattike	Okhaldhunga	Baruneshwor	100	1000
30	Molung Khola III	Okhaldhunga	Harkapur	20	200
31	Kakani Khola	Okhaldhunga	Harkapur	18	177
32	Kakani Khola II	Okhaldhunga	Katunje	12	127
33	Thotne Khola	Okhaldhunga	Mamkha	23	205
34	Saha Khola MHP	Gorkha	Saurpani-1	9	90
35	Sandhi Khola MHP	Gorkha	Ghyachowk-3	8	80
36	Andheri khola Daraudi Dovan	Gorkha	Simjung-9	8.2	82
37	Jhyalla Khola II MHP	Gorkha	Muchowk-3	28	280
38	Adheri khola I MHP	Gorkha	Hansapur-3	13	130
39	Lili khola MHP	Gorkha	Kharibot-4	35	350
40	Patle Khola	Gorkha	Simjung	16	162
41	Upper Hundi Khola	Gorkha	Saurpani/Swara	35	374
42	Maglung Khola	Gorkha	Gumda	25	250
43	Nauli Khola III	Gorkha	Lapu	30	251
44	Bhut Khola	Gorkha	Gumda	45	376
45	Sthul Khola	Gorkha	Swara	70	586
46	Nauli Khola II	Gorkha	Lapu	16	146
47	Upper Hundi Khola III	Gorkha	Saurpani/Swara	22	235
48	Litti khola MHP	Dhading	Litti khola MHP	15	150
49	Kheste khola MHP	Dhading	Kheste khola MHP	13	100
50	Kheste Khola I MHP	Dhading	Kheste Khola I MHP	9	90
51	Kheste Khola II	Dhading	Kheste Khola II	12	107
52	Malekhu Khola III	Dhading	Malekhu Khola III	12	124
53	Malekhu Khola IV	Dhading	Malekhu Khola IV	15	135
54	Maour Khola	Rasuwa	Maour Khola	10	121
55	Machat Khola	Rasuwa	Machat Khola	11	104
56	Khosyang Khola	Rasuwa	Khosyang Khola	10	116
57	Daldhung Khola	Rasuwa	Daldhung Khola	14	137
58	Reuti khola segu tikedhunga	Makawanpur	Reuti khola segu tikedhunga	8	80
59	Reuti khola MHP	Makawanpur	Reuti khola MHP	15	150
60	Nagdaha khola MHP	Makawanpur	Nagdaha khola MHP	19.2	192
61	Syaurebhum MHP	Nuwakot	Syaurebhum MHP	23	230
62	Marin Haitar Khola MHP	Sindhuli	Bastipur	12	120

63	Khani khola MHP	Sindhuli	Shanteswori	13	130
64	Rangcha Ganesthan Khola	Sindhuli	Shantiswori	10	100
65	Waksu Khola III MHP	Sindhuli	Pokhari	36	360
66	Aarubote Khola MHP	Sindhuli	Sitalpati	25.5	255
67	Sokhu Khola MHP	Sindhuli	Ratnadwati	10	100
68	Khani Khola Chokhepani MHS	Sindhuli	Shanteswari	4	40
69	Garke PHP	Sindhuli	Shanteswari	2	20
70	Dhapkhani MHS	Sindhuli	Balajor	5	50
71	Marin Khola	Sindhuli	Amale	24	224
72	Shakar Khola	Sindhuli	Kholagaun	13	192
73	Sou Khola	Sindhuli	Ratnawati	12	158
74	Manpang Khola	Dhading	Budathum	16	200
75	Manpang Khola II	Dhading	Budathum	11	114
76	Manpang Khola III	Dhading	Budathum	9	105
77	Lapang Khola	Dhading	Marpak	9	105
78	Mangpang Khola V	Dhading	Bhudhathum	10	104
79	Kholsyang Khola	Dhading	Ri	20	250
80	Mangpang Khola VI	Dhading	Phulkharka	11	102
81	Kingtang Khola	Dhading	Darkha	40	350
82	Dhunduri khola MHP	Dhading	Jharlang-3	66	660
83	Aafal khola MHP	Dhading	Ri, Gumdi	100	1000
84	Lisne khola MHP	Dhading	Jharlang-2	72	720
85	Kubinde Pachase khola MHP	Dhading	Katunje-4	18	180
86	Lapa khola MHP	Dhading	Lapa-3	30	300
87	Malekhu I	Dhading	Mahadevsthan	26	265
88	Malekhu II	Dhading	Mahadevsthan	18	166
89	Indrawati Khola	Sindhupalchok	Bhotang	40	150
90	Chhahare Khola	Sindhupalchok	Baruwa	17	173
91	Bhumae Khola	Sindhupalchok	Pangtang	13	160
92	Gumba Khola	Sindhupalchok	Gumba	12	160
93	Yangri Khola	Sindhupalchok	Baruwa	28	165
94	Bedang Khola	Sindhupalchok	Gumba	13	140
95	Pangarpu Khola	Sindhupalchok	Pangtang	51	510
96	Jamkitar Khola	Dolakha	Khopachagun	20	200
97	Shyankhu Khola	Dolakha	Chilankha	30	330
98	Ghatte Khola	Dolakha	Khopachngu	12	240
99	Kakchepu Khola	Dolakha	Jhyanku	32	320
100	Dorung Khola	Dolakha	Chilankha	29	324
101	Ruptang Khola	Dolakha	Bigu	52	520
102	Kolung Khola	Dolakha	Suri	50	598
103	Gurumphi Khola	Dolakha	Nebaru, Suri	26	260
104	Doling Khola	Dolakha	Chankhu	37	370
105	Thulo Sim Ghatte Khola	Dolakha	Lamidanda	21	210



