NEPAL

Renewable Energy for Rural Livelihood (RERL)

ANNUAL PROGRESS REPORT 2021

PROJECT PROFILE

About the Project	Geographic coverage of the project
Project Title: Renewable Energy for Rural Livelihood Award ID: 00076958 Web link: www.aepc.gov.np/rerl/public	National level coverage (Yes/No): Yes Number of Provinces covered: 6 Number of Districts Covered: 11 Number of Rural Municipalities Covered: 15
Strategic Results	
UNDP Strategic Plan Outcome: Growth & development are inclusive and sustainable, incorporating productive capacities that create employment and livelihoods for the poor and excluded	
UNDP Strategic Plan Output: Number and proportion of households benefitting from clean, affordable and sustainable energy access	
Country Programme Outcome 1: By 2022, impoverished, especially economically vulnerable, unemployed and under-employed and vulnerable people, have increased access to sustainable livelihood, safe and decent employment and income opportunities	
Country Programme Output 1.1: Policy, institutional and capacity development solutions lead to improved disaster and climate resilient livelihoods, productive employment and increased productivity rural areas Country Programme Indicator Number of households with energy access with UNDP-supported interventions (SDG 7.1.1)	

Project Duration (day/month/year)	Implementing Partner(s)	Implementation Modality
Start Date: 1 April 2020 End Date: 31 December 2022	1. Ministry of Energy Water Resource and Irrigation (MoEWRI)/ Alternative Energy Promotion Centre (AEPC)	National Implementation Modality (NIM)

Project Budget (US$)	
Total Project Budget:	US$ 2,520,000
Total Project Expenditure till 2021:	US$ 1,456,042
Budget 2021:	US$ 565,100
Expenditure 2021 :	US$ 527,919
Budget Utilization % (2021)	**93%**

Signature:_____
Name: Satish Gautam
Programme Manager
Date:

Signature:_____
Name: Dr. Madhusudhan Adhikari
Chair, Project Executive Board
Date:

TABLE OF CONTENT

ABBREVIATION

ADB	:	Asian Development Bank
AEPC	:	Alternative Energy Promotion Centre
ACEF	:	Asia Pacific Clean Energy Forum
BFI	:	Banking and Financing Institutions
BoA	:	Business Opportunity Assessment
CAA	:	Country Action A
CREF	:	Central Renewable Energy Fund
DFS	:	Detailed Feasibility Study
DED	:	Detailed Engineering Design
GoN	:	Government of Nepal
IEEE	:	Institute of Electrical and Electronics Engineers
MEP	:	Municipal Energy Plan
MHP	:	Mini Hydro Plant
NGO	:	Non-Governmental Organization
SGP	:	Small Grants Project
PEU	:	Productive Energy Use
RERL	:	Renewable Energy for Rural Livelihood
SASEC	:	South Asia Sub-regional Economic Cooperation
SGP	:	Small Grant Project
SMG	:	Solar Mini Grid
SWHMG	:	Solar/Solar Wind Hybrid Mini Grid
SPV	:	Special Purpose Vehicle
TA	:	Technical Assistance
UNDP	:	United Nations Development Programme
WECAN	:	Water and Energy Consultants' Association, Nepal

LIST OF TABLES

1. EXECUTIVE SUMMARY

In 2021, RERL continued providing technical assistance to AEPC to implement ADB funded South Asia Sub-regional Economic Cooperation (SASEC) Power System Expansion Project Off grid Component, which includes development of 8 Mini Hydro Subprojects (MHP) and 9 Solar and Solar Wind Hybrid Mini Grids (SMG). In this reporting period, 1 SMG and 2 MHPs were completed. Thus, all 9 SMGs under SASEC are completed and operational. Three more MHPs that are under construction will be completed in 2022. The construction of the 998kW Saniveri Khola MHP and procurement process of 750kW Ankhe Khola MHP have been initiated. In this way, 1632 households in off-grid areas have access to electricity from 9 SMGs and 2700 households from 3 MHPs.

RERL is also supporting communities to establish institutions – users' groups, cooperatives, company - to sustainably manage their renewable energy systems. Further, for meaningful participation of women in management of energy projects and optimization of benefits from access to electricity, they are encouraged to engage in Saving & Credit activities. As of now, more than 700 women have benefited by investing in income generating activities.

In 2021, 60 men and 75 women benefited from training on leadership development and management and 677 men and 419 women from technical training such as house wiring and electricity hazard and safety. Moreover, women entrepreneurs are supported to establish electricity powered enterprises and maximize benefit. Women were encouraged to own and manage business and be involved in all stages of production and marketing by supporting them to access additional subsidy from AEPC. In this reporting period, 83 electricity operated enterprises have been established that employ 111 people of whom 41% are women.

Key Achievements (January - December 2021)

- 200kW Giri Khola & 200kW Lower Bom Khola Mini Hydropower Projects Tested
- 150kWp Thabang Solar Mini Grids (SMG) Commissioned
- 89 New Enterprises established employing 177 people including 95 women

2. BACKGROUND AND RATIONALE

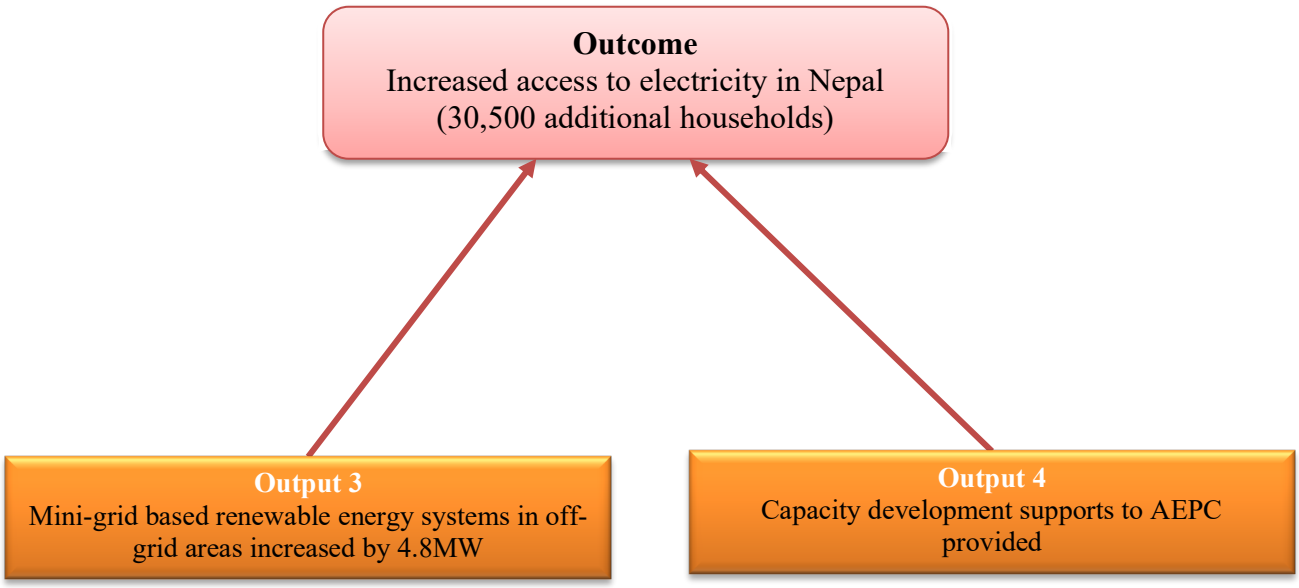
The Alternative Energy Promotion Centre (AEPC) under the Ministry of Energy, Water Resources and Irrigation (MoEWRI) has been implementing the off-grid component of the Asian Development Bank (ADB) funded South Asia Subregional Economic Cooperation (SASEC) project since 2015. The SASEC project was designed to be implemented with the technical assistance of AEPC's National Rural and Renewable Energy Programme (NRREP), a framework programme under which all AEPC projects operated. However, with the phasing out of external funding for NRREP in mid-2017, AEPC initiated the implementation of the SASEC project through the TA of GEF-UNDP Renewable Energy for Rural Livelihood (RERL), a project also being implemented by AEPC since 2014 within the NRREP framework. As both SASEC and RERL had similar objectives of helping rural communities, among others, to develop mini hydro and solar mini grids, both projects worked closely for meeting their respective targets. During this period from 2015 to 2019, RERL provided TA to SASEC amounting over USD 2 million.

In this context, GoN and ADB agreed on continuing RERL TA support to SASEC off grid component through UNDP from April 2020 for the remainder of the SASEC project duration up to December 2021. The Agreement between AEPC and UNDP was signed on 19 March 2020. The RERL TA primarily focuses on achieving financial closure, community mobilization, institution establishment and strengthening, construction supervision, productive energy use (PEU) promotion and capacity development for smooth operation and management of 4.8MW of mini hydropower projects (MHP) and solar/solar wind hybrid mini grids (SMG).

3. PROJECT SUMMARY AND OBJECTIVES

The main objective of UNDP/RERL technical assistance is to help AEPC/SASEC in meeting SASEC target of 4.3MW MHP and 0.5MW SMG for electricity access to 30,500 households, 20% capacity utilization in productive uses and mainstreaming gender equality and social inclusion (GESI) throughout the project cycle.

