FINAL

Development of Hydropower and Renewable Energy (HRE) Project in Khyber Pakhtunkhwa (Phase I)

END LINE SURVEY REPORT

Volume One: Main Report

October 2021

Innovative Development Consultants (Pvt) Limited

INNOVATIONS IN DEVELOPMENT

List of Abbreviations & Acronyms

AKRSP	Aga Khan Rural Support Program
AEDB	Alternate Energy Development Board
CO	Community Organization/ Consumer Organization
CMDO	Community Motivation & Development Organization
E&M	Electrical and Mechanical
EPC	Engineering Procurement Contract
EU	European Union
FGD	Focus Group Discussion
HPP	Hydro power project
HRE	Hydropower and Renewable Energy
INNOVATIVE	Innovative Development Consultants (Pvt) Limited
INTEGRATION	INTEGRATION environment & energy GmbH
KfW	Bank for Reconstruction (KreditanstaltfürWiederaufbau)
KPK	Khyber Pakhtunkhwa
kW	Kilo Watt
LNG	Liquefied Natural Gas
MW	Mega Watt
MHPs	Mini & Micro Hydropower Plants
MGPO	Mountain & Glacier Protection Organization
NGOs	Non-Governmental Organizations
NOC	No Objection Certificate
NRSP	National Rural Support Program
PPAF	Pakistan Poverty Alleviation Fund Islamabad
PPRE	Pilot Projects Renewable Energy
QPR	Quarterly Progress Report
QA/QC	Quality Assurance and Quality Control
RE	Renewable Energy
PEDO	Pakhtunkhwa Energy Development Organization
POs	Partner Organizations
PV	Photo Voltaic
SMR	Short Monthly Report
SABAWON	Social Action Bureau for Assistance in Welfare & Organizational Networking
SRSP	Sarhad Rural Support Program
SLS	Solar Lighting System
T&D	Transmission and Distribution
VO	Village Organization
PH	Power House
TW	Transect Walk

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INTRODUCTION

The implementation of the Hydropower and Renewable Energy-1 Project, (HRE 1 Project), started on May 13, 2013. Funded by KfW, the Project is being executed by PPAF, which has established a dedicated HRE Unit to manage the Project.

Following a Community Driven Development, (CDD) approach, the project has been implemented in 18 villages of six districts of KPK. Owing to suitable topography, mini / micro hydropower projects (MHPs) have been planned / constructed in 5 villages in Buner, Chitral, and Upper Dir districts. The remaining 13 villages in the districts of Karak, Lakki Marwat, and Swabi have been electrified through solar Photo Voltaic (PV) systems/ Solar Lighting Systems (SLSs). Based on a thorough appraisal of various qualified organizations, PPAF selected 5 Partner Organizations, (AKRSP, NRSP, SRSP, CMDO and SABAWON).

The Partner Organizations (POs) were entrusted the social mobilization and channeling of funds to the specially created and capacitated Community Organization (COs) and Village Organizations (VOs) to implement and manage the projects in their respective villages.

With the consent of PPAF, KfW has appointed INTEGRATION Environment & Energy GmbH to supervise the Project. In order to make a scientific assessment of the success / failure the Project to meet its spelled-out objectives, INTEGRATION has commissioned Innovative Development Consultants (Pvt) Limited, to carry out the midline and end line studies of the HRE 1 Project.

The midline study was carried out at a stage when social mobilization had been completed and COs and VOs formed in all the project villages, while projects in some villages had been completed and commissioned. The midline study was completed in October 2019.

Now as all the projects have been mostly completed and commissioned, the end line study has commenced in June 2021. The Report in hand presents the on-ground situation, determined through a complementary set of investigations, including (a) transect walks, (b), Focus Group Discussions, and (c) detailed household surveys in Project villages.

The Report is set in two volumes. Volume One presents an analytical discussion of post project intervention situation in each of the 13 villages. Volume Two presents the survey instruments used and the findings of investigations in a tabular form.

EXECUTIVE SUMMARY

This document is the end-line survey report, aimed at evaluating the results of Hydropower and Renewable Energy (HRE-I) Project. HRE-I is supported by the Bank for Reconstruction, KreditanstaltfürWiederaufbau (KfW), and implemented by Pakistan Poverty Alleviation Fund (PPAF), through 5 Partner Organizations (POs)[2]. The project is implemented in 18 villages across six districts of Khyber Pakhtunkhwa (KP) province. The Project components include five micro hydel projects (MHPs) in as many 5 villages, and 68 solar lighting systems (SLS), installed in 13 villages. All the MHPs are operational since the last year[3], and the 68 SLS projects in 13 villages of three districts are operational for the last two years.

The study methodology included review of project documents and conducting an end-line survey of beneficiary households, to collect quantitative and qualitative data from all 18 project sites on key variables. This information was validated and supported with further qualitative assessments through transact walks and focus group discussions (FGDs) in all 18 project village sites.

The evaluation follows LOGFRAME indicators to assess the project achievement against its objectives and results, and uses DAC criteria, to present the main findings and conclusions. A snapshot of the project objectives and its achievement are presented in Summary Table-S.1 below.

Table S.1: Achievement Against Key LOGFRAME Indicators

Key Objectives /Results	Key Indicators	Midline Status (2019)	End-line Status (2021)	Variation (+/-)
1. *Sustainability of operation*	At least 60% of all components financed by the Project are used, operated and maintained properly by the target communities	0%	29%	29.00%
	The replacement rate of spare parts for the solar power-based technologies is at least 60%.	0%	100%	+ 100.00%
2. *Reduction of household cost*	The share of Energy in total household expenditures is reduced by 30%.	48%	46.44%	- 001.56%*
3. *Contribution to CO2 mitigation*	A reduction of at least 80% in the consumption of fossil fuels for lighting purposes	0%	100%	+ 100.00%
4. *Village organization / mobilization*	At least 50% of the Community Organizations supported through the Project continue to be actively involved in the planning and implementation of local development initiatives and/or have access to external support programs.	0%	100%	+ 100.00%

*A small negative variation in the reduction of energy expenditure is due to the addition of high energy consuming household appliances like room and water heaters. However, the FGD participants reveal a big amelioration in the quality of life, due to these appliances.

S.1 Summary of Findings

Relevance:

- The project has high relevance to household needs, especially women, children and young people, living in these remote, off-grid villages of northern KP
- The project outcomes contribute to public policy for promoting community-based micro energy solutions
- Participation and contribution of beneficiary households /consumer groups, in the identification, construction and management after completion of these micro projects show strong user-ownership

Efficiency:

- Project imputes have been delivered in a timely and efficient manner
- Although, the project is implemented in remote and difficult areas, it reflects robust design features, smart planning and efficient implementation
- The evaluation recognizes clear thinking and good coordination among implementing partners, as well as with key stakeholders
- The quality of the delivered outputs has been generally high, and acknowledged as such, by beneficiary communities

Effectiveness:

- The project has achieved its overall objectives, including operational sustainability, reduction in the share of energy in total household expenses, likely reductions in CO_2 emissions, and village organization and mobilization to address other needs and priorities
- The LOGFRAME results of the project have been achieved in the form of: i) 5 fully operational hydel plants in as many (5) villages and, ii) 68 SLSs in 13 villages, which are providing expected benefits to the target beneficiary households
- At least 60% of the Hydropower and renewable energy components financed through the Project are used, operated and maintained properly by the target communities;
- The Replacement rate of spare parts for the solar power-based technologies is at least 60%.
- The quality of different components of the hydel plants and SLSs are satisfactory; both the MHPs and SLSs are providing reliable electricity to the communities in target villages
- The beneficiary communities have created institutional mechanisms for operation and management (O&M), including dedicated committees and hired personnel for regular maintenance, collection of bills and procurement and replacement of essential parts
- The project has created positive social, economic and ecological benefits for the local communities

Sustainability:

- All the electricity units are 100% operational under the COs formed around the MHP and Solar units with formalized and professional management staff members
- The MHP Units generate revenues through electricity tariff to cover operational and maintenance expenses.
- In MHP areas the share of energy in total household expenses has decreased, mainly due to reduction in the use of firewood for heating and cooking.
- The reduced in the use of firewood accompanied with reduced use of fossil fuel and tree plantation have also likely contributed to a reduction in CO_2 in the project villages.

- The Community Organizations (COs) have demonstrated potential to become platforms for social mobilization and community development in the area, as seen from their ownership and management of the electrification system.
- The project impact is emerging in the form of reduced share of energy costs in household expenditure, especially fuelwood in the case of MHPs, and reduced workload on women and children. The impact on women, young people and girls is decidedly positive, in terms of longer hours to study, and reduction in their workload

Table S.2 Evaluation Matrix

Dimension	Technical	Financial	Social/ Institutional
Relevance	Very High	High	Very High
Efficiency	High	Medium	Very High
Effectiveness	High	Medium	High
Sustainability	Low	Medium	Medium
Impact	High	Medium	High

CHAPTER 1: BACKGROUND, OBJECTIVES AND SCOPE

1.1 Background Information

The *Kreditanstalt für Wiederaufbau* (KfW) funded hydropower and renewable energy (HRE), Project is being implemented in 18 villages of six districts of KPK. These districts include: Buner, Chitral, Upper Dir, Karak, Lakki Marwat, and Swabi Owing to suitable topography, mini / micro hydropower projects (MHPs) have been planned / constructed in 5 villages in Buner, Chitral, and Upper Dir districts. The remaining 13 villages in the districts of Karak, Lakky Marwat, and Swabi have been electrified through solar PV systems, (Figure 1.1).

Owing to technical constraints, the spatial coverage of the off-grid solar PV systems is very limited. Accordingly, the 13 villages served with solar PV have been divided into 68 clusters. All the electrification unit under the HRE project are completed and 100% operational.