106	Korung Khola	Dolakha	Marbu	30	300
107	Nagara Ghatte Khola	Dolakha	Alampu	40	400
108	Milti Khola II MHP	Dolakha	Dandakharka	37	370
109	Ghatte Khola MHP	Solukhumbu	Kaku	13.5	135
110	Bhuwa khola MHP	Solukhumbu	Bung	88	880
111	Rok Khola	Solukhumbu	Sotang	70.2	702
112	Upper Rok	Solukhumbu	Sotang	76	760
113	Muhan Khola Jor Dhara	Solukhumbu	Jubu	14.7	147
114	Pekanas Khola	Solukhumbu	Tingla	15	150
115	Khari Khola II	Solukhumbu	Juving	40	400
116	Khari Khola III	Solukhumbu	Juving	70	700
117	Jwalamai Loding Khola MHP	Solukhumbu	Tamakhani	20	200
118	Bom Khola	Solukhumbu	Chaurikharka	100	147
119	Monjo Khola	Solukhumbu	Churikharka	50	94
120	Dudu Khola	Solukhumbu	Lokhim	52	525
121	Sumbu Khola	Solukhumbu	Deusa	15	200
122	Dudu Khola II	Solukhumbu	Jubu	67	579
123	Pokhara khola MHVEP	Kavre	Fosingtar	11	118
124	Chauri Khola MHDS	Kavre	Pokharichauri	22	205
125	Parbati Khola MHDS	Kavre	Budhakhani	22	210
126	Khani Khola I MHDS,	Kavre	Falametar	23	154
127	Chauri khola IV MHDS	Kavre	Pokharichauri	45	416
128	Parbati Khola II MHDS	Kavre	Budhakhani	21	210
129	Durlung Khola I MHS	Kavre	Milche	15	150
130	Durlung Khola II MHS	Kavre	Milche	20	200
131	Khani Khola II MHDS	Kavre	Salmechakal	22	240
132	Chauri Khola V MHVEP,	Kavre	Maghifeda	29	290
133	Daune Khola MHDs	Kavre	Mangaltar	12	107
134	Kulkule Khola MHVEP	Kavre	Milche	12	120
135	Banakhu khola MHVEP	Kavre	Ghartichhap	50	511
136	Chau khola I MHVEP	Kavre	Gokule	22	194
137	Chau khola II MHVEP	Kavre	Dandagaun	24	239
138	Chau Khola III MHS	Kavre	Dandagaun	28	254
139	Banakhu khola II MHS	Kavre	Ghartichhap	25	259
140	Chau khola IV MHS	Kavre	Gokule	20	205
<b>Total</b>				<b>3833.8</b>	<b>37547</b>