The project directly contributes to SDG7 and SDG13 by ensuring access to affordable, reliable sustainable and modern energy for all through the development of mini hydro and solar mini grid projects in remote off-grid areas not served by the national electricity grid. Likewise, the project also contributes to increase the share of renewable energy in the national energy mix. In the same context, the project aims to contribute to other SDGs with energy as the entry point. The promotion of productive energy uses of electricity generated has direct linkages with SDG1, SDG8 and SDG12 while the gender component of the project contributes to SDG5.



Theory of Change

Though Nepal had developed dozens of mini hydropower projects (MHPs) since 1975 mainly to provide electricity access to the district headquarters of mountainous districts, the segment (between 100kW and 1000kW) has been overlooked until recently because mini hydropower segment is more complex than micro hydro (up to 100kW) but does not have economy of scale of larger hydropower projects (>5MW). Promotion of MHPs in Nepal requires extensive capacity development of not only rural communities on operation and management but also designers, system integrators, equipment manufacturers, installers and after sales services providers.

Similarly, though Nepal has more than a million solar home systems, solar mini grids for rural electrification were promoted by non-governmental organizations (NGOs) until RERL supported AEPC to pilot a few solar mini/micro grids. To overcome a crucial policy barrier for promotion of these larger technologies, RERL helped AEPC incorporate them in its Renewable Energy Subsidy Policy.

UNDP/RERL partnered with Asian Development Bank (ADB) and AEPC to develop 4.3 MW of MHP and 0.5 MW of SMG to provide access to electricity to 30,500 households in remote off-grid areas of the country to help improve their livelihood by utilizing 20% capacity of the projects for productive uses under the South Asia Sub-regional Economic Cooperation (SASEC) Off-grid Component.

The partnership focuses on building up capacity to design and construct the mini hydropower projects and solar mini grids, establish local institutions for operation and management and promote optimum utilization of electricity to improve local livelihoods. The project also supports in building of both technical and managerial capacity of beneficiaries ensuring that women and members of marginalized communities are capable to maximize benefits from access to electricity by engaging in income generating activities and establishing enterprises powered by electricity.

Thus, the Project contributes to UNDAF 1 and UNDP's CPD Output 1.1 through increased access to electricity as well as contributing to SDG 7 and SDG 13 by ensuring access to affordable, reliable and sustainable energy and achievement of national commitments by increasing share of renewable energy mix.

4. PROGRAMMATIC REVISIONS

Project Duration: The existing SASEC project duration is until end of December 2021 and the physical target of completing 0.5MW SMG has already been achieved. However, only 25% of the target of 4.3MW MHP will be achieved by the end of 2021. Further, the household target of 30,500 with access to electricity will not be achieved until 2023. Delay in implementation of subprojects is mainly due to COVID-19 lockdown and delay in achieving financial closure of mini hydropower subprojects. Thus, to meet all SASEC targets the project duration needs to be extended by 2 more years until the end of 2023. Realizing the situation, GoN and ADB have decided to initiate process for project extension until 2023 and has been proposed accordingly.

Realizing the situation, GoN and ADB agreed on the 'No Cost Extension' of the project with the current resources until end of 2022. The extension of the project until 2023 will be subject to availability of funds from ADB and UNDP.

5. NARRATIVE ON KEY RESULTS ACHIEVED IN JANUARY– DECEMBER 2021

Testing & Commissioning Mini Hydropower Subprojects : The 200 kW Giri Khola MHP located at Tatopani Rural Municipality of Jumla district was partially tested on 31 December 2020. The subproject could not be fully tested and commissioned following AEPC Mini Hydro Testing and Commissioning Guidelines as the experts from the Chinese supplier could not travel to Nepal. It was then tested and commissioned in September 2021 by Nepali experts and in-house engineers. Likewise, the 200kW Lower Bom Khola MHP (LBHMHP) located at Lukla in Solukhumbu was also completed, tested and commissioned in October 2021. The electromechanical equipment of the 500kW Middle Phawa Khola MHP located at Taplejung is being installed and the project is expected to be completed by early 2022.

Thus, 3 MHPs of 200kW each, supported by AEPC under the SASEC project, have already been completed. These subprojects provide reliable and quality electricity services to over 2700 households and more than 200 enterprises.

Testing & Commissioning of Solar Mini Grids: The 150kW Thabang SMG located at Thabang Rural Municipality of Rolpa district which was installed in December 2020 is the largest solar mini grid in Nepal. The SMG was tested and commission in January 2021 following AEPC guidelines. In 2021, the municipality decided to extend the SMG to provide electricity access to 55 additional households. The subproject is now providing uninterrupted electricity to 382 households and 81 enterprises. The Thabang Rural Municipality is operating the SMG by themselves and RERL helped prepare the Operation Manual and provided orientation on running the project and preparation of a business plan.

Productive Uses of Energy: To achieve SASEC target of 20% electricity utilization for economic activities, RERL has been providing extensive support to MHPs and SMGs to carry out comprehensive assessment of business opportunities in their catchment areas, prepare business plans and help potential entrepreneurs to establish and operate enterprises that use electricity. The business plan of an electricity supplier looks at its income and expenditure and potential for business expansion.

In 2021, RERL supported Simrutu Khola MHP to prepare its business plan and initiated similar activity in Lower Bom Khola MHP. As of now, business scheme of 32 potential enterprises in Gutu, Sugarkhal and Hilepani SMGs have been prepared and entrepreneurs supported to establish and operationalize them. RERL has so far supported to establish 179 enterprises in SMGs that consume 78kW which is 14% of the total installed capacity. Similarly, 12 enterprises have been established in Simrutu Khola MHP that consume 86kW which is 43% of the total capacity.

Following table shows the linkage of outcome and output statements of the project:

Table 1: Outcome and Output Statements

Outcome Statement	Output Statement
Country Programme Outcome 2.4.1: By 2022, impoverished, especially economically vulnerable, unemployed and under-employed and vulnerable people, have increased access to sustainable livelihood, safe and decent employment and income opportunities	Country Programme Output 1.1: Policy institutional and capacity development solutions lead to improved disaster and climate resilient livelihoods, productive employment and increased productivity in rural areas Country Programme Output Indicator1.1.2 Number of households with energy access with UNDP supported interventions (SDG 7.1.1)
Project Outcome: Improved livelihood through access to clean energy solutions	**Outcome 1:** 28,000 households have access to electricity through mini hydropower projects
	Outcome 2: 2,500 households have access to electricity through solar/solar wind hybrid mini grid projects
Project Output 3: Mini-grid based renewable energy systems in off-grid areas increased	**Output 3.1:** Provide technical support to operationalize 4.3 MW mini hydro
	Output 3.2: Provide technical support to operationalize 0.5 MW solar/wind mini grid
	Output 3.3: Women trained in the construction, O&M of mini grid systems and as customer service providers
	Output 3.4: Enhance women, FHH and disadvantaged groups participation in sub-project development
	Output 3.5: Mobilize community-based organizations for social and environmental community development activities
	Output 3.6: The total connected load of productive end uses is 20% (0.96 MW) of installed capacity (4.8 MW)
Project Output 4: Capacity Development support to NEA and AEPC	**Output 4.1:** Trainings in GESI-based community participation and management of energy systems
	Output 4.2: Conduct training of trainer to develop 'technology promoters
	Output 4.3: Reducing women's time burden spent on household tasks
	Output 4.4: Women led micro-enterprises developed
	Output 4.5: Draft regulation for implementing renewable energy promotion board act

5.1 Progress towards the CPD Outcomes

Table 2: Progress on Outcome Indicators

Outcome statement	Outcome indicator	Baseline	Cumulative Target for 2018 - 2022	Total target achieved till 2020	Milestone for 2021, if any	Achievement 2021	Source of data
Country Programme Output 1. By 2022, impoverished, especially economically vulnerable, unemployed and under employed and vulnerable people have increased access to sustainable livelihood, safe and decent employment and income opportunities	Number of households with energy access with UNDP supported interventions (SDG 7.1.1)	107,827 HHs	25,000 HHs connected to energy services	140,119 HHs	140,416 (cumulative) households with electricity access	141,436 (cumulative households with electricity access) (in 2021, 700 Giri + 617 Bom = 1317)	RERL CPD Report

Progress towards Outcome 1: Improved livelihood through access to clean energy solutions

Target: 30,500 additional households supplied by renewable energy in rural communities by 2021 (at least 33% household are women headed or disadvantage groups)

RERL has been providing TA in developing 9 MHPs and 9 SMGs. RERL support for MHP starts from project identification to feasibility study and engineering design, financial closure, construction supervision and monitoring and capacity development and institution establishment and strengthening and promotion of PEU. As of December 2021, 9 SMGs with a total capacity of 565kW, providing electricity access to 1632 households, have been installed. Besides, 1500 households were provided solar home systems after the earthquake of 2015 in off-grid areas. Thus, 3132 households are benefiting from solar electricity. Further, 3 MHPs with total capacity of 600kW serving electricity to 2,703 households are also completed. So far, 5,835 households against the target of 30,500 have access to electricity which is about 20%. The household targets and achievement made so far are summarized in the table below.