Figure-1.1 HRE Project

1.2 Primary Objectives of the Project

The primary objectives of the Project are as follows:

(i) Sustainability of Operation:
- At least 60% of the Hydropower and renewable energy components financed through the Project are used, operated and maintained properly by the target communities;
- The Replacement rate of spare parts for the solar power-based technologies is at least 50%.

(ii) Reduction in household cost
- The share of Share of Energy in total HH Expenditures in total household expenditures is reduced by 20%.

(iii) Contribution to CO_2 mitigation, and

(iv) Village organization & mobilization
- At least 50% of the Community Organizations supported through the Project continue to be actively involved in the planning and implementation of local development initiatives and/or have access to external support programs.

1.3 Objective and Scope of the Assignment

The overarching objective of the assignment is to evaluate the impact of electrification in the Project villages, using pre-selected indicators, through comparison and analysis of baseline/mid line data with end line results.

1.4 Structure of Investigations

The Study uses three types of survey instruments in a complementary manner, including: (a) Organized Observations through Transect Walks, (b) Focus Group Discussions (FGDs), and (c) a stratified sample survey of households in Project villages.

1.5 Organization of the End-Line Survey Report

The end-line survey report is presented in two volumes. Volume - One presents the Main Report. A core segment of the end-line Report this volume is devoted to a discussion of findings, analyses, and conclusions. Volume-Two encompasses a set of appendices, the survey instruments, proceedings of FGDs.

1.6 Approach and Methodology

The Study aims at evaluating the impact of the Project in the framework of the Project objectives and pre-selected indicators, discussed above.

A midline survey study was carried out in Sept-Oct, 2019, and this end-line survey have been used to compare with the midline survey situation to evaluate the impact of the project.

The end-line Report is prepared through a systematic completion of three sequential activities, including:

a) Development of surveys instruments in the framework of the Project objectives, discussed above,

b) Carrying out surveys and investigations in 18 project villages, with the help of a set of three survey instruments, and

c) Compilation and analysis of the information collected from the field, using spreadsheets. The end-line Report thus prepared has been written to capture the impact of electrification in a well-articulated manner.

The following sampling methodology was adopted for this end-line report, covering all the project villages in the project districts, and determining randomly selected sample sizes. Despite a number of challenging situations in the field, the Study has been completed by covering all the Project villages and with a significant coverage of the sample households. The response rate of the household interviewees and the FGD participants has also been excellent. Table 1.1 presents a summary of the household coverage and the response / participation rate.

Table 1.1 Sample Size and Response / Participation Rate

Sr. No.	Districts/ Project Villages	Total Households (#)	Sample Size (#)	Participating Households	Participation Rate (%)
Buner					
1	Bagaria Khwar	58	18	18	100
Chitral					
2	Golen Istore	79	24	24	100
3	Gazen Village	335	101	101	100
4	Pursat	227	70	70	100
Upper Dir					
5	Bishoo	500	150	150	100
Karak					
6	Azar Khel	61	18	18	100

7	Sarobi Ida Khel	54	16	16	100
8	Shamshaski	39	30	30	100
Lakki Marwat					
9	Bazid Korona	5	5	5	100
10	Dhoda	12	5	5	100
11	Ghafar Korona	9	5	5	100
12	Hazzar Dharak	56	18	18	100
13	Matora Korona	24	8	8	100
14	Mekhan Khel	19	7	7	100
15	Shah Hasan Khel	8	3	3	100
Swabi					
16	Badga	57	17	18	106
17	Jabba	141	42	40	95
18	Nogram	32	11	11	100
Total		**230**	**548**	**548**	**100**

1.7 Overview of Project Performance

The end-line survey results show that the project has achieved its overall objectives, including operational sustainability, reduction in the share of energy in total household expenses, likely reductions in CO_2 emissions, and village organization and mobilization to address other needs and priorities

The LOGFRAME results of the project have been achieved in the form of: i) 5 fully operational hydel plants in as many (5) villages and, ii) 68 SLSs in 13 villages, which are providing expected benefits to the target beneficiary households

Table 1.2 Achievement Against Key Indicators

Key Objectives/ Results	Key Indicator	Midline Status (2019)	End-line Status (2021)	Variation (+/-)
1. Sustainability of operation	At least 60% of all components financed by the Project are used, operated and maintained properly by the target communities	100%	100%	000.00%
	The replacement rate of spare parts for the solar power-based technologies is at least 60%.	0%	100%	+ 100.00%
2. Reduction of household cost	The share of Energy in total household expenditures is reduced by 30%.	48%	46.44%	- 001.56%*

3. Contribution to CO2 mitigation	A reduction of at least 80% in the consumption of fossil fuels for lighting purposes.	0%	100%	+ 100.00%
4. Village organization / mobilization	At least 50% of the Community Organizations supported through the Project continue to be actively involved in the planning and implementation of local development initiatives and/or have access to external support programs.	0%	100%	+ 100.00%

**A small negative variation in the reduction of energy expenditure is due to the addition of high energy consuming household appliances like room and water heaters. However, the FGD participants reveal a big amelioration in the quality of life, due to these appliances.*

Table 1.2 above summarizes project achievements against key objectives and their indicators (LOGFRAME RESULTS), which are quite impressive. However, the capacity of the communities to keep the projects in running condition and maintain the socioeconomic growth trajectory needs to be assessed after a follow up impact assessment study after a couple of years.

The benefits of electrification through MHPs and SLSs were found to be immediate and tangible, with clear multiplier effects. Moreover, operational sustainability has been achieved, and there is evidence for reduced use of forest trees as fuelwood. This in turn results in lower carbon emissions and positive impacts of electrification on education, health, and business/employability.

CHAPTER 2 PROJECT PERFORMANCE IN CHITRAL

2.1 Progress of MHPs in Chitral District

The project has invested in 3 MHPs in 3 villages: Golen, Gazen and Pursat. Altogether, the systems provide electricity to 594 households, including 59 in Golen village, 315 in Gazen village, and 220 in Pursat village, with a total capacity of 567 Kw. All households are included in the benefits. However, in some villages they were planning to expand the number of consumers to earn more revenues so that they cover their financial needs. Table 2.2 shows progress on key MHP implementation, based on the results of End-line Household Survey conducted in each project village.

Table 2.1 Snapshot of Progress in MHPs in District Chitral

Sr. No.	Key Variables	MHPs in Project Villages in District Chitral								
		Golen			Gazen			Pursat		
		Mid-line Status (Sep 2019)	End-line Status (Apr 2021)	Vari-ance	Mid-line Status (Sep 2019)	End-line Status (Apr 2021)	Vari ance	Mid-line Status (Sep 2019)	End-line Status (Apr 2021)	Vari-ance
1	Physical progress (%)	98%	100%	+ 2	98%	100%	2	98%	100%	+ 2
2	Installed Capacity (kW)	136	136	0	306	306	0	125	125	0
3	Plant Load Factor	0.234	0.675	0.44 1	0.050	0.342	0.29 2	0.426	0.969	+ 0.543
4	Total Households (#)	79	79	0	335	335	0	227	227	0
5	Beneficiary households (#)	62	79	0	325	325	0	227	227	0
6	Coverage (%)	78.5	78.5	0	97	97	0	100	100	0

Source: Project documents and field observations

2.2 Primary Users and Uses of Electricity

Comparison of midline and end-line data presented in Table 2.3 below shows that provision of electricity through the MHP units has significantly enhanced the use of electricity. This usage is not simply limited to lighting purpose and mobile phone, but also the number of other electric gadgets have increased.

The most significant increase has been in the usage of electricity for cooking purpose, and this will have huge impact on forest conservation and reduced CO2 emissions. In all the three project areas people have purchased ovens, locally made water geysers, electric stoves, iron and weighing machines. Also, the number of satellite TVs in all the three project villages have increased.

Table 2.2 Primary Users and Uses of Electricity in Project Villages of District Chitral

Sr. No.	Key Variables	Project Villages in District Chitral								
		Golen			Gazen			Pursat		
		Mid-line Status (Sep 2019)	End-line Status (Apr 2021)	Vari-ance	Mid- line Status (Sep 2019)	End-line Status (Apr 2021)	Vari-ance	Mid- line Status (Sep 2019)	End-line Status (Apr 2021)	Vari-ance
1.	Light bulbs	18	75	57	274	337	63	97	213	116
2.	Mobile phones	37	42	5	227	312	85	150	198	48
3.	Iron	1	8	7	40	63	23	5	23	18
4.	Weigh machine	0	9	9	11	34	23	5	34	29
5.	TV/ Satellite dish	2	7	5	36	47	11	2	12	10
6.	Refrigerator	0	1	1	3	11	8	0	3	3
7.	Micro Wave	0	0		0	0		0	0	0
8.	Oven	0	5	5	0	35	35	0	14	14
9.	Generator	0	0	0	0	0		1	1	0
10	Roti maker	0	0	0	0	0		0	0	
11.	Fan	35	31	-4	0	22	22	2	37	35
12.	Water heating Rod	0	9	9	1	31	30	0	22	22
13.	Juicer	0	0	0	0	2	2	0	0	0
14.	Electric Stove	0	12	12	0	41	41	0	18	18
15	Music Player	0	0	0	1	3	2	0	0	0

2.3 Operation and Management (O&M)

Gazen, MHP Unit, District Chitral

MHPs in the target villages are owned and operated by their respective Community Organizations (COs), the institutional mechanisms created for post-project completion management. The MHP units are operated and maintained by the community's management committees and technicians, trained by the engineers of partner organizations. The MHP staff members have formed WhatsApp groups to discuss issues and convey messages of any breakdown in MHP units. However, bad internet connection and low level of education of operators remains a short-term challenge in ensuring high quality in O&M of MHPs. While the community organizations were actively involved during the MHP construction process, fewer members participate when a meeting is called nowadays, it was disclosed. The Management Committee members normally meet once they are required to discuss any issue. Since the formation of power committees, general members are rarely invited to meetings, FGD participant in Golen complained.

