

## Outcome 1: Policy and Institutional

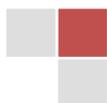
**Policy for Grid Connection of Renewable Energy Technologies:** The Government of Nepal is looking at the feasibility of interconnecting large solar PV and Wind energy plants with the national grid to reduce power outages in the Integrated Nepal Power System and also to reduce dependence on imported fossil fuel for electricity generation. A Task Force under the chairmanship of the Energy Secretary has been constituted to look at the possibilities of grid connection of RE and provide recommendations to the government. RERL and AEPC were actively involved in preparing the recommendations. The Task Force has recommended to inject 15% of the total connected power from renewable resources along with limits of power injection at various voltage levels. Once these recommendations are adopted in the policy, NEA will go for PPA for renewable resources at higher rate than conventional sources.

**Technical Standards for Grid Connection of Renewable Energy Technologies :** AEPC/RERL organized a half day workshop on Grid Connection of Renewable Energy Technologies on 4 March 2016. The main purpose of the workshop was to bring together representatives from government, utility and academic institutions and practitioner to finalize the draft technical specifications for interconnection of solar PV prepared by RERL/AEPC, revision of existing Technical Standard for Grid Connection of Micro/Mini Hydro, experience sharing of grid connection of Micro/Mini Hydro from region and sharing of Technical Report prepared by Ministry of Energy for Grid Connection of Solar PV and Feed in Tariff and Net Metering Policy Discussion for RE Technologies. Altogether 53 participants from different organizations actively participated in the workshop.

**Case Studies of Mini Hydropower Projects in Nepal:** RERL supported AEPC to prepare a proposal to undertake studies of 5 mini hydropower projects in Nepal with financial assistance of United Nations Environment Programme (UNEP). RERL/AEPC and Practical Action Consultancy are jointly studying these projects to identify issues related to governance, management, financing, operation, etc. UNEP is providing USD 70,000 to undertake this study.

**Institutional arrangement in the federal structure:** The Government of Nepal has asked ministries, departments and agencies to prepare plans to decentralize activities as envisaged by the recently promulgated Constitution of Nepal 2015. In this regard, RERL is supporting AEPC to prepare a broad concept to decentralize renewable energy promotion activities from central level to provincial, district and village/municipalities. RERL has subcontracted FEM to undertake this activity.

**Renewable Energy Exhibition:** Renewable Energy for Rural Livelihood (RERL) supported Alternative Energy Promotion Centre (AEPC) to organize “Renewable Energy Exhibition 2016” with slogan of “Renewable Energy for Energy Security” in Kathmandu from January 1 to 3, 2016 with the objective of creating awareness about renewable energy among the general public as an effective alternative to address energy crisis faced by



Alternative Energy Promotion Centre  
Renewable Energy for Rural Livelihood



the country. The programme also included a Policy Discussion on ‘renewable energy for enhancing energy security’.



Prime Minister Mr. K.P. Sharma Oli inaugurated the exhibition on January 1, 2016. In his keynote speech, Mr. Oli elaborated his vision to harness indigenously available clean energy resources and reducing dependency on imported fossil fuel. He mentioned that if we work hard, we can generate enough power within year to make the rolling black outs a thing of the past. The Prime Minister also acknowledged AEPC’s effort and support from developing partners in organizing this important and relevant event. He also pledged full support from his government for this sector. The highlight of the opening

ceremony was the signing of contracts between various energy service providers and local industries for solar PV installation and power purchase agreement amounting to 10 MW. This is considered a major breakthrough in Nepal’s solar energy market.

## Outcome 2: Increase Investment in RE

**Taplejung Mini Grid:** RERL is supporting AEPC to implement the World Bank funded Kabeli Transmission Project, Component 3. The Taplejung Mini Grid interconnecting 6 mini/micro hydropower plants to evacuate electricity to the district headquarters is being developed under this project. RERL has provided assistance to finalize the detailed feasibility study of the project and establishment of Taplejung Mini Grid Development Functional Group. RERL is also supporting the communities to procure goods and services following IDA procedures. RERL also provided assistance to assess bids for installation of 11 kV transmission line, preparation of Vulnerable Community Development Plan and Environment Assessment related to the mini grid.

**Baglung Mini Grid:** UNDP and AEPC had installed Baglung Mini Grid in 2011. This mini grid pools energy from six MHPs with the total installed capacity of 106 kW. Due to conflicts within the community, the mini grid was not operated optimally. RERL provided technical assistance to the communities to revive the mini grid. RERL is also planning to support the communities to strengthen the capability of the cooperative for smooth and sustainable operation of the project. AEPC also plans to support the communities to interconnect their mini grid with the national grid in 2016.