Table 3: The progress towards achieving the SASEC Outcome:

	Installed Capacity (MW)				Beneficiary Households (No.)			
	Target	**Completed**	**Under const.**	**Pipeline***	**Target**	**Completed**	**Under const.**	**Pipeline**
Mini Hydro Subprojects	4.3	0.6	2.996	1.748	28,000	2,703	13,352	12,437
Solar/Wind Mini Grid Subprojects	0.5	0.565	-	-	2,500	3,132#	-	-
Total	**4.8**	**1.165**	**2.996**	**1.748**	**30,500**	**5,835**	**13,352**	**12,437**

Includes 1,500 solar home systems supported after the 2015 earthquake

* Pipeline projects include 750kW Ankhe Khola MHP, Dolpa and 998kW Hepka Khola MHP, Humla.

The SASEC Output target 3 (i) of 4.3MW MHP development will be realized even without Hepka Khola MHP that will benefit 4,380 households. It has been included in the pipeline to meet the SASEC Outcome target of 30,500 electrified households.

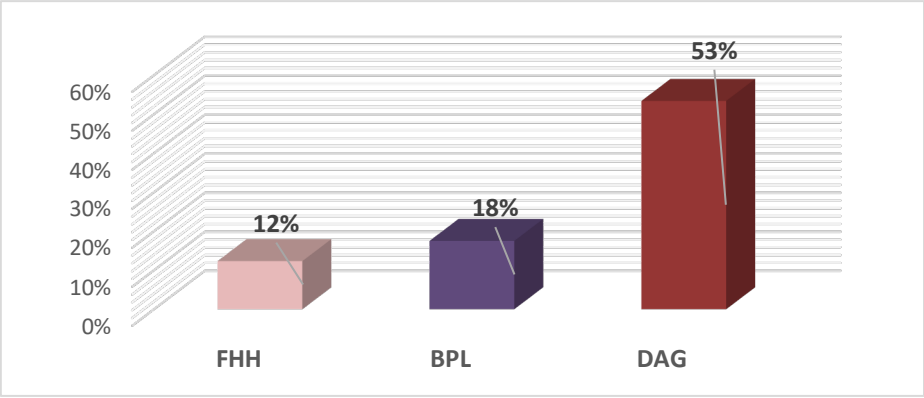


Chart 1: Percentage of FHH, BPL & DAG in MHPs & SMGs beneficiaries

The categorization of households as required by GoN and ADB, are illustrated in the Chart 1. The target of SASEC is to provide electricity to 30,500 households out of which 30% have to be from marginalized groups such as female headed (FHH), Below Poverty Line (BPL) and Disadvantaged Groups (DAG) as defined by GoN. As the energy projects built under SASEC are located at remote off-grid areas, most of the households fall within the aforementioned three categories. Out of 1632 households served by the 9 completed SMGs, 8% are women headed, almost 60% belong to DAG and 8% are BPL. On the other hand, among

the beneficiary households of the 7 MHPs that are under construction or planned to be initiated soon, 13% are women headed, 53% belong to DAG and 19% belong to BPL.

5.2 Progress on Output 3.1: Provide technical support to operationalize 4.3 MW mini hydro

5.2.1 Progress against SASEC Outputs[1]

Output 3: Mini-grid based renewable energy systems in off-grid areas increased

i. Output 3 (i) 4.3 MW Mini Hydro Subprojects

As discussed above in the Outcome section, AEPC has identified and studied 9 MHPs with the total capacity of 5.3MW for development through SASEC. As of December 2021, Simrutu Khola MHP, Rukum (West), Giri Khola MHP, Jumla and Lower Bom Khola MHP, Solukhumbu, each of 200kW capacity, have already been commissioned. Thus, 0.6MW out of 4.3MW target or 14% has been achieved so far. Further, 4 MHPs with total capacity of 2,996kW are under construction and 2 MHPs of 1,748kW capacity are in the pipeline. Among the 2 projects in the pipeline, procurement process of the 750kW Ankhe Khola MHP has already been initiated and 998kW Hepka MHP, Humla has been studied and detailed engineering design completed. As the ninth project will not be completed within 2023 even if the project duration is extended, AEPC will develop it with GoN fund and RERL TA. Status of MHPs under SASEC is detailed below in the Table 2.

Table 4: Status of Mini Hydro Subprojects

SN	Name of Subproject	Location	kW	HHs	Status
1	Simrutu Khola	Rukum (W)	200	1,386	• Installation completed in 2018 • Major repair and maintenance carried out in 2021 • Simrutu Jalbidhyut Cooperative signed Net Metering Agreement with NEA in July 2021 • Grid interconnection expected in 2022
2	Giri Khola	Jumla	200	1,840	• Testing and Commissioning (T&C) completed in September 2021. It was delayed as the Chinese suppliers could not travel to Nepal due to COVID-19 restriction. • Net Metering Agreement with NEA initiated, and grid interconnection expected in 2022
3	Lower Bom Khola	Solukhumbu	200	617	• T&C completed in September 2021. • RERL will support in demand side management in 2022
4	Middle Phawa Khola	Taplejung	500	2,070	• 90% civil works completed; forebay rebuilt as it was damaged by a landslide • 100% hydro mechanical work completed • 80% of Transmission & Distribution (T&D) network completed; 2 load centers to be connected

[1] *Note: There are 4 Outputs under SASEC projects, the first 2 are concerned with NEA and the remaining 2 with AEPC. Here, progress against SASEC Outputs 3 and 4, related to AEPC, are discussed.*

					• Installation of EM equipment ongoing • T&C expected in early 2022 • Middle Phawa Khola is a part of the Taplejung Mini Grid and will be interconnected with the existing mini grid
5	Khatyad Khola	Mugu	500	2,564	• 100% of T&D network completed. • Dhulachaur, Bajura, has requested for power from Khatyad Khola MHP • Headworks, approach canal, settling basin and spillway completed • Construction of surge pipe, penstock pipe, powerhouse, operator room and machine foundation ongoing • Installation of headrace pipe delayed due to social conflict and change of alignment as per Detailed Engineering Design (DED) by the rural municipality • T&C is expected by March 2022
6	Patrasi Chukeni	Jumla	998	6,250	• 80% of T&D network completed • 40% Civil work completed • 50% of turbine equipment transported to Nepal • T&C is expected by June 2022
7	Saniveri Khola	Rukum East	998	5,039	• NMB Bank Ltd. has agreed to provide loan of NPR 65 million and community and rural municipality are managing Equity Collection • T&D planned to be implemented by Nepal Electricity Authority (NEA) • Civil construction initiated in October 2021 • T&C is expected by June 2023
8	Ankhe Khola	Dolpa	750	3,059	• The developer signed Net Metering Agreement with NEA in July 2021 • Bidding document submitted to ADB for approval • Upfront Equity being collected • NMB Bank Ltd. has agreed to provide loan to cover funding gap • Construction work is expected to be initiated in March 2022 • T&C is expected by September 2023
9	Hepka Khola	Humla	1000	4,380	• AEPC/RERL studied the 998kW subproject as an alternative site to achieve SASEC Outcome target of 30,500 HHs • Detailed Engineering Design has been completed • Procurement process is expected to be initiated in January 2022 and completed by July 2024 • As the project will not be completed within the expected new SASEC project closing time of December 2023, AEPC has decided to fund it with GoN budget
Total			**5,346**	**27,205**	

SASEC Output 3 (ii) 0.5 MW Solar Mini Grid Sub-project

The SASEC target of developing 0.5MW of solar/solar wind hybrid mini grids has already been achieved. Nine such SMGs with a total capacity of 565kWp ranging from 25kWp to 150kWp have been installed and are operational. These 9 SMGs provide electricity not only to 1,632 households but also enterprises and other public services. The list of the SMGs, respective capacities and categories of households benefiting are given in Table 3 below.

Table 5: Status of SMGs and Beneficiaries

SN	Name of Sub-projects	Location	Capacity (kWp)	HHs	FHH	BPL	DAG
1	Chisapani SMG	Harkapur Chisapani, Sindhuli	35	90	7	9	83
2	Ramitekhola SMG	Ramite, Morang	30	75	6	8	57
3	Olane SMG	Olane, Panchthar	25	70	9		19
4	Saptame SMG	Saptame, Panchthar	70	110	16		91
5	Gutu SMG	Gutu, Surkhet	100	344	14		80
6	Sugarkhal SMG	Sugarkhal, Kailali	75	216	21	22	76
7	Dandapur Malladehi SMG	Dandapur, Baitadi	30	110	10	8	
8	Hilepani SMG	Manebhanjyang, Okhaldhunga	50	235	24	8	200
9	Thabang SMG	Thabang, Rolpa	150	382	20	30	365
Total			**565**	**1632**	**127**	**85**	**971**

AEPC/RERL support for developers included establishment of cooperatives or users' groups to develop and manage their SMGs. The Thabang Rural Municipality manages Thabang SMG by itself and has established a section within the municipality for this purpose. AEPC/RERL provided assistance to the municipality for operation and management.