## ANNEX 7: List of Rapid Assessment of Solar Pumping Systems Damage by Earthquake

S.N.	Assessed PVPS sites	Doistrict	Location	Functional status post-EQ
1	Chisopani RSDWP	Dhading	Sunaulo Bazaar - 4	Non-functional
2	Barkhe Khola RSDWP	Dolakha	Bulung - 4,	Partially functional
3	Chaap Dhara RSDWP,	Dolakha	Khare-5, Okhreni,	Partially functional
4	Lukuwa Dhunga,	Okhaldhunga	Thulachap - 1,	Partially functional
5	Dhara Khola RSDWP	Ramechhap	Himganga - 4,	Partially functional
6	Jalukeni RSDWP	Sindhuli	Hatpate, Jalukeni -3,	Partially functional
7	Tirtire RSDWP	Sindhuli	Belghari, Tirtire-6	Partially functional
8	Bhadauri Kholsi RSDWP	Tanahu	Gajarkot - 8	Partially functional
9	Loshe RSDWP	Ilam	Mahmai - 9	Non-functional
10	Dadui RSDWP	Ilam	Mahmai - 2,3,	Non-functional
11	Kali Kholsi RSDWP	Ilam	Danabari - 9,	Non-functional
12	Choronge RSDWP	Panchthar	Aarubote	Non-functional
13	Mangmalung RSDWP	Ilam	Bajho	Non-functional
14	Simle Kholsi	Sindhuli Udayapur	Katunjebawal-7	Partially functional
15	Kause Khola RSDWP	Makwanpur	Dhiyal-8,	Partially functional
16	Simkhola RSDWP	Okhaldhunga	Kettuke - 8,	Partially functional
17	Baguwa RSDWP	Kavre	NA	Under construction
18	Jaali Dhunga RSDWP	Ramechhap	NA	Under construction
19	Besitole RSDWP	Ramechhap	NA	Under construction
20	Dharadi Khottar RSDWP	Tanahun	NA	Functional
21	Arcekhola PVPS	Myagdi	Mudi-5,	Non-functional
22	Jogineta PVPS	Rukum	Kholagaun-3	Partially functional

23	Lamiraha Surkimare PVPS	Rukum	Kholagaun-3	Partially functional
24	Setapaira PVPS	Surkhet	Gharpat-7	Partially functional
25	Dahakhola PVPS,	Rukum	Pur Mkanda-4,	Partially functional
26	Siddhasthan PVPS	Baglung	Sukhura-1	Non-functional
27	Khadar PVPS,	Palpa	Jhirubas,	Non-functional
28	Dungale PVPS,	Rukum	Kholagaun-3,	Partially functional
29	Dopka PVPS,	Dailekh	Lalikanda-4,	Partially functional
30	Devasthan PVPS	Palpa	Sahalkot-6,	Partially functional
31	Yari PVPS,	Rolpa	Kare-5	Partially functional
32	Kasilmela PVPS	Dailekh	Awalparajul-2	Partially functional
33	Bhalajung PVPS	Rolpa	Nuwagaun-8,	Partially functional
34	Dadagaun PVPS	Rolpa	Nuwagaun-8,	Partially functional
35	Dhanmang PVPS	Rolpa	Nuwagaun,	Partially functional
36	Chiurikhola PVPS	Rolpa	Gairigaun-9	Partially functional
37	Oyapani PVPS	Arghakhachi	Maidan-8,	Functional
38	Domilla Todke PVPS	Rukum	Peuga-1,2,9,	Under construction
39	Jharatope Dhup Halne PVPS,	Rukum	Pur Mkanda- 4,5,	Under construction
40	Pakhapani Lugadhune Timile PVPS,	Rolpa	Nuwakot-4,5,9	Under construction
41	Lolekhola PVPS,	Rolpa	Nuwagaun-1,	Under construction
42	Dwarpani PVPS	Rolpa	Nuwagaun-1,	Under construction