**Power Purchase Agreement of 2 Micro Hydro Plants:** NEA Board has approved Power Purchase Agreements of the 23 kW Syaurebhumi and 40 kW Leguwa Khola MHPs. This has opened up opportunity to grid connect existing MHPs in areas encroched by the national grid. RERL is providing technical and financial assistance to the communities to synchronize their systems with the grid.

**Dhading Solar Project:** RERL is implementing Dhading Solar Project funded by Gyeongsangbuk – do Provincial Government of Korea. Uder this project, RERL is supporting the marginalized Chepang



communities to install 3 solar PV mini grid, water lifting system and an industrial hub in Chotesh, Mahadevsthan VDC of Dhading. The integrated water supply system has been installed, the mini grids are being installed and procurement process for industrial hub has already been initiated. All the works are expected to be completed by the end of April 2016.

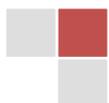
**Every Drop Matters:** With the financial assistance of the Every Drop Matters project of UNDP and the Coca Cola Foundation, communities of 5 villages in Dhading have installed water lifting projects. The projects are located at Simthali, Chiuritar, Jarung and Chotesh of Mahadevsthan and Apchur of Baireni. Four of these systems utilize MHP and the fifth one at Chotesh is solar PV integrated water pumping project.

**Bhorleni Solar Wind Hybrid System:** AEPC supported the communities of Bhorleni, Makwanpur to install a 25 kW solar wind hybrid system. The system was inaugurated by Hon. Minister of Ministry of Population and Environment on 13 March 2016. The hybrid system consists of a 15 kW solar PV plant and 10 kW wind energy plant. It is providing electricity access to 131 households and businesses. Bhorleni is the market center of 5 VDCs of Makwanpur and Kavre districts. RERL is supporting the communities to establish a cooperative to manage the system and to promote productive energy uses. RERL is helping DDC Makwanpur to procure consulting services to mobilize the beneficiary households and to establish and register a cooperative.

**Dubung Solar Mini Grid:** Under the Pro-poor Public Private Partnership (5P) modality, AEPC with financial assistance of UNESCAP has supported the communities of Dubung, Baidi, Tanahun to establish a 18 kW solar mini grid providing electricity to 140 households and productive energy uses. The mini grid was installed and commissioned on November 2015. This system was developed by a Special Purpose Vehicle called Dubung Solar Power Company formed by Saral Urja Nepal, a private company based in Kathmandu and the communities of Dubung. This is the first of its kind institutional set up in Nepal for development and supply of electricity based on renewable resources. RERL carried out the Business Opportunity Assessment of the mini grid catchment area and has identified more than 20 potential enterprises. RERL is supporting PEUC/NRREP to establish enterprises.

**Support for Mini Hydropower Projects:** RERL and SASEC of AEPC have identified 7 mini hydropower projects for development. These projects include Phawa Khola (360 kW), Namche (300 kW), Manjo (512 kW), Bom Khola II (186 kW), Simrudhu (200 kW), Sani Bheri (200 kW) and Giri Khola (200 kW). AEPC, RERL, SASEC and Asian Development Bank decided to take these projects forward. RERL will provide technical assistance necessary for financial closure whereas SASEC will provide financial assistance (both loan and subsidy) to develop these projects.

RERL is also supporting the communities of Junbesi Mini Hydropower Project (300 kW) to carry out Business Plan of the project. This project is being developed with financial assistance of AEPC/NRREP.



**Credit Guarantee and Vendor Financing for Solar Pumping:** RERL has supported CREF to establish a credit guarantee fund to support Sun Farmer to install and operate 5 household sized solar pumping systems for irrigating vegetable gardens in Khairahani of Chitwan district. The first system was installed in January 2016. Other systems are in the process of installation. The first system is owned by Ms. Shanti Mahato and her neighbors all of whom belong to the marginalized Tharu community. The system pumps 32,000 liters of water every day. RERL had provided USD 3,000 to CREF to establish credit guarantee mechanism to encourage private companies for vendor financing of renewable energy systems.

### Outcome 3

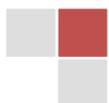
**Design of Commercial Financing Instruments for Mini-hydro and Large Scale Solar PV Project:** RERL provided assistance to CREF to look into reluctance of Banks and Financial Institutions to provide credit to mini/micro hydropower projects and to identify financing instruments to encourage them to lend to renewable energy projects. A comprehensive report that identifies problems and recommends solutions to attract private investment in mini/micro hydropower projects has been prepared and discussed extensively with CREF partner banks.