SASEC Output 3 (iii) Women trained in the construction, O&M of mini grid systems and as customer service provider

This output is mainly concerned with capacity enhancement of women in technical areas so that they are capable to engage in project construction, operation and management and customer services by providing them different trainings. Capacity development of women included training/orientation on electricity safety, house wiring, linesman, masonry, cooperative/institutions management, computerized financial management and operation and management of mini grids. Different technical capacity development activities undertaken so far, and women's participations is presented in Chart 2.

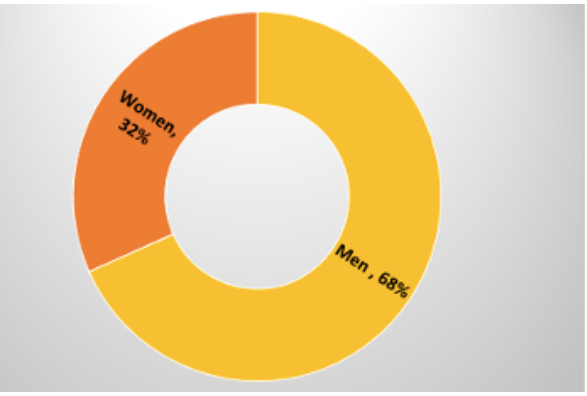


Chart 2: Women's representation in Technical Training

In this reporting period, 1096 community members have received different types of training and capacity development support out of which 38% of the participants were women against the target of at least 30%. The training included core technical areas such as house wiring, masonry and operation of RE systems and management of both RE systems and institutions. RERL will work with each mini grid project to identify most potential areas for women's involvement and design capacity development activities accordingly to meet at least 30% women participants in technical trainings. In 2021, RERL helped organized house wiring and electrical hazards and safety awareness training for 416 beneficiaries including 151 women.

SASEC Output 3 (iv) Enhance women, FHH and disadvantaged groups participation in sub-project development

SASEC target requires at least 30% women and/or members of disadvantage/marginalized groups in the Executive Committee of each RE project. RERL supported to establish institutions in 7 MHPs and all 9 SMGs. Regarding the institutional arrangement for development and operation of these projects the community have opted to register as cooperative, company or users' groups

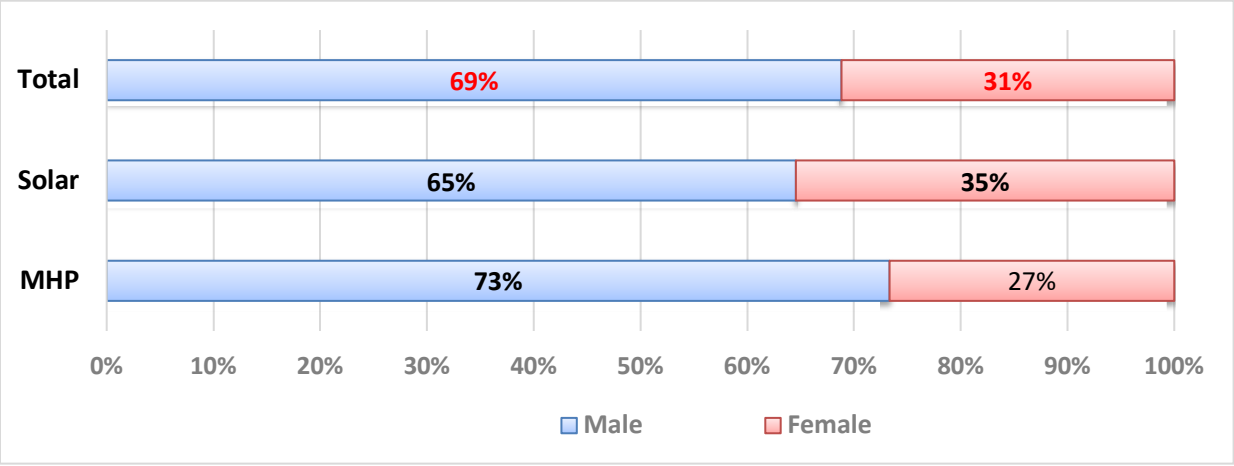


Chart 3: Percentage of Women Representation in Executive Committee

In MHPs, all communities except the 200 kW Lower Bom Khola MHP, Solukhumbu, have opted to establish cooperatives while the Lower Bom Khola MHP has been registered as a company owned by the beneficiaries. Out of 75 Executive Members of these organizations only 20 (27%) are women. To increase women's representation in these Executive Committees, RERL provided orientation to the communities and respective municipalities. RERL plans to provide more such orientations to increase women's participation in decision making.

On the other hand, communities have opted to register their SMGs as cooperatives or users' groups, whereas, Thabang Rural Municipality, Rolpa decided to directly manage its system. Saptame and Olane SMGs, Panchthar and Dandpur Malladehi SMG, Baitadi have formed Users' Groups and the rest are managed by cooperatives. Out of 79 Executive Members involved in managing SMGs, 29 are women (35%).

To ensure continued engagement and support of municipalities in operation and management of SMGs, AEPC/RERL has initiated formalizing the relationship between SMGs and respective municipalities. In this regard, the Ramite Khola SMG was handed over to Miklajung Rural Municipality, Morang for sustainable operation on 12 August 2021. This formalization process will be replicated in other SMGs too.

SASEC Output 3 (v) Mobilize community-based organizations for social and environmental community development activities

This output requires minimum of 30% women and proportionate representation of disadvantaged groups in environment management activities for mini hydro sites, e.g., community forestry and tree plantation and social activities in MHP and SMG sites, e.g., environment health and sanitation, trail road construction following AEPC's Social Mobilization Guidelines on Women's Empowerment.

After the COVID-19 Pandemic affected Nepal in March 2020, RERL site staff provided orientation to community personnel and construction labour on health and safety. RERL is continuously monitoring field level labour management plan, cleaning and infection control plan, emergency plan, etc. to ensure safe working environment at project sites.

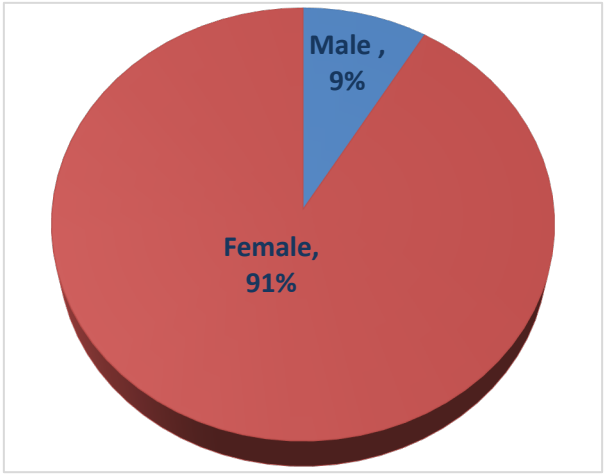


Chart 4: Percentage of Women in Micro Finance Activity

RERL has, for meaningful participation of women in management of energy projects and optimization of benefits from access to electricity, encouraged Saving & Credit activities. Communities from 3 MHPs and 3 SMGs - Gutu, Sugarkhal and Hillepani SMGs and Simrutu, Chukeni and Khatayad MHPs are actively participating in Saving & Credit activities.

As of December 2021, 219 Saving and Credit Groups are in operation with 4,247 members, out of which 3,886 or 91% are women and 1,311 or 31% are from DAG community. These groups have so far saved NPR 11 million which is provided to members for income generating activities and the total credit flow including rollover is NPR 20 million. Over 90% of the borrowers are women and have invested mainly in vegetable farming, poultry, goat/pig rearing, etc. The representation of women in Saving & Credit groups is shown in Chart 4.

In 2021, RERL helped to form 49 new all women Saving & Credit Groups with 749 members which has saved NPR.652,500 and invested NPR. 308,665. Financial literacy training and orientation on leadership were provided to members of these new Saving & Credit Groups. Likewise, 14 women and 3 men participated in Account Management & Administration Training.

SASEC Output 3 (vi) Total connected load of productive end use is 20% (0.96MW) of installed capacity of (4.8MW)

This output requires installation of productive end uses totalling 0.96 MW capacity (20% of 4.8 MW). To meet this ambitious target, RERL has been supporting both developers and interested community members by providing them orientation on productive energy uses, business opportunity assessment, business scheme and entrepreneurship development, accessing credit and establishment and operation of enterprises. In 2021, 21 women and 3 men were provided training on productive energy uses and entrepreneurship.

RERL has comprehensively assessed business opportunities in 7 subprojects that includes 1 MHP and 6 SMGs. As of now, business plans of 32 potential enterprises in Gutu, Sugarkhal and Hilepani SMGs have been prepared and

entrepreneurs were supported to establish and operationalize them. The Gutu SMG along with Sugarkhal SMG and Ramite Khola SMG have potential to become good demonstration sites for financially viable solar mini grids in the country. These three SMGs have been successful as they are servicing bustling markets that cater to surrounding areas.