It was disclosed during FDGs that Terms of Reference (TORs) had been provided for Management Committee, and Technical Committees, Chairperson, Manager and Operators, and due to their long involvement in design, implementation and operation, they are familiar with these TORs.

Control Room of MHP Pursat, Chitral

However, they said that more complicated financial management was an issue due to lack of education of the village people. They said that those who are educated migrate out for better job opportunities, and the villages are left behind with less or uneducated people. To conclude, target communities have organized themselves around MHPs in the form of management and professional committees. They are yet to register themselves with legal entities, and have to open bank account to carry out formal financial management.

There has been repair/replacement of parts in the MHP units in Chitral. The units develop minor faults, which are repaired by the engineers when informed. The communities demand for a dedicated engineer based in Chitral with responsibility to look after all the three MHP units in future.

Table 2.3 Parts Replaced / Repair Works Since Project Completion in District Chitral

Sr. No.	Key Variables	Project Villages in District Chitral					
		Golen		Gazen		Pursat	
		Mid-line Status (Sep 2019)	End-line Status (Apr 2021)	Mid-line Status (Sep 2019)	End-line Status (Apr 2021)	Mid-line Status (Sep 2019)	End-line Status (Apr 2021)
1	Civil Works	0	0	0	1	0	0
2	Transmission & Distribution	0	0	0	0	0	0
3	Electrical & Mechanical Equipment	0	2	0	6	0	5

2.4 Share of Energy in HH Expenditure

Table 2.5. below shows that there has been a significant decrease in the usage of firewood for cooking and heating after the MHP units have been operational. In Golen village, the share of energy in total household expenses has reduced from 46% to 36.5%, while in Gazen the share of energy in total household expenses has reduced from 57% to 41.4 %. In Pursat village there has been negligible reduction in the share of energy in total household expenses, mainly because firewood is easily available from the forest of silver oak around the village. While the villages of Gazen and Golen lie far from forest area, and have therefore, recorded significant reduction in the use of firewood as household fuel source. This reduction has been encouraged by the availability of electricity and the use of electric gadgets for cooking and heating.

Table 2.4 Share of Energy in Total Household Expenses

Sr. No.	Expense Category	Project Villages in District Chitral								
		Golen			Gazen			Pursat		
		Mid-line Status (Sep 2019)	End-line Status (Apr 2021)	Vari-ance	Mid-line Status (Sep 2019)	End-line Status (Apr 2021)	Vari-ance	Mid-line Status (Sep 2019)	End-line Status (Apr 2021)	Vari-ance
1	Average Monthly Household Non-Energy Expenses (PKR)	16,200	17,150	+ 950	14,100	17,652	+ 3,552	14,100	13,450	- 650

2	Average Monthly Household Energy Expenses (PKR)	13,772	9,850	- 3,922	18,895	12,460	-6,435	18,451	15,675	- 2,776
	Total	29,972	27,000	-2,972	32,995	30,112	-2,873	32,551	29,125	-3,426
3	Share of Energy in HH Expense (%)	46	36.5	9.5	57	41.4	15.6	56.68	53.82	3.3

Source: Household Survey

2.5 Community Organization and Management

The MHP units are operated and managed by community organizations. Representation of women in the CO varies among Project villages. The CO in Gazen village has almost as many women members as men. However, in Pursat and Golen villages women do not have any presence in the COs.

Non-involvement of women in decision making is a major discrepancy in MHP management, as these are women who affect the use of electricity and are the primary beneficiaries of electrification.

This is interesting to note that in the case of Gazen, where women have been given a chance to participate, their saving in the inter-stage period of the Study, turned out to be greater than men.

Table 2.6. below shows the institutional composition of MHP management and savings held by COs in the Project villages in Chitral., at the midline (Sept. 2019), and end line (April 2021) stages.

Table 2.5 Composition and Savings with Community Organizations in District Chitral

S #	COs in Project Villages	Project Villages in District Chitral								
		Golen			Gazen			Pursat		
		Mid-line Status	End-line Status	Vari-ance	Mid-line Status	End-line Status	Vari-ance	Mid-line Status	End-line Status	Vari-ance
1	Men CO members	28	28	0	152	152	0	70	70	0
2	Total Savings (PKR)	0	0	0	550,700	590,265	39,565	25,000	29,250	4,250
3	Women CO members	0	0	0	127	127	0	0	0	0
4	Saving (PKR)	0	0	0	430,600	492,660	62,060	0	0	0

2.6 Women Empowerment

Women empowerment does not exist in any formal way in the target villages. Even in Gazen village where women have almost equal participation in the village organization, they do not represent the management committee in an active sense. At the household level, women do not have their own cash income, except those very few, with jobs. They were not found carrying out any such economic activities which use electricity, or use any electric appliance that save women labor. However, having their presence inside the house for the most part of time, they are significant beneficiaries of electricity.

Table 2.6 Women Empowerment in Project Villages of District Chitral

S#	Empowerment Criteria	Golen			Gazen			Pursat		
		Midline Status	End-line Status	Vari-ance	Midline Status	End-line Status	Vari-ance	Midline Status	End-line Status	Vari-Ance
1	Number of women on the Management Committee	2	2		7	7		0	0	0
2	Number of women with cash income	0	0		0	0		0	0	0
3	Economic activities by women that use electricity	0	0		0	0		0	0	0

2.7 Summary of Findings

MHP Control Panel in Village Golen, Chitral

All three MHPs are 100% complete, operational and maintained by the user groups to achieve the project objective of operational sustainability. However, a key concern among all MHPs is that their project might develop issues in the long run, and local operators may not be able to run the MHPs, in case of a major breakdown. An encouraging trend is reduced use of firewood for cooking and heating, especially in Gazen and Golen villages, which directly contribute to reducing the share of energy in household expenses, as well as a reduction in green-house gases, due to resultant increase in forest cover. CO2 mitigation objective, in terms of sparing more forest trees by using alternate source of household fuel source of electricity, seems to be in the line of

achievement in all the three beneficiary villages in Chitral district.

Gazen village has vibrant community with a strong social organization landscape. Both men and women organizations have been actively involved in local development for the last more than two decades due to presence of Aga Khan Development Network institutions in the area. On the other hand, Golen and Pursat villages have been less exposed to development works.

Electricity tariff and salary for staff are different from village to village. In Gazen, for example, in order to encourage the use of energy against the issue of under usage a tariff system is set under which consumers have to pay PKR 600 flat per month, but beyond consuming 500 units they are charged at the rate of PKR 5 per unit. During winter it was reported that some households paid tariff as high as PKR 3000. In Golen village consumer have to opt between either PKR 1000 fix rate for as much unit they consume or PKR 7 per unit, and it was reported that the trend is that most of the consumers prefer to pay PKR 1000 fix tariff rate. In Bishoo and Bagria Khwar they pay PKR 7 per unit. Salaries for operators range from PKR 2,000 to 5,000 depending mostly on number of employees they keep, and number of consumers.

CHAPTER 3 PROJECT PERFORMANCE IN UPPER DIR

3.1 Project Progress in Upper Dir

An MHP has been built in Bishoo village of District Upper Dir, which has an installed capacity of 200 Kw. Since the midline survey, the MHP is fully operational, though the usage remains below 100 Kw. The MHP provides electricity to 607 households of the Bishoo village which also includes small villages in the neighborhood, including Siyasen, and have achieved 100% coverage, (Table-3.1).

Table 3.1 Project Snapshot in Target Village of District Dir Upper

S.#	Key Variable	Mid-line Status (Sep 2019)	End-line Status (Apr 2021	Variance (-/+)
1.	Physical progress (%)	90	100	0
2.	Installed Capacity (kW)	200	200	0
3.	Plant Load Factor	0.204	0.788	+ 0.584
4.	Total Households (#)	607	607	0
5.	Beneficiary households (#)	500	607	0
6.	Coverage (%)	82.37	100	0

Source: Project Documents

3.2 Primary Users and Uses of Electricity

Households of Bishoo village make major primary users of electricity in the area beside providing electricity to 8 mosques, 2 schools and 5 small businesses. The introduction of mobile phone has encouraged local people to use it for lighting and expand their social connectivity through increased number of mobile phones as shown in Table 3.2 below.

Table 3.2 Primary Users of Electricity in Project Village of District Dir Upper

Sr. No.	Primary Users	Users (#) Mid-line Status (Sep 2019)	Users (#) End-line Status (Apr 2021	Variance
1.	Dwellings	607	607	0
2.	Schools	2	2	0
3.	Health units	0	0	0
4.	Small businesses	5	5	0
7.	Street lights	0	0	0
8.	Places of worship	8	8	0

As shown in Table 3.3 below, the most significant change has been an increase in the number of

electric stoves, ovens, and geysers for cooking and heating purpose, and the trend will have huge impact in terms of forest conservation and reducing CO_2 emission

Table 3.3 Primary Uses of Electricity in Project Village of District Dir Upper

No.	Primary Uses	Frequency in Sample* Mid-line Status (Sep 2019)	Frequency in Sample* End-line (Apr 2021	Variance
1.	Light bulbs	186	449	263
2.	Mobile phones	362	570	208
3.	Iron	16	45	29
4.	Weigh machine	1	23	22
5.	TV/ Satellite dish	5	18	13
6.	Refrigerator	2	8	6
8.	Oven	0	22	22
9.	Fan	35	50	15
10.	Water heating Rod	4	37	33
11.	Juicer	5	7	2
12.	Electric Stove	0	34	34
13.	Music Player	0	0	0

3.2 Operation and Maintenance of MHP

The MHP in Upper Dir, has been commissioned two years ago, as the installation of distribution lines took more time than originally estimated. Nevertheless, the local government representatives actively worked with the CO to complete the infrastructure and commission the sub project.