## ANNEX 8: List of Rapid Assessment of Solar Pumping Systems Damage by Earthquake

S.N.	Name of Entreprises	Name of Entrepreneur	Gender	District	VDC
1	Chhantyal Computer Sewa	Tilak Chhantyal	M	Baglung	Jaljala
2	Monika Computer Centre	Toran Chhantyal	M	Baglung	Burtibang
3	Pachhimanchal Technical Institute	Jiban Safal Chhantyal	M	Baglung	Burtibang
4	Machhapuchhere Chiuree Harbal Soap	Nar Bahadur Chhetri	M	Baglung	Bhimgithhe
5	Roka Masu Pasal	Gom Bahadur Roka	M	Baglung	Burtibang
6	Paija Pisani Mill	Mukta Bahadur Paija	M	Baglung	Gwalichaur
7	Rudra Masu Pasal	Rudra Bahadur Pun	M	Baglung	Jaljala
8	Ane Chhantyal Masu Pasal	Ane Chhantyal	M	Baglung	Jaljala
9	Khatri Masu Pasal	Bir Bahadur Khatri	M	Baglung	Bhimgithhe
10	Samuhel Grill Udhyog	Dil Bahadur Karki	M	Baglung	Devisthan
11	Ramjali Computer Center	Chandra Sing Ramjali	M	Baglung	Devisthan
12	Puspa Dudh Pasal	Mukta Bahadur Shing	M	Baglung	Devisthan
13	Smriti Kutani Pisani Mill	Bhupendra Gharti	M	Baglung	Nishi
14	Sapkota Kutani Pisani Mill	Bali Bhadra Sapkota	M	Baglung	Boharagaun
15	Dhan Bahadur Kutani Pisani Mill	Dhan Bahadur Thapa	M	Baglung	Dagatundanda
16	Birkot Kutani Pisani Mill	Nanda Bahadur Darlami	M	Baglung	Kandebas
17	Buddha Bangur Masu Pasal	Buddhiman B.K.	M	Baglung	Burtibang
18	Aakriti Photocopy Center	Top Bahadur Darlami	M	Baglung	Dagatundanda
19	Sagar Samundr Furniture Udhyog	Gunanidhi Ghimire	M	Baglung	Gwalichaur
20	Sapkota Kutani Pisani Mill	Devi Ram Sapkota	M	Baglung	Aadhikarichaur
21	Yogendra Rice Mill	Yogendra Gharti	M	Baglung	Boharagaun
22	Salleri Community Furniture Uhyog	Resham Tamang	M	Baglung	Burtibang
23	Trisana Motor parts	Kubir B.K.	M	Baglung	Burtibang
24	Shresh Pisani Mill	Jit Bahadur Shreesh	M	Baglung	Ransingkiteni
25	K.C.Masu Pasal	Man Bahadur K.C.	M	Baglung	Devisthan
26	Kunwar Masu Pasal	Narendra Kunwar	M	Baglung	Devisthan
27	Pandavkhani Pisani Mill	Nabin Pun	M	Baglung	Pandavkhani
28	Kiran Rice Mill	Ishwori Kumari Kunwar Chhettri	F	Baglung	Devisthan
29	Dhurba Masu Pasal	Dhurba Raj Regmi	M	Baglung	Boharagaun
30	Susan Masu Pasal	Amrit Thapa	M	Baglung	Rajkut
31	Bhu.Pu. Sainik Rice Mill	Laxman Karki	M	Baglung	Devisthan
32	Kunwar Rice Mill	Jit Bahadur Kunwar	M	Baglung	Devisthan
33	Prabes Grill Udhyog	Goma Kharel	F	Baglung	Gwalichaur
34	Durlek Nepali Hate Kagaj	Gange Bahadur Shreesh	M	Baglung	Ransingkiteni
35	Shiva Parbati Block Udhyog	Krishna Shai	M	Baglung	Boharagaun
36	Radio Paribartan	Ram Narayan Subedi	M	Baglung	Burtibang
37	Bhusal Electronics	Chandra Kanta Bhusal	M	Baglung	Boharagaun
38	Love Mobile	Kamal Bhandari	M	Baglung	Kandebas
39	Sarbodaya Kutani Pisani Mill	Hem Lal Paudel	M	Baglung	Sarkuwa