So far, RERL supported to establish 169 enterprises in SMGs that consume 78kW which is 14% of the total capacity. 12 enterprises have been established in Simrutu Khola MHP that consume 86kW which is 43% of total installed capacity.

ii. SASEC Output 4: Capacity development support to NEA and AEPC

SASEC Output 4 (i) Training on GESI-based community participation and management of energy systems (GESI sensitization for all stakeholders)

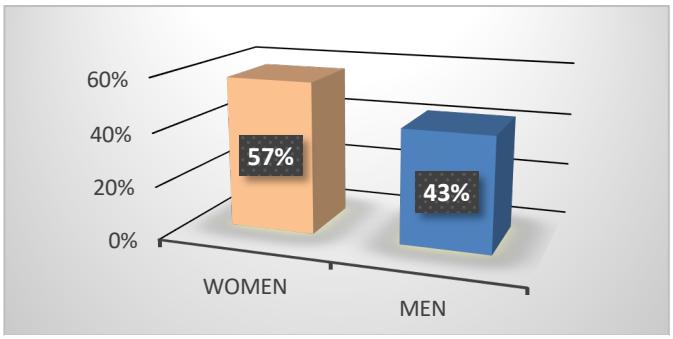


Chart 5: Women's participation in capacity development

RERL gives high priority to participation of women in all capacity development activities as well as GESI sensitization to all stakeholders. So far, RERL has provided cooperative management, financial literacy, social mobilization, basic accounting and enterprise development trainings for 1,717 members of cooperatives of whom 987 were women which is 57% of the total participants. RERL has already organized 45 GESI sensitization trainings against the target of 5 required. In this reporting period, 2 more GESI sensitization trainings were provided to cooperative members and elected officials of rural municipalities of Jumla; 41 women (56%) participated in these trainings.

SASEC Output 4 (ii) Conduct training of trainer to develop 'technology promoters'

Activities under Output 4 will raise awareness for the productive, safe and sustainable use of energy and prepare women as 'technology promoters' in areas such as improved cook stove, electric cooking, water mills, ICT technologies, solar heaters/hot-water systems/dryers, food/agro-processing and other productive end uses, electricity safety, etc.

171 women have participated in different technical trainings such as house wiring, electricity safety and management of RE systems. Out of 6 women who participated in house wiring training at Khatyad Khola MHP, Mugu, 2 are engaged in house wiring and erection of distribution network and have expressed interest to establish electrical shops, 2 other are studying Diploma in Engineering. Further, RERL organized a 'training of trainers' in September 2021 for 16 women participants from 2 MHPs in Jumla district. The training included classes on renewable energy in general, operation and management of MHP, types of potential productive uses of energy and entrepreneurship development.

SASEC Output 4 (iii) Reducing women's time burden spent on household task

RERL is planning to conduct end line survey in 3 SMGs that have already crossed their operation agreement of 3 years with suppliers/installers. As mentioned above, the Ramite Khola SMG, Morang has already been handed over to the rural municipality and end line survey was initiated in October 2021 and the field work has been completed. The study will look at impacts of access to electricity on beneficiaries including women's time burden on household tasks.

SASEC Output 4 (iv) Women led micro-enterprise development

To achieve the target of 30% increase in women led micro-enterprises, need assessment mapping existing and potential women led enterprises are carried out in each project site. Support is provided both to establish new enterprises and upgrade existing ones. Women are supported to access additional fund based on AEPC subsidy policy and delivery mechanism. Further, women are also supported on skill development, book-keeping and financial management, access to finance and other services necessary to establish and operate businesses. So far, RERL/SASEC has supported to establish 179 enterprises mainly in SASEC SMGs, out of which 38 or 21% are women led and provide employment to 316 people of whom 150 or 47.5% are women. As more MHPs are completed, more productive end uses will be established and operated. RERL will continue emphasizing on promotion of women led enterprises to meet the target of 30%.

5.2 Progress on Project Outputs

Table 6: Progress on Output Indicators

Output statement	Output indicator	Baseline	Cumulative Target for 2018 - 2022	Total target achieved till 2020	Milestone for 2021, if any	Progress in 2021 against	Cumulative progress up to 2021	Means of verification	Remarks
Output 3.1: Provide technical support to operationalize 4.3 MW mini hydro	Installed Capacity	400kW Haluwa Khola Mini Hydro	4.3 MW	0.2MW	0.9MW	0.4MW	0.6MW	Testing & Commissioning Report	2021 Milestone (500kW Phawa+200kW Bom+200kW Giri) but Phawa is not completed in 2021
Output 3.2: Provide technical support to operationalize 0.5 MW solar/wind mini grid	Installed Capacity	NA	0.5MW	0.565MW			0.565MW	Project Completion Report	Target Achieved in 2020
Output 3.3: Women trained in the construction, O&M of mini grid systems and as customer service providers	% of women trained on technical trainings	NA	30%	15%	15%	17%	32%	Training Report	On track to achieve target
Output 3.4: Formation of user committees for project development and implementation	% of women and proportionate representation of disadvantaged groups in executive committee	NA	30%	Total – 31% SMG -35% MHP -27%		Total – 31% SMG - 35% MHP - 27%	Total – 31% SMG -35% MHP -27%	Project MIS	On track to achieve target
Output 3.5: Mobilize community-	% of women and proportionate representation of	NA	30%	Total – 4247members					Target Achieved in 2020

based organizations for social and environmental community development activities	disadvantaged groups in environment management activities			Women Members – 3886 (91%)					
Output 3.6: The total connected load of productive end uses is 20% (0.96 MW) of installed capacity (4.8 MW)	Minimum 960 kW productive end uses	NA	960kW	Total - 164kW SMG-78kWp MHP-86kW	100kW			Project MIS	More productive uses of electricity will come online as MHPs are completed There is no new enterprises has been installed in 2021
Output 4.1: Training in GESI based community participation and management of energy systems	No. of training conducted	NA	5	63	0	8	71	Training Reports	Target already achieved, (one off training/orientation per subproject is not enough) This target already been achieved in till 2020
Output 4.2: Conduct training of trainer to develop 'technology promoters'	No of trainee	NA	17		5	16		Training Report	RERL has organized a training of trainers for 16 women in 2021
Output 4.3: Reducing women's time burden spent on household tasks	No of studies (baseline and end line)	NA	17	10				RERL MIS	Baseline data survey already completed and endline survey of SMG has been initiated

									Baseline data has been collected of 10 projects. Carried out end line survey of Ramite Khola SMG in 2021
Output 4.4: 30 30% increase in women led micro-enterprises	30% increase in women led micro-enterprises	1,289	30%	21%	30%	45%	45%	RERL MIS	In 2021, 89 new enterprises have been established of which 40 are women led
Output 4.5: Draft regulation for implementing renewable energy promotion board act	AEPC Act drafted	Rural Energy Policy 2006	1 AEPC Act drafted	1 AEPC Act drafted and submitted to AEPC					Already achieved

6. BUDGET AND EXPENDITURE

The following table shows the output wise indicative budget and expenditure for 2021 **(January – December 2021)** and the sources of funds budgeted and utilization.

Table 7: Output wise annual budget and corresponding expenditure as per CDR

Output	Annual Budget	Annual Expenditure through project	Annual Expenditure through UNDP	Total Expenditure	Budget Utilization%[2]
Output 1	239,000	215,496	-12,271	203,224	85
Output 2	103,300	101,327	7659.51	108,987	106
Output 3	49,000	48,070	3845.57	51,915	106
Output 4	79,388	17,237	19,132	36,370	46
Output 5	8,950	8,856	0	8,856	99
Programme Support Cost	85,462	63,337	55,229	118,567	139
Total	**565,100**	**454,324**	**73,595**	**527,919**	

Table 8: Source of funds and Budget and Utilization of project period

Source of Fund	Funding period	Total Project Budget	Additional TRAC Fund	Total Budget	Expenditure 2019	Expenditure 2020	Expenditure 2021	Total Expenditure till 2021	Total Budget Utilization %	Budget Balance USD
ADB	July 2019 –Dec 2021	1,500,000	0	1,500,000	0	333,103	394,235	727,338	48%	772,662
UNDP	July 2019 –Dec 2021	800,000	220,000	1,020,000	367,804	227,217	133,683	728,704	71%	291,296
Total		**2,300,000**	**220,000**	**2,520,000**	**367,804**	**560,320**	**527,918**	**1,456,042**	**58%**	**1,063,958**

[2] *Note on Fund Over Utilization: During the year 2021, the second tranche of ADB fund was not receive on time as per the agreement. Therefore, UNDP resources was utilized for staff salary of QTR IV.*

Table 9: M&E Expenditure: In 2021, Project spend on M&E activities

Expenditure for Monitoring Costs associated with UNDP/project staff, consultants, project partners, supporting national statistical systems in designing project specific data collection methodologies (qualitative and quantitative), monitoring methods including stakeholder surveys and other qualitative methods, collection of data, analysis and dissemination of the findings to inform a project, either with project partners or to fulfill specific UNDP/project requirements (preferably the former).	**18.46%**
Expenditure in USD	**104,324**

Narrative on Progress related to Budget and Expenditure

RERL allocated USD 565,100 for January to December 2021 of which USD 475,200 from ADB and USD 89,900 from UNDP's TRAC fund to carry out various activities. In this period RERL utilized 93% of the total budget. The lockdowns due to COVID 19 and delay in receiving the second tranche from ADB to UNDP, several activities mainly related to capacity development could not be carried out and will be carried out in 2022.