The MHP is now generating enough funds to cover repair and maintenance and this trend is expected to continue in near future. Village people are organized around a project management committee, which was created and remained involved in the project during the construction phase, and is now managing the operational and financial aspects of the project. As shown in Table 3.4, some electromechanical equipment has been replaced since the Midline Study.

Table 3.4 Parts Replaced since Project Completion in District Upper Dir

S#	Component	Mid-line Status (Sep 2019)	End-line Status (Apr 2021)
1	Civil Works	0	0
2	Transmission & Distribution	0	0
3	Electrical & Mechanical Equipment (bearings)	0	6

3.3 Share of Energy in Total HH Expenditure

Table 3.5 below shows that there has been significant decrease (from 53% to 36.5%) in the share of energy in total household expenses, because of the increasing use of electric appliances for cooking and heating and resultantly reduced use of firewood for cooking and heating. However, people were

found complaining that low quality China made appliances do not work for longer time, and there is no service center in the nearby market to repair them.

Table 3.5 Average Monthly Household Expenditures in District Dir Upper

Sr. No.	Items	Mid-line Status (Sep 2019)	End-line Status (Apr 2021)	Variance
1	Average Monthly Household Non-Energy Expenses (PKR)	14,100	19,560	+ 5,460
2	Average Monthly Household Energy Expenses (PKR)	15,913	11,245	- 4,668
3	Total Monthly Household Expenses (PKR)	30,013	30,805	+ 792
4	Share of Energy in Total HH Expenses (%)	53	36.5	-16.5

3.4 Community Organization and Management

A men-only community organization which had been involved in the implementation of the project. The CO has now been reshuffled to form a Management Committee to manage the electricity. As the area has been less exposed to the outside world, social organization remains tribally-oriented.

Table 3.6 below shows that all the sampled households had membership in the only male organization, and that it was disclosed that all the beneficiary households are included in the organization as well. Local councilors and *Nazims* are still active in overall project implementation through mobilizing internal support and coordination with project staff.

Table 3.6 Number of Family Members in Project Village of District Dir Upper

Sr. No.	Community Organizations	Mid-line Status (Sep 2019)	End-line Status (Apr 2021)	Variance
1	Men members	127	127	0
2	Saving (PKR)	17,502	32,695	+ 15193
3	Women members	0	0	0
4	Saving (PKR)	0	0	0

3.5 Status of Women Empowerment

Women empowerment in terms of modern and formal sense does not seem to exist. The power management committee works without any woman member, no one in the sampled households reported to have women with their own cash income. Electricity is yet to come to

the help of women in the form of having ownership of any economic activity that uses electricity. Electric cooking and heating devices and cloth presser may be termed as labor saving devices.

3.6 Summary of Findings

This MHP has young and energetic leadership behind it with greater skill of community mobilization. However, the professional staff is less educated and need more training.

The share of energy in total household expenses has significantly shrunk down from 53% to 36.5% reflecting higher response to the project objective of reducing share of energy in household expenses.

Data show that the use of forest trees as household fuel source is in decline, and that will play important role in CO2 mitigation.

Until now, the Bishoo village community has little exposure to the outside world, but that will change with access to electricity, as that will bring television and Internet to homes and individual members of the community. The young local leadership consisting of local government representatives and strong civil society organization are pushing government institutions for local development and women's empowerment.

CHAPTER-4 PROJECT PERFORMANCE IN BUNER

4.1 MHP Progress Achieved in Buner

The KfW has supported construction of an MHP in Bagaria Khwar village, with an installed capacity of 36 KW. The MHP is completed and operational for the last more than two and a half years (Table 4.1). It provides electricity to 58 beneficiary households covering 100% of the village population. The quality of civil works, machinery and distribution lines were assessed to be of good quality.

Table 4.1 Project Snapshot in District Buner

S.#	Key Variables	Mid-line Status (Sep 2019)	End-line (Apr 2021	Variance (-/+)
1.	Physical progress (%)	100	100	0
2.	Installed Capacity (kW)	36	36	0
3.	Plant Load Factor	0.084	0.151	+ 0.667
4.	Total Households (#)	58	58	0
5.	Beneficiary households (#)	58	58	0
6.	Coverage (%)	100	100	0

4.2 Primary Users and Uses of Electricity in Buner

Over the last more than two years there has not been any change in the users of electricity. The primary users of electricity include 58 households, one school two village shops and 3 mosques as it was recorded in the midline survey. Primary reason for stagnancy in electricity usage is that the MHP runs as low as 7 Kw in Summer and hardly 20 Kw in Winter due to water shortage.

Table 4.2 Primary Users of Electricity in in Project Village, District Buner

Sr. No.	Primary Users	Users (#) Mid-line Status (Sep 2019)	Users (#) End-line (Apr 2021	Variance
1.	Dwellings	58	58	0
2.	Schools	1	1	0
3.	Health units	0	0	0
4.	Small businesses	2	2	0
7.	Street lights	0	0	0
8.	Places of worship	3	3	0

There has not been significant increase in the uses of electricity as most of the time the power

unit does not run on its full potential due to shortage of water. However, every sampled household has improved on lighting conditions as reflected in the increased number of bulbs over the last two years.

The emphasis seems to be communications as 26 mobiles phones were recorded in the sampled households as compared to the numbers of mobile phone in midline survey. The village has been linked with 4G network, and local people referred to emerging trend of buying smart phones (Table 4.3).

Table 4.3 Primary Uses of Electricity in Target Village, District Buner

Sr. No.	Primary Uses	Frequency in Sample* Mid-line Status	Frequency in Sample* End-line Status	Variance
1.	Light bulbs	18	59	14
2.	Mobile phones	37	63	26
3.	Iron	1	3	2
4.	Weigh machine	0	0	0
5.	TV/ Satellite dish	2	6	4
6.	Refrigerator	0	0	0
7.	Micro Wave	0	0	0
8.	Oven	0	0	0
9.	Generator	0	0	0
10	Roti maker	0	0	0
11.	Fan	35	42	7
12.	Water heating Rod	0	0	0
13.	Juicer	0	0	0
14.	Electric Stove	0	0	0
15	Music Player	0	0	0

*The sample size in village Bagaria Khwar is 18 households

Source: Household Survey

4.3 Operation and Maintenance of MHP in Buner

The MHP is managed by the same project committee, which had been involved in project identification and implementation from the beginning. People sounded satisfied with the operation and maintenance of the MHP, but were critical of the fact that the MHP did not generate enough power, and people faced load shedding even they use it only for lighting and running fans.

MHP Bagaria Khwar - Buner

Since the operation there has not been any significant fault in the system. Two bearings were changed provided by the engineer who is responsible to take care of the system, and the rest is routine maintenance such as greasing the parts. It was reported that a few months earlier it has developed a fault in the valve, which was repaired, but had again developed the same fault.

It was reported that people regularly pay their electricity bills, which cover the salaries of 2 operators, ad small maintenance expenses. They said that the bill amounts normally remained constant for the most part of the year, except the hot summer season when they use fans. They said that if they had enough water to run the MHP, they could have used more power consuming devices and machines such as fridge and geysers that would have increased the tariff collection to support MHP management.

Table 4.4 Parts Replaced Since Project Completion in District Buner

Sr. No.	Component	Mid-line Status (Sep 2019)	End-line Status (Apr 2021)
1	Civil Works	0	0
2	Transmission & Distribution	0	0
3	Electrical & Mechanical Equipment (bearings)	0	2

4.4 Share of Energy in Total HH Expenditure in Buner

The end line survey shows that there has been 9.2% increase in the share of energy in total household expenses over the last two years, (Table 4.5). This has however, been contributed by the increase of the use of firewood for cooking and heating rather than contributed by the hydro power in the case of Bagaria Khwar village. The only share of hydro power in household energy expenses has been recorded that of electricity bill amounting to PKR 750 used only for lighting and running fans. One the other hand the share of non-energy expenses has decreased mildly but significantly as people reported to have spent less on food and other non-energy expenses due to price hike of commodities of everyday use. Health and education expenses show a slight increase. While the per unit price remains the same, local people pay a little more for lighting and running fans, as number of bulbs and fans show increase in number.

Table 4.5 Average Monthly Household Energy Expenditures in Project Village, District Buner

Sr. No.	Items	Bagaria Khwar		
		Mid-line Status (Sep 2019)	End-line Status (Apr 2021)	Variance
1	A. Average Monthly Household Non-Energy Expenses (PKR)	*11,610*	*10,550*	*- 1060*
2	B. Average Monthly Household Energy Expenses (PKR)	*14905*	*19950*	*+ 5045*
	Total HH Expenditure (PKR)	26,515	30,500	+ 3985
3	Share of Energy in Total HH Expenses (%)	56.21	65.41	+ 9.2%

Source: Household Survey

4.5 Community Organization and Management in Buner

The end line survey shows that women have not formally been included in the management of the MHP. Due to shortage of water, special instructions have been given to households to use electricity carefully to minimize the hours of load shedding, and women therefore, play important role in electricity management within households. They are responsible to turn on and off bulbs and fans when needed.

Table 4.6 Households Represented in Community Organization in Project Village in District Buner

Sr. No.	Community Organizations	Bagaria Khwar		
		Mid-line Status (Sep 2019)	End-line Status (Apr 2021)	Variance
1	Men members	18	18	0
2	Saving	3,000	42,000	+ 39,000
3	Women members	0	0	0
4	Saving	0	0	0

4.6 Status of Women Empowerment in Buner

Within the village, women's mobility is restricted due to cultural constraints. Access to good quality and affordable electricity has the potential to reduce workload on women, increase economic and educational opportunities, and improve family and personal health and hygiene. However, at this stage, women are only empowered to make joint decisions with family men regarding children's education, finances and others.