The report has focused on the background of renewable energy technologies; financial, environmental, legal, and economic analysis of mini-hydro and large scale solar PV; management and institutional auditing; renewable energy financing risk and risk mitigation instruments, and viable financing modalities for mini-hydro and large scale solar PV technologies. This report has suggested that establishing credit guarantee mechanism, incentivizing the banks, loan insurance etc. can help banks to finance in RE sector.

**Design training materials for bankers to understand challenges and opportunities in Mini-hydro and Large-scale solar PV projects financing:** RERL assisted CREF to design training materials for banks on mini-hydro and large-scale solar PV financing. RERL and CREF organized a one day orientation to the representative of partner banks on 10 March 2016. The training material includes technical aspects of min/micro hydro and solar PV systems, the role of AEPC and development partners in promoting these technologies, subsidy policy and subsidy delivery mechanism, case studies of successful and unsuccessful micro-hydro projects, risks and challenges in financing these technologies, and viable financial instruments which can motivate Bank and Financial Institutions (BFIs) to provide loans.

**Business Management Training for Women:** RERL supported PEUC of NRREP/AEPC to conduct Business Management Training for women from 28 February to 3 March 2016. 25 women from Far-Western Development Region participated in the training. The training will help them to maintain accounts and operate their business in a professional manner. This is the third of its kind training supported by RERL. Two similar training were organized in 2015 in Western and Eastern Development Regions.

**Lokta Training:** RERL supported PEUC to organize training in collaboration with Handpass for lokta entrepreneurs in Gandruk from 20 to 23 March 2016. Altogether 14 lokta entrepreneurs from different

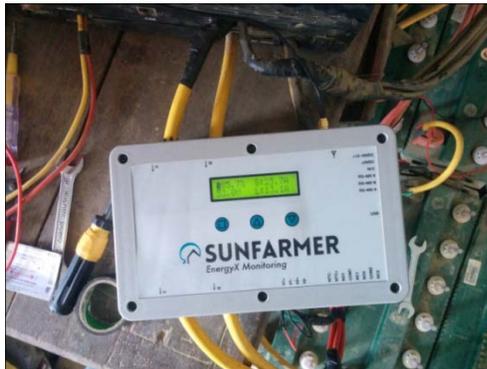


parts of the country participated in the training of which 2 were women participants. The entrepreneurs learnt about the sustainable harvesting, quality production, waste management and technology improvement. The lokta boiling technology using electricity and quality standards and requirements of lokta paper exporters.

#### Outcome 4

**Support AEPC/NRREP to develop and implement Monitoring system:** AEPC/NRREP has provision of three tier monitoring system which is in-line with the National Planning Commission's Monitoring System. First Component/Unit level Monitoring is carried out for proper utilization of subsidy, verification of technical standard and after sales service; then after, Random Monitoring System (10% sample from whole population of installed system) is conducted and lastly Spontaneous Monitoring through phone contact at anytime is done.

This rigorous monitoring procedure incurs a lot of time and huge financial costs. AEPC/RERL piloted



remote monitoring system for large scale solar systems. This technology has already been practiced in micro hydro systems and it is a proven technology. However it has not been practiced in solar system as this requires. Remote monitoring systems have been installed in Sindhuli, Okhaldhunga and Kalikot districts. The installed remote monitoring devices measure battery voltage, solar current and inverter current from which it derives state of charge, solar energy, grid energy and load energy. The data is stacked and sent to the center every 6 hours via SMS. The

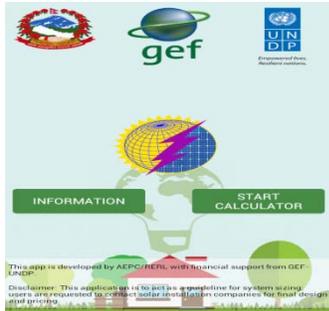
data can be view at Energy X Sun Farmer website ([energyx.sunfarmer.org](http://energyx.sunfarmer.org)).

**Installation manual for LSSPV technicians:** AEPC solar component has been talking need for installation manual for large scale solar PV systems. AEPC has two installation manuals i) for Level 1 technicians and ii) for Level 2 technicians. Both manual focuses more on small solar home system and solar home system which are mainly less than 100Wp capacity. Simultaneously AEPC has already started promotion of solar mini grid. Three pilot projects have been successfully commissioned in 2015; 21 kWp in Khotang, 25 kWp wind-solar hybrid project in Makwanpur and 18kWp in Tanhun. RERL is working with SESC of NRREP/AEPC to prepare 'installation manual' for large scale solar PV mainly for solar mini grid. This manual will be the standard for installation of AEPC supported solar mini grid projects.