7. CROSS CUTTING ISSUES

7.1 Targeting and voice/Participation of Target groups

The main target groups of RERL support are people living in off-grid areas. All RERL activities are related to promotion of larger renewable energy systems for provision of modern energy in such areas through enabling environment for participation of the private sector in project development. At the operational level, technical support was extended to AEPC to prepare GESI sensitive Special Purpose Vehicle (SPV), mainly cooperatives ensuring equal participation of women and marginalized groups in decision making positions. Further, AEPC has also provisioned additional financial support to targeted beneficiaries including women headed and marginalized community households in the Renewable Energy Subsidy Policy 2016.

To ensure that women and members of marginalized groups maximize benefits from access to electricity, RERL encourages them to engage in micro finance activities, which not only helps them in accessing finance but also develop their capacity for meaningful participation by voicing their concerns in other community development activities.

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

The ADB/SASEC project accords high priority to mainstreaming GESI aspects at every steps of the project cycle. UNDP/RERL does not only ensure participation of women and members of disadvantaged groups during the implementation of project activities but also ensures that they

maximize benefits from access to electricity. Though the GESI Action Plan of SASEC is implemented in all stages of the subproject cycle requiring 30% participation of women in decision making bodies and 30% participants in capacity development activities, SMGs have 35% women in their Executive Committees but MHPs have only 27%. RERL will organize orientation for municipal officials and SPV leaders to ensure that women's representation as required by the project will be met. UNDP/RERL has been prioritizing engagement of women and members of vulnerable and disadvantaged groups in the PEU activities of the project which is discussed in Outputs 3.6 and 4.4.

In addition, the project helps identify potential enterprises that can engage women in the communities where MHP and SMG are operational. In this reporting period, women and members of marginalized communities were encouraged to engage in regular saving and credit schemes and over 3000 women are involved in 200 groups which is more than 91% of the total members. Leaders of these groups are provided trainings on enterprise development, organization management, accounting and book-keeping. So far, the cumulative savings and credit of these groups are NPR 21 million and NPR 13 million respectively. Women have taken out loan to not only meet their household needs but also to start income like poultry, goat raising and vegetable farming.

Furthermore, ADB/SASEC requires electricity access to 30,500 households out of which 30% have to be from marginalized groups such as female headed, below poverty line and disadvantaged groups as defined by the GoN. As the energy projects built under SASEC are located at remote off-grid areas, most of the households fall within the aforementioned three categories. Out of 21,409 households served by the 9 completed SMGs or 7 MHPs that are completed, under construction or planned to be initiated soon, 12% are women headed, 53% belong to DAG and 18% belong to BPL.

7.3 National Capacity Development

RERL professionals work closely with AEPC counterparts and help develop plans, implementation modalities and implementation management of solar and community electrification subcomponents and Central Renewable Energy Fund (CREF) in areas of project selection, detailed feasibility study, credit financing and achieving financial closure. As SASEC project is implemented following Public Procurement Act, AEPC's capacity to implement larger RE projects has been enhanced.

RERL has been leading the grid interconnection of RE within AEPC and has helped prepare guidelines and standards, draft Simplified Power Purchase Agreement and Net Metering Agreement between NEA and MHPs. Further, 4 MHP Grid Interconnection demonstration projects carried out by RERL with AEPC funding has opened up opportunities for scaling up similar interconnections throughout the country.

7.4 Sustainability

Experience has clearly demonstrated that the rural communities require technical support not only during RE project formulation and implementation but more so after completion of installation works. Post installation support is an integral part of UNDP/RERL TA for SASEC project in particular and other AEPC projects in general. Post installation support includes institutional strengthening and capacity enhancement for smooth operation of the plants and promotion of productive electricity uses for increasing revenue generation, operation of over 2000 AEPC supported micro/mini hydropower projects are evidence that there is a strong correlation between revenue generation and sustainable operation of the plants.

MHP Operation and Management Guidelines provide details on sustainable operation. SPVs are encouraged and supported to establish productive end uses with connected load of at least 20% of

the installed capacity of SASEC subprojects. To achieve the target of the productive end uses, RERL has been working closely with AEPC to provide technical assistance to subprojects to identify potential enterprises and entrepreneurs, business plan preparation, skill development, market linkage and financing, including government subsidy and credit. In 2021, 89 new enterprises such as agro-processing mill, carpentry, bakery, poultry, eateries, fresh house, etc. were established which employ 177 community people of whom 95 (54%) are women. On an average, these enterprises consume 28 kWh of electricity a month.

Studies on functional status of MHPs carried out by AEPC show that beside major calamities, grid encroachment in the catchment area of a MHP is the main reason for its demise/abandonment. In this context, RERL has been able to play a crucial role on behalf of AEPC to bring Nepal Electricity Authority (NEA) onboard to jointly prepare standard and guidelines for grid interconnection of MHPs, technology development, piloting in 4 MHPs and policy inputs for upscaling. Grid interconnection of MHP not only ensures its sustainability but also helps improve reliability of NEA system in rural areas and quality of electricity.

Involvement of local governments in project development as shareholders and post installation support in case of major damages due to natural calamities is crucial for enhancing robustness of RE systems. In all SASEC subprojects, municipalities have invested as equity holders which is envisaged to lead to their active engagement in post installation period too.

Furthermore, technical capacity of rural people to operate complex engineering technologies such as MHP is limited. Although AEPC provides operator training, it is not adequate for smooth operation of the plants. RERL is working with AEPC and communities to bring the knowledge, skill and efficiency of the private sector to rural areas to operate and manage mini/micro hydropower projects. As the private sector is reluctant to work in rural areas in general due to lack of economy of scale and community owned projects in particular due to problems of collective action, a lot of financial incentives and other supports are necessary to convince them to get involved. RERL is supporting the private sector to access finance through CREF, mobilize communities to overcome collective action problems and capacity building of rural technicians and establishment of linkages between them to help ameliorate the risk perception of private companies.

7.5 South-South and Triangular Cooperation

RERL has been actively involved with Hydro Empowerment Network (HPNET), a network of practitioners from the Asia Pacific Region, since last several years to share Nepal's long and rich experience in developing micro hydropower projects for rural electrification. On the other hand, RERL and Nepal have also gained from research carried out by HPNET members on technical aspects of MHP Grid Interconnection. Sabah Province of Malaysia in particular has demonstrated eagerness to learn from Nepal's experience in rural electrification both in terms of technologies and policies. RERL shared Nepal's experience with officials of the province, engineers and NGOs/PSOs in 2021.

7.5 Partnerships

a) RERL is providing technical assistance to AEPC to implement ADB funded SASEC project, which intends to support rural communities to install 4.3 MW of mini hydro and 500 kW of solar mini grids and provide electricity access to 30,500 households. This is a three-way partnership between ADB, AEPC and UNDP where each partner brings its strength on the table to help rural

communities; ADB is financing RE projects, AEPC is the implementor and UNDP is supporting AEPC through RERL. As this is the first partnership of its kind between ADB and UNDP, it has proved to be pathbreaking initiative and has been replicated in several other countries of the Asia Pacific Region.

b) The GoN has prioritized rural electrification to achieve its target of clean energy for all by 2022 and has invested commensurately through NEA. As a result, over 90% of the population today is connected to Nepal Integrated Power System, which requires a dense collaboration between NEA and AEPC to avoid duplication of work and wastage of resources. RERL is playing a critical role to bring NEA and AEPC together. In 2021, RERL helped to draft Simplified Power Purchase Agreement for NEA and conceptualize and draft Integrated Master Plan for Mini Grids and identify 100 best MHPs for grid interconnection through NEA Engineering Company which will be jointly implemented by AEPC and NEA. Moreover, NEA and AEPC have agreed to develop the 998kW Saniveri MHP under SASEC whereby AEPC will help in developing the generation component and NEA the electricity distribution network.

7.7 Promotion of civic engagement

All RERL supported projects are community owned and managed as either cooperatives or public limited companies. RERL directly works with beneficiaries to empower them for identification, planning, implementation, management, operation and monitoring of RE projects.

Further, RERL has been supporting municipalities to prepare municipal energy plans (MEP) in participatory approach, engaging individuals, elected officials, civil society, private sectors, governmental line agencies and donors. In 2021, RERL is supporting Tara Khola Rural Municipality, Baglung to initiate preparation of its MEP.

7.8 Expanding opportunities for youth

Young men and women usually are the proponents of RE projects in off-grid areas as they know the benefits of having reliable and adequate electricity supply. Young people have been engaged from the beginning of the project cycle and take advantage of electricity access later on by establishing different productive uses. In almost all RE projects supported by RERL, the operators are young men. There are 15 men working as operators of MHPs and SMGs. On the other hand, both men and women are engaged in establishing and operating productive use enterprises. As of now, 438 people, mostly young men and women, are employed in 264 different businesses. Furthermore, young men and women have taken advantage of training opportunities provided by the project. So far, 560 men and 260 women have participated in technical training and 771 men and 1036 women in leadership and management training.