40	Thapa Digital Photo Studio	Mitra Bahadur Thapa	M	Baglung	Rangkhani
41	Aacharya Masu Pasal	Nanda Lal Padhya	M	Baglung	Rangkhani
42	Kandebas Cyber Center	Rajib Serchan	M	Baglung	Kandebas
43	Milan Duna Tapari udhyog	Dammar Bahadur Shreesh	M	Baglung	Righa
44	Sidhhathan Masu Pasal	Dil Bahadur Pun	M	Baglung	Pandavkhani
45	Sujata Masu Pasal	Shankar Kharel	M	Baglung	Gwalichaur
46	Prem Rice Mill	Prem Lal Damai	M	Baglung	Burtibang
47	Gautam Rice Mill	Bhim Bahadur Gautam	M	Baglung	Aadhikarichaur
48	Computer Training Institute and Photocopy Centre	Dhan Bahadur Mahat	M	Baglung	Burtibang
49	Computer Education Training and Photocopy Centre	Keshab Sapkota	M	Baglung	Aadhikarichaur
50	Bhupendra Aaran Bebasaya Udhog	Jitendra Kumar Sirpali	M	Baglung	Aadhikarichaur
51	Aarnakot Masu Pasal	Shankar Bahadur Kunwar	M	Baglung	Burtibang
52	Dhupibot Rice Mill	Bhimsen Pun	M	Baglung	Aadhikarichaur
53	Ganesh Puroti Udhog	Lal Bahadur Pun	M	Baglung	Aadhikarichaur
54	Gaule Fresh House	Amrita Pun	F	Baglung	Aadhikarichaur
55	Sherdhani Rice Mill	Dhane Giri	M	Baglung	Aadhikarichaur
56	Salghari Fero Duna Tapari Udhog	Man Kumari B.K.	M	Baglung	Burtibang
57	Khadka Pisani Mill	Chit Bahadur Khadka	M	Baglung	Burtibang
58	Bimal Digital Photo Studio	Bimal Gharti	M	Baglung	Bhimgithhe
59	Boharagaun Grill udhyog	Rajendra Shai	M	Baglung	Boharagaun
60	Khanal Masu Pasal	Bom Bahadur Chhettri	M	Baglung	Burtibang
61	Barsa Masu Pasal	Buddhi Bahadur Singh	M	Baglung	Devisthan
62	Bipin Fresh House	Nanda Bahadur Shreess	M	Baglung	Ransingkiteni
63	Shreesh Kutani Pisani Mill	Tul Prasad Shreess	M	Baglung	Rangkhani
64	Himal Pouroti udhyog	Thaman Bahadur Gharti Magar	M	Baglung	Nishi
65	Nok Rice Mill	Nok Bahadur Khatri	M	Baglung	Devisthan
66	Prabin Masu Pasal	Tara prasad Shrestha	M	Baglung	Rajkut
67	Anup Mill Udhog	Yam Kumari B.K.	F	Baglung	Bongadovan
68	Nabin pisani Mill	Nar Bahadur Gharti	M	Baglung	Bongadovan
69	Burtibang Better test Masu Pasal	Jit Bahadur Malla	M	Baglung	Burtibang
70	Manohar Rice Mill	Manohar Buda Magar	M	Baglung	Boharagaun
71	Chhantyal Rice Mill	Saba Raj Chhantyal	M	Baglung	Devisthan
72	Engineering Service Center	Hem Bahadur Kunwar	M	Baglung	Burtibang
73	Salamkot Kutani Pisani Mill	Nem Lal Kandel	M	Baglung	Burtibang
74	Amar Pisani Mill	Amar Bahadur Buda	M	Baglung	Aadhikarichaur
75	Kismat Tailors	Yam Bahadur Darji	M	Baglung	Kandebas
76	Kharel Fresh House	Jibalal Jaisi Kharal	M	Baglung	Bhimgithhe
77	Sumitra Rice Mill	Nar Bahadur Chhetri	M	Baglung	Bhimgithhe
78	Manisha Kutani,Pisani & Pelani Mill	Man Bahadur Shress	M	Baglung	Rangkhani
79	Krishi Kutani Pisani Mill	Krishna Bahadur K.C.	M	Baglung	Bhimgithhe