4.7 Summary of Findings

The MHP in Bagaria Khwar village has achieved its objective of operational sustainability as

100% of MHP components financed through the project are used and maintained by local communities. However, the objective of reducing the share of energy in household expenses has not been achieved, and share of energy has rather increased due to more uses of firewood for cooking and heating purpose. This is because of the MHP does not run on its full potential due to lack of water as it is used for irrigation purpose in upstream, and electricity is used only for lighting and running fans.

Consequently, CO2 mitigation objective of MHP has had no significant achievement as people cut forest trees to use for household fuel purpose, including cooking and heating. Electricity however, has replaced fossil fuels.

The local Community Organization, formed around the MHP, has been actively involved in local development. It was disclosed during the FGD that local people, under the leadership of CO Chairman, pushed the local government and met member of Provincial Assembly (MPA) to lobby for the completion of village link road black topping project, which had been pending for the last two years.

CHAPTER-5 PROJECT PERFORMANCE IN KARAK

5.1 Progress Achieved in SLS Projects in Karak

The three beneficiary villages in District Karak are Azar Khel, Sarobi Ida Khel and Shamshaki settlements, all part of Paloosa UC. Five separate solar systems have been installed in as many (5) clusters of houses in the village Azar Khel. The installed capacity of 49.1 Kw provides electricity, mainly for lighting and running fans during summer.

Sarobi Ida Khel village has been divided into 8 clusters solar systems, with 47 Kw designed to provide electricity to 54 houses, covering 100% of the village popultion. Solar lighting systems in Shamshaski village have been built in 19 clusters. The cluster has an installed capacity of 80.85 kw, and provides electricity to all 100 households. Electrification projects in all the three villages have since been completed and 100% households have been provided with connections, (Table-5.1).

Table 5.1 Project Snapshot in Target Villages in District Karak

S#	Key Variables	Azar Khel			Sarobi Ida Khel			Shamshaki		
		Mid-line Status	End-line Status	Variance	Mid-line Status	End-line Status	Variance	Mid-line Status	End-line Status	Variance
1	Physical progress (%)	100	100	0	100	100	0	100	100	0
2	Installed Capacity (kW)	49.1	49.1	0	47.3	47.3	0	81	81	0
4	Total Households (#)	61	61	0	54	54	0	89	89	0
5	Beneficiary households (#)	61	61	0	54	54	0	89	89	0
6	Coverag e (%)	98	100		100	100	0	100	100	0

Source: Project Documents and physical observation

5.2 Primary Users and Uses of Electricity

Since the midline survey there has not been any significant increase in the use of electrical appliances. A mild increase in the number of bulbs, mobile phones and fans has been observed in all the three villages as shown in the below Table 5.2.

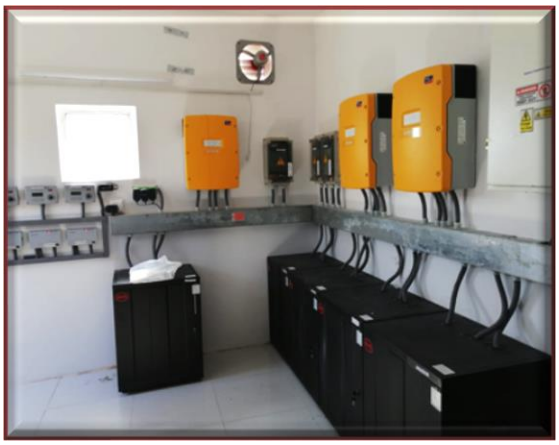
Primary users of electricity are all 61 households, one school, one shop and the village Mosque. People also perceive lighting, fans and charging mobile phones as the major advantage of having access to electricity. However, the local people sounded proud having a system where they never get the issue of load shedding.

Table 5.2 Primary Uses of Electricity in Project Villages in District Karak

S#	Key Variables	Azar Khel			Sarobi Ida Khel			Shamshaki		
		Mid-line Status	End-line Status	Variance	Mid-line Status	End-line Status	Variance	Mid-line Status	End-line Status	Variance
1.	Light bulbs	32	34	+ 2	34	37	+ 3	60	71	+ 11
2.	Mobile phone	28	33	+ 5	35	39	+ 4	66	69	+ 3
3.	Iron	5	3	-2	7	9	+ 2	15	17	+ 2
5.	TV/ Satellite dish	0	0	0	2	2	0	0	0	0
6.	Refrigerator	0	0	0	0	0	0	0	0	0
7.	Micro Wave	0	0	0	0	0	0	0	0	0
10	Roti maker	0	0	0	0	0	0	0	0	0
11.	Fan	29	24	-5	26	28	+ 2	74	78	+ 4
12.	Water heating Rod	0	0	0	0	0	0	0	0	0
13.	Juicer	0	0	0	0	0	0	0	0	0

5.2 Operation and Maintenance

Solar system operation and maintenance has been smooth, as they experienced very few faults in the solar system components including, panels, batteries and inverters. Operators are trained from time to time and were reported working to full satisfaction of the community. In some cases, such as in Shamshaki village, beneficiaries in one of the clusters have developed issues with the SLS operator, who comes from another cluster, and have stopped paying electricity tariff to the operator. The issue still lingers on.



SLS Control Room in Village Shamshaki, Karak

PV panels have been replaced in all the project villages, while inverters had to be replaced in two project villages. Interestingly, no batteries have been replaced so far in any village, (Table-5.3).

Table 5.3 Parts Replaced since Project Completion in Project Villages in District Karak

S#	Components Replaced	Azar Khel			Sarobi Ida Khel			Shamshaki		
		Mid-line Status	End-line Status	Variance	Mid-line Status	End-line Status	Variance	Mid-line Status	End-line Status	Variance
1	PV Panels	0	3	3	0	1	1	0	2	2
2	Batteries	0	0	0	0	0	0	0	0	0
3	Invertors	0	1	1	0	1	1	0	0	0

5.3 Share of Energy in Total HH Expenditure

Table 5.4 shows share of energy in total household expenses. Though not significant, there has been increase in share of energy in household expenses, and people use more forest tree as firewood than the data showed in midline survey.

Table 5.4 Average Monthly Household Expenditure in Project Villages, District Karak

S#	Items	Azar Khel			Sarobi Ida Khel			Shamshaki		
		Mid-line Status	End-line Status	Vari-ance	Mid-line Status	End-line Status	Vari-ance	Mid-line Status	End-line Status	Vari-ance
1	A. Average Monthly Household Non-Energy Expenses (PKR)	11,100	12,250	+ 1150	14,000	15,152	+ 1,152	16,110	15,550	+150
2	B. Average Monthly Household Energy Expenses (PKR)	8,869	9,750	+ 881	7,447	9,450	+2,003	7,742	8,675	+ 933
3	Total Monthly Expenses (PKR)	19,969	22,000	+ 2,031	21,447	24,602	+ 3,155	23,852	24,225	+ 373
4	Share of Energy in Total HH Expenses (%)	44.4	44.32	- 0.08	34.72	38.41	3.69	32.46	35.81	+ 3.35

Source: Household survey, Transect Walk and FGD data

Electricity through solar units is strictly forbidden for uses other than lighting and running fans. Electrification has however, created awareness of the uses of energy, as people, in all the Project villages demanded to install system to pump water from the aquifer or streams.

5.4 Community Organization and Management

The only-men CO has been active in managing the solar units in all the three villages. The COs run under the same management committee who have been working from the beginning. Professional committee members include only operators who are paid PKR 3,000 to 5,000 depending on the income of the solar unit or paid 20% of monthly income collected from the electricity tariff. Women COs do not exist in all the target villages of district Karak.

5.5 Women Empowerment

Women empowerment seems restricted to the use of electricity inside the household, and the benefits they reap from lighting and running fans. Women may have a say in management of electricity in informal ways inside the household such as decision over number of bulbs and fans and when to use them.

Table 5.5 Number of Family Members in Community Organizations in Project Villages in District Karak

S#	Community Organizations	Azar Khel			Sarobi Ida Khel			Shamshaki		
		Mid-line Status	End-line Status	Vari-ance	Mid-line Status	End-line Status	Vari-ance	Mid-line Status	End-line Status	Vari-ance
1	Men members	16	16	0	54	54	0	89	89	0
2	Saving	0	0	0	0	0	0	0	0	0
3	Women members	0	0	0	0	0	0	0	0	0
4	Saving	0	0	0	0	0	0	0	0	0

Electricity appears to have enabled women to use mobile phones to talk to their relatives and partners who work in the cities. they do not have membership in management committee, and do not keep any cash income which might be affected by access to electricity.

5.6 Summary of Findings

All the SLSs in the villages of Azarkhel, Sarobi and Shamshaki are 100% operational, and are managed by local communities independently. They have just one management committee, and electricity tariff are regularly collected to ensure operation and maintenance. Though there are small difference over management, all three clusters have achieved operational

sustainability.

The objective of reduced share of energy in household expenses is not relevant in case of solar units in three villages of Swabi district as they are lower power and meant for lighting and running fans.

Electricity provided from solar units is not an alternative for fuelwood used at household level, and do not play any role in sparing forest trees from burning as firewood in the target villages. The objective of mitigating CO2 emission is however been contributed by replacement of fossil fuels and plantation of trees.

Activities around the solar projects, interaction with people from development organizations have sensitized the local people to voice for other development activities including drinking water using solar power.

CHAPTER-6 PROJECT PERFORMANCE IN SWABI

6.1 Progress Achieved in SLS Projects in Swabi

In District Swabi, the survey covered three project villages: Badga, Jabba and Nogram, where the KfW has supported SLSs. As Table 6.1 below shows, SLSs in all the three Project villages are 100% functional, covering all the households within these villages.