7.9 Innovation

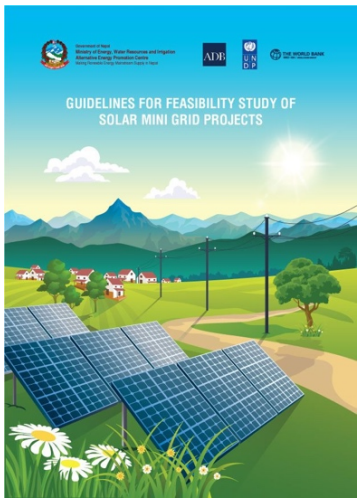
In 2021, RERL supported AEPC to develop web application SolarCity simulator. The main objective of the web application is to assist homes, businesses, and municipalities to assess the prospects for electricity generation using rooftop solar photovoltaic (PV) systems.

For homes and businesses, this customized simulator provides a means to calculate solar PV potential, annual energy production, annual revenue, payback period, and social-environmental benefits. For municipal authorities, the simulator supports assessments of different policy instruments and incentive schemes, such as generation or capital subsidies.

For more information about rooftop solar PV implementation in Nepal, reach out to AEPC (info@aepc.gov.np).

7.10 Knowledge Management and Products

In 2021, RERL contributed in the following online publications. These publication focuses on lessons learnt from 11 private sector driven clean mini-grid projects across South and South-East Asia. In addition, grid connection of micro hydro and its commercial viability.



- Guideline for Feasibility Study of Solar Mini Grid Projects
- Management & Administrative Guidelines for micro finance operation
- Micro Hydro History in Nepal
- https://www.ruralelec.org/publications/private-sector-driven-business-models-clean-energy-mini-grids-lessons-learnt-south-and
- https://www.youtube.com/watch?v=CIv4BzE0uPQ
- https://www.youtube.com/watch?v=J-XJXBiN--w&feature=share

8. LESSONS LEARNED

- Nepal is likely to meet universal access to affordable, reliable and modern energy services for lighting – but not cooking, as envisaged by the Agenda 2030 (SDGs). Access to electricity is not considered for cooking in the RE subsidy policy, which provisions only 200 watts per household. In areas where biogas is not feasible, MHP should be promoted for electric cooking and space heating/cooling purposes. For this, low wattage cooking appliances and modification of commercially available stoves should be promoted. New technological solutions and innovative tariff structures should be designed and implemented for demand side management to cut/shift the peak demand.
- Though the Constitution of Nepal 2015 gives all rights related to alternative/renewable energy and hydropower projects up to 1MW to local government, their management capabilities are limited. Local government requires much support to be able to prepare energy plans, identify suitable projects, mobilize resources, and to implement, monitor and manage RE systems. Orientation on their roles and responsibilities, guidelines and manuals on the various aspects of RE development, establishment of planning and monitoring systems and training in, for instance, planning, implementation, and monitoring, needs to be provided to local governments until they are able to function as envisaged by the Constitution. Municipalities should be supported in preparing energy plans that include an understanding of their energy supply and consumption situation, in identifying potential resources and appropriate technologies, and on choosing sustainable and least cost options.
- Although CREF has been operational for some years, most of its focus has been on approving and channelling subsidies. It has not been able to mobilize credit from BFIs to the fullest extent despite having financial instruments specifically designed to attract private investment in RE projects. The efforts made to mobilize credit for mini hydropower projects need to be continued and other innovative approaches adopted to de-risk financing RE projects.
- Although four MHPs and several solar PV systems have so far been successfully interconnected with the national grid with AEPC support, the policy is still ambiguous and implementation arbitrary. Therefore, lobbying/advocacy needs to be continued for grid interconnection of RE

projects to realize the benefits of distributed generation that enhances the reliability of grid and quality electricity supply. The procedure for grid interconnection of MHP is the same as that for large hydropower projects, which is cumbersome for communities in remote areas and needs to be simplified and standardized. The technology required for grid interconnection also needs further research and development for greater reliability and cost effectiveness.

9. IMPLEMENTATION ISSUES AND CHALLENGES

- The lockdown due to COVID-19 that started on 24 March 2020 has been the biggest challenge for project implementation in both 2020 and 2021 and may also affect in 2022 as new variants are reported. The lockdown mainly disrupted transportation of equipment and construction materials and movement of project personnel and skilled labour. Activities requiring gathering of people like community mobilization, institutional strengthening and PEU promotion had to be halted for some time. In this grave situation, RERL provided orientation to its engineers and community mobilizers on health and safety including COVID-19. RERL staff then provided orientation to contractors' personnel, local labour and the general public on precautionary measures to avoid COVID-19 infection. The project also provided masks, sanitizer and hand wash at the site to continue construction of MHPs with reduced labour whenever possible. In spite of such adverse situation, 3 subprojects were completed (Giri Khola and Lower Bom Khola MHPs and Thabang SMG), Middle Phawa Khola MHP is expected to be completed in early 2022 and Patarasi Chukeni Khola and Khatyad MHPs by the middle of 2022.
- The agreement between AEPC and UNDP is valid only up to the end of 2021. As it will take at least 2 more years to complete all 5 MHPs identified for implementation, both AEPC and ADB are working on time extension of SASEC project until December 2023.
- For both contractors engaged in supply and construction of SASEC MHPs, lack of working capital has proved to be the biggest barrier for timely progress/completion. To overcome this situation, CREF is providing fund for capital requirements for issuance of Letter of Credit from the bank and part of working capital with the GEF RERL supported Guarantee Fund.

There are also other issues that will be resolved with more efforts in ongoing projects, including;

- Institution of Khatyad Khola MHP is a one-man-show and decisions are not implemented promptly despite regular follow-up. Further, the additional cost due to change in canal alignment to be incurred by the Rural Municipality has not been formally endorsed which may lead to delay in project implementation. Extensive community mobilization emphasizing transparency and accountability is required for sustainable operation of the subproject.

10. PRIORITIES FOR 2022

The main focus of RERL in 2022 will be on; i) completion of 3 ongoing MHPs and post installation support including promotion of PEU for sustainability, ii) support communities to adopt electric cooking and demand side management measures, and iii) preparation of documents, project proposals and concept notes to mobilize resources from ADB, GCF and other potential development partners.

11.A SPECIFIC STORY

Ice-popsicle in Grocery Shop Makes Children Happy

It was beyond our imagination that we could buy ice-popsicle in a Grocery shop of Aitebare village, Ramite Khola of Miklajung Rural Municipality – 1, Morang, Province 1. We would never know if a kid had not come to buy ice-popsicle when we were interviewing the owner of the shop. Ms. Shrijana Rai[3], resident of the same village, has established a Grocery Shop cum Cosmetics Parlour with the investment of approx. NRs. 30,000/- few years back after the installation of 30 kWp Ramite Khola SMG.

Her husband was abroad engaged in foreign employment is raising her daughter on her own in the village. To utilize her spare time, she thought to engage herself in a productive activity and decided to run a business. Considering the demand of the village, she initiated a small grocery shop and later expanded into selling cosmetic products as well.

Once her husband returned, he had an opportunity to attend the house wiring training organized by the Solar Project. This motivated him to start his own career in the country working as an electrician in the village. Additionally, he also runs a small carpentry at home as well.

With the availability of reliable source of electricity in the village, they thought of buying some electrical appliances such as mixer and fridge. Ms. Rai started to explore the opportunity of utilizing the fridge and thought of making ice popsicles from juice (sarbat). Her target customers are the students of Shree Tadi Secondary School located in Sirantar of the same ward, as the students have to pass through her shop to go to the school. She is not satisfied with her own business of ice-popsicle as her production is not sufficient to fulfil demand of the students which often disappoints her. This has motivated her to offer different variety of ice-cream and wants to upgrade her skill of making ice-cream. Ms. Rai is interested to participate in any training that will support her to enhance her skill and extend her business. Thus, reliable energy has provided her an opportunity to start a small-scale business and reduce her own socio-economic vulnerability.

[3] Ms. Shrijana Rai has provided consent to disclose her name and picture

1. RISK AND ISSUE LOGS

Table 10: Risk and Issue 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) A	Impact (scale of 1 to 5 with 5 being the highest impact) B	Risk factor (A x B)	Mitigation measures if risk occurs	Date risk is Identified	Last Updated	Potential Effects
1.	Incompletion of 4 MHPs within the project period	Implementation	5	5	25	• Ministry of Finance has submitted request for time extension of SASEC project up to the end of 2023 along with additional resources.	September 2020	December 2021	• Khatyad Khola, Chukeni, Saniveri and Ankhe Khola MHPs will not be completed in 2021
2.	Lack of financial capacity of contractors to complete mini hydro projects on time	Operational	4	5	20	• Credit facility from CREF • Capacity building of contractor/vendor/Site Engineers on project construction management	March 2019	October 2021	• Project delivery delayed • Project cost increased
3.	Arrival of national grid at the subprojects sites	Regulatory	4	2	8	• Support developers for grid connection of mini-grids – Simrutu Khola MHP & Ankhe Khola MHP have signed Net Metering Agreement with NEA & documents for net metering of Giri Khola & Middle Phawa Khola submitted to NEA • AEPC and NEA have decided to develop Saniveri MHP in close coordination, AEPC will be responsible for the generation	September 2020	October 2021	• Risk for future sustainability of the isolated RE projects

						component whereas NEA will build the distribution network with its own resources • AEPC and NEA are planning to prepare an Interconnection Master Plan for Mini Grids in 2021.			
4.	Lack of capacity of community to manage projects	Organizational	4	5	20	• Capacity building for establishment of accountable governance and management system with incentive-based rules and regulations • RERL has initiated establishment of a mechanism for technical backstopping by experienced professionals	December 2020	December 2021	• Irregular electricity supply and services • Weak revenue stream • Lack of proper repair and maintenance
5.	Natural Calamities (earthquake, flood, landslide, etc.)	Environmental	3	5	15	• Mitigation measures identified in environmental assessment will be implemented to minimize damages due to natural calamities	September 2019	September 2019	• Project delivery delayed • Reconstruction/rehabilitation required • Project cost increased
6.	Lockdown due to COVID-19 Pandemic	Health and Safety	5	4	20	• Standard Operating Procedure (SOP) prepared and shared with field staff • Orientation provided to field staff and Site Engineers & Mobilizers orientated construction workers & community in general • Separate/isolated living quarters for construction personnel • Provision of masks and sanitizer in all project sites	March 2020	October 2021	• Project delivery delayed • Project cost increased