80	LB Aaran Udhyog	Jiyalal Kami	M	Baglung	Bongadovan
81	Bishowkarma Aaran Udhyog	Gopi Ram Kami	M	Baglung	Burtibang
82	Bhattarai Books and stationary	Prakash Bhattarai	M	Baglung	Kandebas
83	Gom Kutani Pisani Mill	Gom Bahadur Rana	M	Baglung	Dagatundanda
84	Jana Priya Photo Studio & Photocopy Centre	Krishna Prakash Adhai	M	Baglung	Aadhikarichaur
85	Bibisa Masu Pasal	Ganga Thapa Magar	F	Baglung	Bhimgithhe
86	Resham Kutani Pisani Mill	Lok Bahadur Khatri	M	Baglung	Bhimgithhe
87	Youbanisha Pouroti Udhyog	Dhan Maya Ramjali	F	Baglung	Righa
88	Deep Kiran Community Furniture	Rul Bahadur Gharti Magar	M	Baglung	Khunga
89	Amrita Kutani Pisani Mill	Yam Bahadur Balal	M	Gulmi	Neta
90	Deurali Computer Sewa	Dil Bahadur Thapa	M	Syangja	Chitrehanjyang
91	Simran Silai Katai Udhyog	Hira Damai	M	Syangja	Chisapani-6
92	Sunil, Sandip, Sanam Fresh house	Indra Kumari Thapa	M	Syangja	Chitrehanjyang
93	Lal Fresh house	Lal Bahadur Bayambu	M	Palpa	Galdha-6
94	Bayambu Fresh house	Hom Bahadur Bayambu	M	Palpa	Galdha-6
95	Materi Kutani Pisani Mill	Dal Bahadur Chauchan	M	Palpa	Rahabas-6
96	Chindi Fresh house	Babu Ram Chidi	M	Palpa	Koldanda-4
97	Shanti Fresh house	Chure B.K.	M	Palpa	Koldanda-7
98	Rana Fresh house	Thanam Singh Rana	M	Palpa	Koldanda-8
99	Chitre Langali Kutanipisani Mill	Balkrishna Rana	M	Syangja	Chitrehanjyang-8
100	Deurali Photo Stuido	Kosh Bahadur Thapa	M	Syangja	Chitrehanjyang-8
101	Ramche Janasewa Rice Mill	Durga Bahadur Rana	M	Syangja	Chitrehanjyang-6
102	Shital Fresh house	Parwati Thapa	F	Syangja	Chisapani-5
103	Sigdel Rice Mill	Krishna Prasad Sigdel	M	Syangja	Chisapani-9
104	Burtibang Nilkamal Tailors	Gyan Devi Kami	F	Gulmi	Wami- 1
105	Shalik Rice Mill	Shalikram Pokhrrel	M	Gulmi	Musikot - 2
106	Musikot Kutpis Mill	Ram Bdr Singh	M	Gulmi	Musikot - 4
107	Shree Ganesh Kutani Pisani Mill	Chandra B Karki	M	Gulmi	Musikot- 7
108	Ghimire Fresh house	Hari Bdr Gimire	M	Gulmi	Musikot - 4
109	Ramdip Fresh House	Ram Bdr Pun	M	Gulmi	Musikot - 4
110	Deurali Masu Pasal	Mahendra singh Thakuri	M	Gulmi	Musikot - 9
111	Goodfit shorting shutting Tailoring	Ramesh Pariyar	M	Gulmi	Purkotdaha - 5
112	Manakamana Fresh house	Kalpana Karki	F	Gulmi	Wami- 1
113	Sabitra Kutani Pisani Sewa	Dorna Bdr Pathak	M	Gulmi	Paudiamarai - 2
114	New famous Silai Kapada Pasal	Durga Damai	F	Gulmi	Wami- 1
115	Raju Tailors	Dhal Bdr Darji	M	Gulmi	Wami- 1
116	Star Furniture Udhyog	Laxman Phullel	M	Gulmi	Wami- 3
117	Asmita Furniturre Udhyog	Man Prasad Shrestha	M	Gulmi	Wami - 1
118	Kutanipisani Mill (Parisharmik Coperative)	Dhal Bdr Bohora	M	Gulmi	Neta - 5
119	Laxmi narayan Mahila Kri Masala Udhyog	Yamuna Ghimire	F	Gulmi	Wami - 1