Table 6.1 Project Snapshot of Target Villages in District Swabi

S#	Key Variables	Badga			Jabba			Nogram		
		Mid-line Statu	End-line Statu	Variance	Mid-line Statu	End-line Statu	Variance	Mid-line Statu	End-line Statu	Variance
1	Physical progress (%)	100	100	0	80	100	+ 20	100	100	0
2	Installed Capacity (kW)	49.1	49.1	0	0	120.78	+ 120.78	27.5	27.5	0
3	Total Households (#)	57	57	0	141	141	0	32	32	0
4	Beneficiary households (#)	57	57	0	0	141	141	32	32	0
5	Coverage (%)	100	100	0	0	100	100	100	100	0

Source: Project documents and field observations

6.2 Primary Users and Uses of Electricity

Primary uses include lighting, fans and charging mobile in the all the three villages of Swabi district, and electricity is mainly consumed within households. Village mosques and schools are other beneficiaries of electricity. Since the midline survey there has not been any significant change in the number of bulbs and fans they use.

The Jabba village has experienced significant increase in number of fans, bulbs, TVs and mobile phones, as the solar system was not operational at the time of the midline survey, (Table-6.2).

Solar Panels in Village Nogram, Swabi

Table 6.2 Primary Users and Uses of Electricity in Target Villages in District Swabi

S#	Key Variables	Badga			Jabba			Nogram		
		Mid-line Status	End-line Status	Variance	Mid-line Status	End-line Status	Variance	Mid-line Status	End-line Status	Variance
1.	Light bulbs	43	45	2	0	120	+ 120	22	32	+ 10
2.	Mobile phones	20	36	+ 16	12	62	+ 50	26	42	+ 16
3.	Iron	1	2	+ 1	0	0	0	5	3	- 2
4.	TV/ Satellite Dish	2	3	+1	0	5	+5	0	0	0
10	Fan	16	21	+ 5	0	34	+ 34	29	33	+ 4
9	Music Player	0	0	0	1	1	0	0	0	0

6.3 Operation and Maintenance

The Solar units are operated at community level by their respective local operators. The operators were reported to have got training, and the systems have not yet developed any issue. The operators seemed to have knowledge of every part of the unit. Table 27 below shows few replacements of PV panels, and inverters. In some units, batteries and inverters were observed not being dusted off.

Table 6.3 Parts Replaced since Project Completion in Target Villages District Swabi

S#	Key Variables	Badga			Jabba			Nogram		
		Mid-line Status	End-line Status	Variance	Mid-line Status	End-line Status	Variance	Mid-line Status	End-line Status	Variance
1	PV Panels	0	5	+ 5	0	1	+ 1	0	2	+ 2
2	Batteries	0	0	0	0	0	0	0	0	0
3	Inverters	0	1	+ 1	0	0	0	0	1	+ 1
4	Others	0	0	0	0	3	+ 3	0	1	+ 1

6.4 Share of Energy in Total HH Expenditure

Share of energy in total household expenditures was recorded to have increased, though less significant. The solar energy does not mean to be used for cooking and heating, and the increase in share of energy in household expenses is mainly contributed by firewood.

Table 6.4 Average Monthly Household Expenditures in Target Villages in District Swabi

S#	Items	Badga			Jabba			Nogram		
		Mid-line Status	End-line Status	Vari-ance	Mid-line Status	End-line Status	Vari-ance	Mid-line Status	End-line Status	Vari-ance
1	A. Average Monthly Household Non-Energy Expenses (PKR)	15,870	16,120	+ 250	11,260	11,800	+ 540	11,430	10,213	-1,217
2	B. Average Monthly Household Energy Expenses (PKR)	12,711	14,100	+ 1,389	10,013	12,121	+ 2,108	11,300	13,240	+ 1,940
3	Total	28,581	30,220	+ 1,639	21,273	23,921	+ 2,648	22,730	23,453	+ 723
4	Share of Energy in Total HH Expenses (%)	44.47	46.66	+ 2.19	47.07	50.67	+ 3.60	49.71	56.45	+ 6.74

Source: Household Survey

6.5 Community Organization and Management

In all three target villages, the communitieshave organized themselves around Cos, comprised of only male members. These COs are led by chairmen and secretaries, and managed by community operators. The operators are responsible for monthly reading of meters, developing electricity bills and collecting the tariff. The monthly collected bill amount is transferred to CO's account in the nearest bank, after deducting the operators' salary.

Table 6.5 Number of Members in Community Organizations in Project Villages in District Swabi

S#	Community Organizations	Badga			Jabba			Nogram		
		Mid-line Status	End-line Status	Vari-ance	Mid-line Status	End-line Status	Vari-ance	Mid-line Status	End-line Status	Vari-ance
1	Men members	18	18	0	40	40	0	11	11	0
2	Saving	0	0	0	0	0	0	0	0	0
3	Women members	0	0	0	0	0	0	0	0	0
4	Saving	0	0	0	0	0	0	0	0	0

6.6 Women Empowerment

Women have no presence in management committee, and there is no enough electricity for women carry out any economic activity using electricity. None of the sampled women respondents reported to have their own cash income. As women stay back at home, most of the time, they definitely have a say in electricity management within the household.

6.7 Summary of Findings

All the Solar units in the villages of Azarkhel, Sarobi and Shamshaki are 100% operational, and are managed by local communities/ user groups through dedicated management committees. Tariffs are regularly collected to ensure operation and maintenance. Though there are small differences over management, the system has achieved operational sustainability.

SLS Control Room in Village Nogram, Swabi

The objective of reduced share of energy in household expenses is not relevant in case of solar units in three villages of Swabi district as they are of lower power and meant for lighting and running fans.

Electricity provided from solar units is not an alternative for fuelwood used at household level, and do not play any role in sparing forest trees from burning as firewood in the target villages. The objective of mitigating CO2 emission, therefore, is relevant only in form of replacement of fossil fuels.

Activities around the solar projects, interaction with people from development organizations have sensitized the local people to voice for other development activities, including drinking water using solar power.

CHAPTER-7 PROJECT PERFORMANCE IN LAKKI MARWAT

7.1 Progress of SLS Projects in Lakky Marwat

In Lakki Marwat, the Project villages include Bazid Korona, Ghafar Korona, Dhoda, Hazar Dharak, Matora Korona, Mekhan Khel and Shah Hassan Khel. Electrification in the targeted villages of Lakki Marwat is aimed to have immediate benefits of lighting, and running fans to get the most needed breeze during hot summer days. The households pay electricity bills on per unit bases from the amount they earn from labor work in down country. The community operator collects the bills from the households at the end of the month to be transferred to the bank account of the Community Organizations, which they call power committees.

Table 7.1 shows that all the Solar units in all the 7 villages are 100% completed covering 100% households. In most cases a village consist of a walled covered area on a raised place, inside which consist as many rooms as brother, and a single solar system provides as many connections as the number of rooms. The villages are situated miles away from each other, and it seems impossible to provide connection to more than one village (cluster of rooms within a boundary wall) from a single solar system.

Solar Panels in Mekhan Khel, Lakki Marwat

Table 7.1 Project Snapshot in Target Villages District Lakki Marwat

Sr. No.	Project Villages	Stage of Study	Physical progress (%)	Installed Capacity (kW	Total Households (#)	Beneficiary households (#)	Coverage (%)
1	Bazid Korona	Midline	100	10	5	5	100
		End-line	100	10	5	5	100
2	Dhoda	Midline	100	8.2	12	11	98
		End-line	100	8.2	12	12	100
3	Ghafar Korona	Midline	100	7.3	9	9	100
		End-line	100	7.3	9	9	100
4	Hazar Dharak	Midline	100	53.4	56	56	100
		End-line	100	53.4	56	56	100
5	Matora Korona	Midline	100	17.3	24	24	100
		End-line	100	17.3	24	24	100
6	Mekhan Khel	Midline	100	19.5	19	19	100
		End-line	100	19	19	19	100
7	Shah Hassan Khel	Midline	100	7.3	8	8	100
		End-line	100	7.3	8	8	100

7.2 Operation and Maintenance

As reported during the FGDs and personally observed, the solar parts are of best quality and perfectly set inside a wired area, therefore, the systems have not yet developed any significant fault. The beneficiaries are confident that in case of any fault they have enough saving in form of electricity tariff, that they would be able to replace the parts if the system develops any fault. However, they are not able to clearly mention who to contact and where to replace the parts.

Table 7.2 Parts Replaced since Project Completion in Project Villages in District Lakki Marwat

Project Villages	Stage of Study	Project Components / Parts			
		PV Panels	Batteries	Inverters	Others
Bazid Korona	Midline	0	0	0	0
	End-line	1	0	1	0
Dhoda	Midline	0	0	0	0
	End-line	0	0	0	1
Ghafar Korona	Midline	0	0	0	0
	End-line	1	0	1	0
Hazar Dharak	Midline	0	0	0	0
	End-line	0	0	0	0
Matora Korona	Midline	0	0	0	0
	End-line	0	0	0	0
Mekhan Khel	Midline	2	0	0	0
	End-line	1	0	0	2
Shah Hassan Khel	Midline	0	0	0	0
	End-line	2	0	1	0

7.3 Primary Users and Uses of Electricity

As there are no public buildings such as schools, hospitals or any shops, the system provides electricity for lighting and running fans to houses only. It was disclosed that uses other than bulb and fans are strictly prohibited, and any use of heavy appliances creates the issue of load management for the system. During the two years from midline to end-line studies no significant difference in the number of bulbs and fans was recorded. Even if people use appliances other than bulb and fans, they do not disclose it due to pressure from the society and office, it was disclosed.