2. PROGRESS AGAINST ANNUAL WORK PLAN 2021

ANNUAL WORK PLAN 2021

Project Title: Renewable Energy for Rural Livelihood Programme (RERL)
Award ID: 76958 / 00117173
Duration of this plan : 1 January - 31 December 2021
Country Programme Outcome 1: By 2022, impoverished, especially economically vulnerable, unemployed and under-employed and vulnerable people, have increased access to sustainable livelihood, safe and decent employment and income opportunities
Country Programme Outcome 1.1: Vulnerable groups have improved access to sustainable productive assets and environmental services
Country Programme Output 1.1.2: Number of households with energy access with UNDP supported interventions (SDG. 1.1)

EXPECTED OUTPUTS	Planned Activities	Targets for Planned Activities	Annual Achievement of Targets	Annual Achievement of Targets in %	Donor Name	Approved Budget	Amount Spent
UNDP/CPAP Output 2.4.1: . Alternative Energy Promotion Centre's capacity enhance for scaling up energy services in rural areas							
Project Output 3: Mini-grid based renewable energy systems in off-grid areas increased	**Output 1:** Provide technical support to operationalize 4.3 MW mini hydro and 0.5 MW solar/wind mini grid	• Construction and Supervision of Mini Hydro Projects • Testing & Commissioning (T&C) Backstopping • Capacity Building of Site Engineer • Knowledge Products and Publications	• Construction & Supervision of Bom Khola, Middle Phawa Khola, Giri Khola, Patarasi Chukeni Khola, Khatyad Khola MHP • T&C of Bom Khola, Giri Khola MHP & Thabang SMG • Published Guideline of Cooperative Management • Documentary on Behli Drinking Water Project	**85%**	UNDP	**239,000**	**203,224**

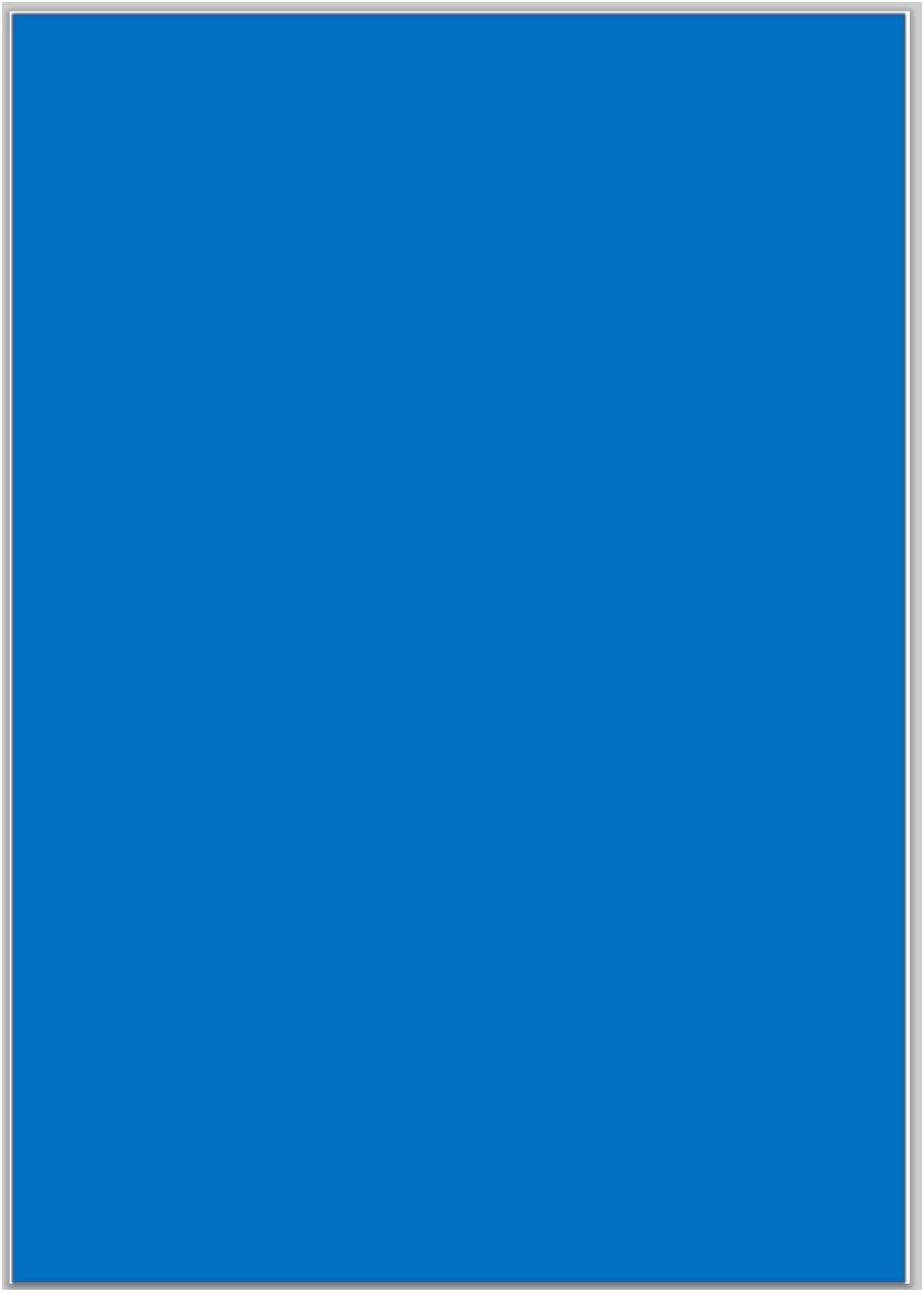
	Output 2: Strengthened institutions for smooth operation and management of mini hydro and solar/wind mini grid subprojects	• Training on Institutional Strengthening for Social Mobilizer • Registration of GESI responsive SPV • Orientation on GESI responsive institutional models • GESI Impact Study • Formation of Women's Saving Credit Group and Micro Finance Literacy Training • Promotion of Electric Cooking to reduce women's drudgery	• Orientation of GESI to 73 (41 women) members of Cooperatives in Jumla • Financial Literacy/Accounting Keeping Training for 918 cooperative members including 184 women • Published ToR to hire consulting service for promotion of Electric Cooking in Tara Khola MHP	**106%**	UNDP	**103,300**	**108,987**
Project Output 4: Capacity Development support to NEA and AEPC	**Output 3** Facilitated utilization of at least 20% of installed capacity for productive use	• Social mobilization For promotion of productive energy uses • Business Opportunities Assessment of Enterprises and Business plan preparation • Entrepreneurship training and selection of business/enterprise with emphasis on women, BPL, DAG	• 2 enterprises established in Thabang SMG • Entrepreneurship Development Training for 17 Technology Promoter in Patarasi, Chukeni Khola MHP, Jumla of whom 3 are women participants	**106%**	UNDP	49,000	51,915
	Output 4 Developed capacity of promoters and	• House Wiring Training	• Organized House wiring training for 15 beneficiaries from Patarasi Chukeni Khola,	**46%**	UNDP	**79,388**	**36,370**

	users for operation and management of subprojects	• Electrical Hazards and Safety Awareness training for the consumers of Mini-Hydro Subproject	Jumla of whom 6 are women participants • Organized Electricity Safety Training for 401 people in Giri Khola, Jumla of whom 145 are women participants • Organized Electricity Safety Training for 680 people in Tara Khola, Jumla of whom 268 are women participants				
	Output 5: Strengthened policy and planning environment to support RE and other low-carbon technology development and utilization	• Integrated Master Plan for Gird Interconnection (IMPM) • Capacity Development support for AEPC and GoN	• Draft report of IMPM submitted to AEPC	**99%**	UNDP	**8,950**	**8,856**
Programme Support Activities				**117%**	UNDP	**85,462**	**118,567**
Total Budget & Expenditure						**565,100**	**527,919**

A Distribution Transformer in Lukla, Solukhumbu

Approach Canal Excavation of the 998kW Saniveri MHP, Rukum East

Transmission Line Distribution in Patarasi Chukeni Khola MHP, Jumla



Empowered lives.
Resilient nations.

www.np.undp.org


www.facebook.com/undpnepal


www.twitter.com/undpnepal

www.youtube.com/undpnepal