120	Sijan Beauty Parlour	Sijan Shakya Bauddhacharya	F	Gulmi	Wami - 1
121	Wami Taxsar Kutani Pisani Mill	Nar Bdr Kumal	M	Gulmi	Wami - 1
122	Amrita Kut Pis Mill	Dev Prasad Ghimire	M	Gulmi	Neta - 4
123	Sandesh and Subidha Tailors	Bhakta Bdr Damai	M	Gulmi	Paudiamrai - 8
124	Karishma Fresh House	Pomananda Kharel	M	Gulmi	Neta - 3
125	Ashmi Kutani Pisani Mill	Hari Bdr Mahat Chhetri	M	Gulmi	Musikot - 9
126	Sangam Fresh House	Bhagirath Ghimire	M	Gulmi	Musikot - 4
127	Lok Shova Fresh House	Lok Bdr Singha	M	Gulmi	Musikot - 5
128	Rudrawati Kutani Pisani Mill	Nar Bdr Khatri	M	Gulmi	Musikot - 6
129	Shree Sirjana Stationery Stores	Yamuna Ghimire	F	Gulmi	Wami - 1
130	Malika Silai Center	Chunna Bdr Damai	F	Gulmi	Wami - 2
131	Jana Sangita Pisani Mill	Hira Bahadur Khatri	M	Gulmi	Paudiamrai - 7
132	Chisapani Namuna Rice Mill	Dil Bdr G.T.	M	Syangja	Chisapani 8
133	Kaladhar Rice Mill	Kaladhar Bhandari	M	Syangja	Chisapani 6
134	Sunder Kalika Rice Mill	Bagar Bahadur Tamang	M	Dhading	Pida
135	Ganesh Himal Rice Mill	Singh Bahadur Tamang	M	Dhading	Lapa
136	Yamuna Rice Mill	Tej Bahadur Lamichhane	M	Dhading	Gumdi
137	Anusha Rice Mill	Bahadur Singh Ghale	M	Dhading	Gumdi
138	Singla Devi Rice Mill	Phaichhiring Tamang	M	Dhading	Sertung
139	Buddhiman Pisani Mill	Buddhiman Thokat Tamang	M	Dhading	Tasarpu
140	Archale Fresh House	Vhim Bahadur Lungeli Magar	M	Dhading	Mahadevsthan
141	Mala Rice Mill	Narayan Bahadur Rijal	M	Dhading	Darkha
142	K.B Kutani Pisani Mill	Khadka Bahadur Magar	M	Dhading	Mahadevsthan
143	Sita Kaudi Rice Mill	Man Bahadur Ghale	M	Dhading	Budhathum
144	Chuli Devi Rice Mill	Min Bahadur Adhikari	M	Dhading	Budhathum
145	Sujan Kutani Pisani	Bal Bahadur Ghale	M	Dhading	Budhathum
146	Bibas Rice Mill	Bahadur Ghale	M	Dhading	Budhathum
147	Jit Bahadur Kutani Pisani Mill	Jit Bahadur Tamang	M	Dhading	Mahadevsthan
148	Amrit Pelani Pisani Mill	Pur Bahadur Gurung	M	Gorkha	Laprak
149	Pritam Bakery Udhyog	Hom Bahadur Gurung	M	Gorkha	Muchok
150	Bhome Nepali kagaj Udhyog	Geet Bahadur Gurung	M	Gorkha	Laprak
151	Thanimai Kutani Pisani Mill	Go-Maya Gurungseni	F	Gorkha	Ghyachok
152	Sujan Mill	Sujan Devkota	M	Gorkha	Muchok
153	Laprak Masu Pasal	Hasbal Gurung	M	Gorkha	Laprak
154	Dudh Pokhari Fresh House	Til Kumari Gurung	M	Gorkha	Takukot
155	Saurpani Photo Studio	Shanta Narayan Shrestha	M	Gorkha	Saurapani
156	Haste Pisani Mill	Hasta Bahadur Gurung	M	Gorkha	Laprak
157	Nage Pokhari Masu Pasal	Khem Raj Gurung	M	Gorkha	Ghyachok
158	Rachana Swachha Masu Pasal	Ram Chandra Devkota	M	Gorkha	Muchok
159	Bhot Khola Tel Pisani Mill	Ram Bahadur Gurung	M	Gorkha	Gumda