Table 7.3 Primary Users and Uses of Electricity in Target Villages District Lakki Marwat

Project Villages	Stage of Study	Electrical Appliances					
		Bulbs	Mobile Phones	Fans	Iron	Refrigerator	Satellite TV
Bazid Korona	Midline	13	6	11	0	0	0
	End-line	12	14	12	0	0	0
Dhoda	Midline	9	16	14	0	0	0
	End-line	12	21	12	0	0	0
Ghafar Korona	Midline	14	20	19	0	0	0
	End-line	17	26	21	0	0	0
Hazar Dhara	Midline	88	54	74	0	0	0
	End-line	104	77	98	0	0	0
Matora Korona	Midline	44	36	32	6	0	0
	End-line	51	47	37	4	0	0
Mekhan Khel	Midline	31	11	14	3	0	0
	End-line	37	27	25	3	0	0
Shah HassanKhel	Midline	14	9	7	1	0	0
	End-line	17	13	12	1	0	0

7.4 Share of Energy in Total HH Expenditure

The solar systems are not meant to be used as household source of energy for cooking, heating and water warming. There has, therefore, been significant, though mild, increase in the share of energy in total household expenses.

SLS Control Room in Village Dhoda, Lakki Marwat

Access to firewood is comparatively easier than access to cash income among most of the beneficiary communities. Small decrease in the average household non-energy expenses was identified due to closer of down country economic activities in the face of COVID-19 pandemic. Most of local people carry out labor work in down country, and had to return back home due to lockdown in cities, resulting in having less cash income and less spending. Table-7.4, on the next page, presents a synopsis of average monthly household expenditure in Project villages in Lakky Marwat.

Table 7.4 Average Monthly Household Expenditures in Project Villages in Lakki Marwat

Project Villages	Stage of Study	Average Monthly Household Non Energy Expenses	Average Monthly Household Energy Expenses	Total Expenses	Share of Energy in total Household expenses (%)	Variance (+/-)
Bazid Korona	Midline	12,000	12,036	24,036	50.07	4.80
	End-line	11,460	13,934	25,394	54.87	
Dhoda	Midline	14,100	12,026	26,126	46.03	0.62
	End-line	15,872	13,879	29,751	46.65	
Ghafar Korona	Midline	17,100	12,886	29,986	42.97	5.3
	End-line	15,278	14,254	29,532	48.27	
Hazar Dharak	Midline	13,910	9,366	23,276	40.24	5.9
	End-line	11,890	10,200	22,090	46.17	
Matora Korona	Midline	17,100	12,615	29,715	42.45	4.3
	End-line	16,789	14,721	31,510	46.71	
Mekhan Khel	Midline	13,100	9,457	22,557	41.92	5.5
	End-line	11,498	10,351	21,849	47.38	
Shah Hassan Khel	Midline	17,200	9,683	26,883	36.02	2.3
	End-line	15,991	9,921	25,912	38.29	

7.5 Community Organization and Management

Traditionally, village level management spaces are strictly considered men spaces in all the electrified villages under the solar system. The 7 COs were formed around the solar systems right from the start. Although, CO members include women, men were hesitant even to discuss women's involvement. This however, does not mean that women do not play any role in electricity management within the households. Men acknowledge that women are responsible to manage the use of electricity within the household as they stay at home most of the time.

There is no concept of collective saving among the beneficiary communities. Some respondents consider the CO account where they collect their electricity tariff collected on monthly basis as their saving. Even if this is considered as saving women remain excluded as they do not have membership in the CO.

7.6 Women Empowerment

Measure of women empowerment among the target communities in terms of number of women in management committee, number of women with their own cash income and number of economic activities undertaken by women that use electricity seems over emphasized, and out of context. In none of the target community women are empowered in modern terms, they however, may be powerful in local context, which needs further investigation.

Table 7.5 Number of Members in COs in Project Villages in District Lakki Marwat

Project Villages	Stage of Study	Men Members	Savings (PKR)	Women Members	Savings (PKR)
Bazid Korona	Midline	5	0	0	0
	End-line	5	0	0	0
Dhoda	Midline	12	0	0	0
	End-line	12	0	0	0
Ghafar Korona	Midline	7	1,100	0	0
	End-line	9	2,800	0	0
Hazar Dharak	Midline	17	1,400	0	0
	End-line	16	1,830	0	0
Matora Korona	Midline	8	0	0	0
	End-line	8	0	0	0
Mekhan Khel	Midline	7	300	0	0
	End-line	7	300	0	0
Shah Hassan Khel	Midline	3	0	0	0
	End-line	3	0	0	0

7.7 Summary of Findings

The solar lighting systems in all the seven villages of Lakki Marwat have got operational, sustainably managed around community organizations with management committees and management staff members. Activities around solar units, and local people interaction with project donors, and project staff members have sensitized them about lack of development in the target areas.

CHAPTER 8 CONCLUSIONS AND RECOMMENDATIONS

3.1 Key Conclusions of the End Line Study

3.1.1 Relevance

- Rural electrification has high relevance to household needs, especially women, children and young people, living in these remote, off-grid villages of northern KP
- The project outcomes contribute to public policy for promoting community-based micro energy solutions in off-grid areas
- Participation and contribution of beneficiary households /consumer groups, in the identification, construction and management after completion of these micro projects show strong user-ownership

3.1.2 Efficiency

- Project imputes have been delivered in a timely and efficient manner
- Although, the project is implemented in remote and difficult areas, it reflects robust design features, smart planning and efficient implementation
- The evaluation recognizes clear thinking and good coordination among implementing partners, as well as with key stakeholders
- The quality of the delivered outputs has been generally high, and acknowledged as such, by beneficiary communities

3.1.3 Effectiveness

- The project has achieved its overall objectives, including operational sustainability, reduction in the share of energy in total household expenses, likely reductions in CO_2 emissions, and village organization and mobilization to address other needs and priorities
- The LOGFRAME results of the project have been achieved in the form of: i) 5 fully operational hydel plants in as many (5) villages and, ii) 68 SLSs in 13 villages, which are providing the expected benefits to the target beneficiary households
- At least 60% of the Hydropower and renewable energy components financed through the Project are used, operated and maintained properly by the target communities;
- The Replacement rate of spare parts for the solar power-based technologies is at least 60%.
- The quality of different components of the hydel plants and SLSs are satisfactory; both the MHPs and SLSs are providing reliable electricity to the communities in target villages
- The beneficiary communities have created institutional mechanisms for operation and management (O&M), including dedicated committees and hired personnel for regular maintenance, collection of bills and procurement and replacement of essential parts
- The project has created positive social, economic and ecological benefits for the local communities

3.1.4 Sustainability

- All the electricity units are 100% operational under the COs formed around the MHP and Solar units with formalized and professional management staff members
- The MHP Units generate revenues through electricity tariff to cover operational and maintenance expenses.
- In MHP areas the share of energy in total household expenses has decreased, mainly due to reduction in the use of firewood for heating and cooking
- The reduction in the use of firewood accompanied with reduced use of fossil fuel and tree plantation have also likely contributed to a reduction in CO_2 in the MHP project villages.
- The Community Organizations have demonstrated potential to become platforms for social mobilization and community development in the area, as seen from their ownership and management of the electrification system
- There are some issues in formalization and professionalization of Cos. For example, local communities are not educated / trained enough to the level expected to run proper financial management of the COs. Though they are able to prepare simple monthly electricity bill and make entries of monthly income in a register.
- Access to electricity has empowered women through workload reduction and creating new opportunities for income, learning and access to new information technology
- The project impact is emerging in the form of reduced share of energy costs in household expenditure, especially fuelwood in the case of MHPs, and reduced workload on women and children. The impact on women, young people and girls is decidedly positive, in terms of longer hours to study, and reduction in their workload.

A synopsis of the conclusions is presented in the form an evaluation matrix in Table-8.1.

Table 8.1 Evaluation Matrix

Dimension	Technical	Financial	Social/ Institutional
Relevance	Very High	High	Very High
Efficiency	High	Medium	Very High
Effectiveness	High	Medium	High
Sustainability	Low	Medium	Medium
Impact	High	Medium	High

3.2 Recommendations for Follow Up Actions

Based on the insights gained through the survey results, discussions and observations in the course of this Study, the following recommendations are presented for follow up actions required for increasing the efficiency, effectiveness, and sustainability of Project interventions.

a) This end line study has been carried out after only one year of the commissioning of micro-hydro projects. As the systems are still new, their O&M is not challenging for the communities, from a managerial and financial point of view. However, after about three years of operation, new challenges will arise, such as replacement of parts and major repairs of infrastructure and equipment. As mentioned already, in order to capture the ability of the COs to handle these challenges, it is recommended that a follow up study, using same survey instruments is carried out in 2023.

b) This Study has already underscored the need of managerial and financial, and technical training of the CO members involved in the management of the MHPs. While the importance of the trainings cannot be overemphasized, it is recommended that the establishment of a not-for-profit Company to manage a cluster of neighboring MHPs, in a professional manner, may be considered

c) For the purposes of the above recommendation, a mini grid of neighboring clusters of MHP villages would be a step forward

d) In the villages electrified by MHPs, the promotion of economic activities is an essential intervention to lift the economy of these villages and the settlements interacting with them for the exchange of goods and services.

e) The solar lighting systems provided under the Project are focused at individual houses only. It will be useful to include street lights for the protection of women and children and of general security, and protection of pedestrians against harmful creatures, such as snakes and scorpions[1].

f) A supply chain of parts, and repair workshops needs to be established by promoting the setting up of such outlets / facilities in the neighboring towns.

[1] Although some householders have installed lights outside their houses, the lights are limited to the boundaries of their houses, the passage to community gathering places, like mosques remain unlit. It is therefore important to put in place a proper street lighting systems, the O&M cost of which may be borne out of savings with the CO / Management Committee.