**Design manual for LSSPV & Hybrid systems:** Presently, more than 118 local solar companies are involved in designing, manufacturing and installation of Solar Home System (SHS), Institutional Solar PV System (ISPS), and PV Pumping System (PVPS) etc. However, there lack of adequate expertise in the country for implementation of solar PV mini grid (S/WMG) or Wind-Solar Hybrid min grid (S/WMG) systems. RERL worked with AEPC to prepare design guidelines and tools for solar mini grid, wind energy



system and solar wind hybrid system. The manual covers i) Design of Large Scale Solar PV (LSSPV), ii) Design of Solar Mini/Micro Grid and iii) Design of Wind-Solar Hybrid mini grid.



**Revision of Android App:** RERL/AEPC successfully launched Solar Calculator, an Android Mobile App, in March 2014. Now, AEPC/RERL is developing IOS app and upgrading the Android App. The new app will include; addition of urban solar subsidy program, price revision, update the AEPC shortlisted companies, addition for design parameters, review of basic and advance design configuration etc. The new app for android “Nepal Solar Calculator 2” has been uploaded on the Google Play Store on 10 March 2016. RERL has supported on technology part and hired an app developer for coding and programming.

**Geo Coded Mapping of Energy Infrastructure:** RERL is supporting AEPC to prepare GIS map for energy infrastructures in Nepal. This map will include AEPC supported Micro Hydro, NEA’s 11kV distribution line and NCELL’s BTS towers. NTC BTS tower will not be mapped as data is not available. This GIS map will be very helpful tool for identification potential sites for development of energy projects in future.

**Piloting of Sustainability Framework for Micro Hydro:** RERL and MQAU of AEPC/NRREP are jointly piloting monitoring system for micro hydro power plants (MHPs) using the earlier developed Sustainability Assessment Framework. 11MHPs from Baglung and Gulmi districts are being studied.

**International Workshop on Best Practices and Business Opportunities for Energy Financing:** RERL provided financial assistance to AEPC to organize Investor Forum to attract private financing in renewable energy projects jointly with ADB. The forum brings together clean energy entrepreneurs, investors, financial institutions, policy makers and practitioners to explore the issues preventing the flow of venture capital, private equity and commercial loans to the key actors in the renewable energy ecosystem, as well as policy and regulations to breaking down the barriers. The two-day event was organized on March 16 and 17, 2016. RERL also presented to mini hydropower projects to potential investors during the event.



## RE Relief & Rehabilitation:

**Handover Ceremony of Kyocera Solar Systems:** Kyocera, a leading Japanese Solar PV manufacturer has donated 5 PV systems to earthquake affected institutions. The system consists of 290kWp solar module, 150Ah 12 V 700 cycles lead acid battery, 350W inverter, 10A charge controller and the balance of systems. RERL provided assistance to install 3 of these systems at District Hospital, Gorkha and 2 at Injury Rehabilitation Unit (IRU) of International Organization for Migration (IOM), Sindhupalchowk. The handover ceremony



was organized on 10 February 2016 at Chautara, Sindhupalchok. AEPC Executive Director, UNDP's Deputy Country Director, RERL's National Programme Manager, IOM/IRU Unit Head, Kyocera Representative, DDRC focal person, acting CDO and LDO of Sindhupalchok and representative of other agencies involved in relief rehabilitation participated in the programme

**Installation of Solar Systems in public institutions:** As public services provided by local governmental bodies, health posts and schools were totally disrupted by the earthquakes, RERL reallocated some of its fund to support public institutions to access electricity through solar PV systems. RERL validated the demand collected and prioritized on need basis. In 2015, RERL provided financial and technical assistance to install solar systems in 40 institutions. In the first quarter of 2016, 13 similar systems have been installed. In the meantime, a long term agreement has been signed with Suryodaya Urja to import and install 49 additional systems. Based on the requirement of the institutions, RERL is providing 300Wp and 800Wp systems.

**Solar Mobile Charger:** To address the immediate need for establishing communication, RERL carried out a quick assessment of need for mobile phone chargers and supported 28 community centers to install a system each. As the people have now established alternative mechanisms to charge their phones, RERL intends to reallocated budget for solar mobile chargers to support institutional systems.

**Solar UV Sterilizer:** It has been widely reported that water sources in many areas have been destroyed/damaged by the earthquakes and RERL allocated fund to support communities, particularly schools, to install solar PV water sterilizers. RERL tried to procure the equipment through competitive bidding but could not find any qualified vendors. Solar UV Sterilizer has not been procured yet though the demand for such system is very high. RERL is looking into alternative mechanisms to procure such systems.