160	Gaunle Kutani Pisani Mill	Krishna Bahadur Thapa Magar	M	Gorkha	Thumi
161	Laprak Computer Institute	Jit Bahadur Gurung	M	Gorkha	Laprak
162	Punya Rice Mill	Bir Bahadur Tamang	M	Gorkha	Swara
163	Machi Khola Chowmin Udhyog	Kemi Gurung	M	Gorkha	Gumda
164	Dorge Poultry Suppliers	Dorge Gurung	M	Gorkha	Barpak
165	Ghale Rice Mill	Thim Bahadur Ghale	M	Gorkha	Barpak
166	Ranjib Gramin Computer Institute	Jit Bahadur Gurung	M	Gorkha	Lapu
167	Barpak Dhunga Udhyog	Hari Ghale and Kumar Ghimire	M	Gorkha	Barpak
168	Shree Jhyalla Bhume Rice Mill	Bed Kumari Bastakoti	M	Gorkha	Muchok
169	Dhanpurna Bakery Udhyog	Kosi Ram Ghale	M	Gorkha	Barpak
170	Saraswati Rice Mill	Gaj Bahadur Gurung	M	Lamjung	Dudhpokhari
171	Milan Rice Mill	Bhim Bahadur Gurung	M	Lamjung	Ilampokhari
172	P4 Fresh House	Prati Jung Tamang	M	Lamjung	Taghring
173	Gurung Rice Mill	Om Bahadur Gurung	M	Lamjung	Ilampokhari
174	Gairegaun Fresh House	Kumari Gurung	F	Lamjung	Dudhpokhari
175	Thulo Kavre Rice Mill	Tulasa Ghale (Gurung)	F	Lamjung	Ilampokhari
176	Moonlight Bakery Udhyog	Kancha Gurung	M	Manang	Tankilmanang
177	Green Bakery Udhyog	Bikram Gurung	M	Manang	Manang
178	Manang Thukppa Udhyog	Sagar Gurung	M	Manang	Manang
179	Sanna Bakery Udhyog	Binod Gurung	M	Manang	Manang
180	S.T Computer Institute	Pemba Dorge Gurung	M	Manang	Manang
181	Manang Yak Cheese Udhyog	Raju Gurung	M	Manang	Manang
182	Shree Sarbottam Pisani Mill	Bot Devi Gurung	M	Manang	Thoché
183	Nabina Tailoring Centre	Buddha Maya Bhanne Nabina Pariyar	F	Manang	Chane
184	Ruchang Masala Udhyog	Man Bahadur Saru	M	Nawalparasi	Ruchang
185	Rakim Aran Udhyog	Ek Bahadur Rakim Magar	M	Nawalparasi	Ruchang
186	Manisha Photo Studio and Communication	Sun Bahadur Saru Magar	M	Nawalparasi	Ruchang
187	Srees Sinki Chauchau Udhyog	Amar Bahadur Gaha Magar	M	Nawalparasi	Ruchang
188	Bal Vidya Mandir Cyber and Photocopy	Niraj Bastakoti	M	Nawalparasi	Bulingtar
189	Buddha Photo Studio	Buddha Bahadur Thapa Magar	M	Nawalparasi	Jaubari
190	Rudrapur Sinke Chau Chau Tatha Chaumin Udhyog	Dhan Bahadur Thapa	M	Nawalparasi	Jaubari
191	Sabina Ice Cream Tatha Juice Udhyog	Dev Bahadur Khandluk Magar	M	Nawalparasi	Jaubari
192	Puspa Kutani Pisani Mill	Resham Lal Thapa Magar	M	Nawalparasi	Ruchang
193	Khom Bahadur Rana Rice Mill	Churamuni Rana	F	Nawalparasi	Jaubari
194	Kota Grill Udhyog	Dhan Raj Gurung	M	Tanahu	Kot
195	Kosish Block Udhyog	Him Raj Gurung	M	Tanahu	Kot
196	Indreni Pauroti Udhyog	Indra Bahadur Ranabhat	M	Tanahu	Baidi



197	Jhimel Gril Udhyog	Buddhi Lal Gurung	M	Tanahu	Kota
198	Prakash Kutani Pisani Rice Mill	Chandra Prakash B.K.	M	Tanahu	Kot
199	Birendra Puroti Udhyog	Lal Bahadur Gurung	M	Tanahu	Kot
200	Khalte Rice Mill	Suk Bahadur Ranabhat	M	Tanahu	Baidi

### ANNEX 9: List of Training

S.N	Training	Participants	
		Male	Female
1	Skill development training on Lokta Japanese technology	16	4
3	Stakeholder Consultation Meeting on opportunities powered enterprises	15	8
4	Skill development training for Lokta Enterprenurs	17	
5	Business Management and Market Linkage training to Lokta enterprenurs	19	0
7	Business Management and counselling training to Cottage Industry Business Development Board	21	0
8	Stakeholder Consultation Meeting to Collect Feefdback on Rural Industrial Cluster Framework	88	12
9	Developing Framework to Establish Rural Industrial Cluster (RIC)	14	2
10	Management and marketing of Lokta prouction	42	3
11	Business Mnagement and Councelling Training to CSIDB officials	28	2
12	Business Management Trainibg to women entrepreneurs	0	21
13	Skill development training for Bakery entrepreneurs	14	3
14	Business Management Training	14	3
15	Business Management Training	22	0
16	Business Management Training	16	3
17	Advance Computer Trainig	0	22
18	Advance Tailoring Training	6	13
<b>Total</b>		<b>332</b>	<b>96</b>



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