FINAL

Development of Hydropower and Renewable Energy (HRE) Project in Khyber Pakhtunkhwa (Phase I)

END LINE SURVEY REPORT

Volume Two: Appendices

October 2021

Innovative Development Consultants (Pvt) Limited

INNOVATIONS IN DEVELOPMENT

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APPENDIX-1 TRANSECT WALK

1.1. GAZEN, DSITCIT CHITRAL

Date_____ April 30, 2021 **Time**_____ 12:30 pm

Village_____Gazen **Tehsil**_____Matuj

UC_____Yarkhun **District**_____Chitral

Change Indicators	Rating	Description
1. Accessibility, Circulation and Environment		
1.1. Accessibility (Travel time to village from the main road - Minutes)		About One hour
1.2. Condition of internal roads	Poor	Rough road and narrow streets
1.3. Condition of Houses	Poor	Mostly low built Kacha houses Latrines flush in to ground tank
1.4. Drainage Situation	Poor	No drainage system
1.5. Solid Waste Management Situation	Poor	Waste are burnt or thrown into river
1.6. Signs of open defecation	None	Not visible
2. Quality of Electrical System provided under the Project		

Change Indicators	Rating	Description
2.1. Construction Quality – Micro-hydro / Solar PV	Very Good	People are happy with the MHP unit
2.2. Construction Quality Distribution Lines (poles, conductors, cables)	Very Good	Insulated line with finely erected poles and nice quality of conductors and cables
2.3. Percentage of Houses Connected to the Village/Cluster Grid		All the HH have been covered
2.4. Street lights provided	No	No street light but bulbs in front of houses
2.5. Conditions of solar panels		
2.6. Condition of batteries		
3. Development Indicators		
3.1. Activities within village (social, cultural and economic-particularly role of women)	Active	Women and men mostly carry out agriculture activities
3.2. Conditions of health and hygiene	Good	Fresh running water in front of houses and people looked clean and neat
3.3. Out of School Children (No. of School Age Children in the Streets)	Good	Children were found running after animals and in the street
3.4. What is special in the village,		Natural scene and clean running water
3.5. Condition of people (dress, facial expressions, social status etc.)	Poor	People were poorly dressed but looked happy

DATA ANALYSIS

Accessibility, Circulation, and Environment

Village Gazen is situated on the right bank side of Chitral river which runs down from Boroghil. A temporary road made on self-help basis leads to the Gazen valley, and households are scattered ranging from 10 minutes to one hour drive in to the valley from the main road. Houses are mostly Kacha made with mud bricks and roofed with mud. Some of the buildings, mostly constructed for guests on the side of kacha house, glitter with teen sheet roofs. Almost all the houses were said to have a toilet attached to it, which drains into ground tank, and no open defecation was visible. Waste water from bathroom and kitchen drains into the sides of houses and into the streets. There is no solid waste management system, and households normally burn their solid waste or through them into the river.

Quality of Electrical System provided

MHP has been constructed on the side of mountain while entering into the village. There is high risk of rolling stones and landslide, and MHP remained closed for a week due to breakdown of channel hit by rolling stone. People complained that the water channel has not been covered and goats and sheep die falling into it. People were satisfied with the distribution lines (poles, conductors and cables), and consider it one of the best systems in Chitral. The lines being insolated were reported not to create problem for the villagers, and cover 100% households of the village. No street lights have been provided, though some people have set bulbs on erected poles in front of their houses.

Development Indicators

Agriculture counts as the major economic activity in the village. Men and women were both seen active in the fields. Women were busy collecting fodder, grazing animals, while men were seen cleaning the channels and water the fields. Environment and health hygiene conditions seemed perfect in the village. Men and women were also observed preparing land for vegetables as they grow green salad, tomato and onions in their kitchen gardens for self-consumption. However, we were offered with chicken buryani in clean utensils with soft drink chilled by putting in water channel. High mountains, clean running water, mud-roofed houses and the greenery make dominant feature of the village, which is disturbed by shining teen sheets over guest houses from place to place. Due to closure of schools, children were mostly seen on the roads, in the streets and young girls running after animals in the fields. Most of the people were dressed in Shalwar Qamis with some young boys dressed in paint shirts. Though people were poorly dressed they kept smile when you talk to them, and sound satisfied with their life.

1.2. Golen, District Chitral

Date_____April 28, 2021 Time_____ 10:25 am

Village_____Golen Tehsil_____Chitral

UC_____Koh District_____Chitral

Figure 2 April 30, 2021, Gazen village street, in district Chitral

Change Indicators	Rating	Description
1. Accessibility, Circulation and Environment		
1.1. Accessibility (Travel time to village from the main road - Minutes)		One and half hour drive
1.2. Condition of internal roads	Poor	Rough road and no internal roads
1.3. Condition of Houses	Poor	Mostly katcha houses with stone and mud walls
1.4. Drainage Situation	Poor	Waste water drains into fields
1.5. Solid Waste Management Situation	Poor	Waste are thrown into water or burnt
1.6. Signs of open defecation	None	No
2. Quality of Electrical System provided under the Project		

Change Indicators	Rating	Description
2.1. Construction Quality – Micro-hydro / Solar PV	Very Good	People were satisfied but not satisfied with operation and maintenance
2.2. Construction Quality Distribution Lines (poles, conductors, cables)	Very Good	Poles are away from each other and rest is fine
2.3. Percentage of Houses Connected to the Village/Cluster Grid		100% coverage
2.4. Street lights provided	No	People wonder who will pay for street lights
2.5. Conditions of solar panels		
2.6. Condition of batteries		
3. Development Indicators		
3.1. Activities within village (social, cultural and economic-particularly role of women)	Active	Men and women are engaged with agriculture activities
3.2. Conditions of health and hygiene	Poor	The streets were littered with plastic , and full of animal droppings people complained of lack of drinking water
3.3. Out of School Children (No. of School Age Children in the Streets)	Poor	Young boys were found wondering for no purpose

Change Indicators	Rating	Description
3.4. What is special in the village,		Natural scene , and clear river passing along the village
3.5. Condition of people (dress, facial expressions, social status etc.)	Poor	Poorly dressed and indifferent people

DATA ANALYSIS

Accessibility, Circulation, and Environment

The target village lies on the end deep into the Golen valley, and it takes more than one hour to drive over the road which often remains closed covered by boulders due to floods. The road passes along the village and there is no internal road to connect the individual houses. Most of the houses are kacha build by stones and mud, however, the trend seems to be of teen sheet roofed houses, while the walls still made of stones and mud. People said that they have toilet in houses, which drains into ground tank, and solid wastes are thrown into river which passes on the side of the village. No open defecation was observed.

Quality of Electrical System provided

MHP unit was visited with the villagers who sounded satisfied with the construction quality of the MHP. The operators, however, said that they need a living room and a toilet as they had to stay in the Unit for full time. They currently live inside the power in a cabin on one side. Construction quality of poles, conductors and cables were erected in a fine way. However, the villagers said that poles have been erected far from each other and main line wires seem to have hanged down to ground. It was disclosed that all the villagers have been provided with electricity. However, no street lights were observed in the village.

Development indicators

As village men migrate to towns and cities for labor work, women are mostly seen active in the carrying out agriculture activities as well as grazing animals. They were working in potato crop fields and collecting fodder for animals. The dusty streets in between the houses were full of animal droppings and littered with plastic covers. Traders from down Pakistan transport low quality and cheap sweets and chips to sell to local vendors, which consumed by village children throwing off the plastic covers. Also, women and were seen crowded in front of a house to attend wedding ceremony. Children surrounded the FGD as they had off school days due to COVID-19 lock down. Children were also seen wondering purposelessly in the streets. Villagers are dressed

1.3 PURSAT, DISTRICT CHITRAL

Date_____ April 26, 2021 Time_____12:30 pm

Village_____Pursat Tehsil_____Chitral

UC_____Shishikoh District_____Chitral

Change Indicators	Rating	Description
1. Accessibility, Circulation and Environment		
1.1. Accessibility (Travel time to village from the main road - Minutes)		More than an hour drive
1.2. Condition of internal roads	Poor	Road passes along the villlages and no internal roads
1.3. Condition of Houses	Poor	Ouses are mostly kacha built with mud and stone
1.4. Drainage Situation	Poor	Wastewater drains into the fields and water channels
1.5. Solid Waste Management Situation	Poor	Burnt and threw outside of houses
1.6. Signs of open defecation	None	No
2. Quality of Electrical System provided under the Project		
2.1. Construction Quality – Micro-hydro / Solar PV	Very Good	Nicely constructed building but highly prone to floods. Machines are of high quality

Change Indicators	Rating	Description
2.2. Construction Quality Distribution Lines (poles, conductors, cables)	Very Good	
2.3. Percentage of Houses Connected to the Village/Cluster Grid		100%
2.4. Street lights provided	No	No street lights
2.5. Conditions of solar panels		
2.6. Condition of batteries		
3.1. Activities within village (social, cultural and economic-particularly role of women)	Stagnant	Women were found busy with agriculture and grazing animals
3.2. Conditions of health and hygiene	Poor	Plastic litters on house sides and in the streets
3.3. Out of School Children (No. of School Age Children in the Streets)	Poor	Boys in the streets and young girls grazing animals
3.4. What is special in the village,		Clean water in torrents, with dense forest slopes
3.5. Condition of people (dress, facial expressions, social status etc.)	Poor	People were poor dressed with bare footed children

DATA ANALYSIS

Accessibility, Circulation and Environment

A kacha road roots off the main Peshawar Chitral road on the right to lead into the Shishi Koh valley, and it takes almost one and half hours to reach Pursat village lying on the right side of Shishi Koh river deep

into the valley. The village is connected with a suspension bridge, and extremely rough road leads whirling up to market area as the center of the village. Houses are made of stone and mud roofed with heavy mud deposit. Waste water from houses was seen draining into fields, streets and water channels. The streets are littered with plastic bags of sweets and chips emptied by children bought from the local shops. Solid wastes are dropped into the river, and burnt in some cases. No open defecation was observed in the area, though not all houses were reported to have toilets.

Quality of Electrical System

The MHP unit is located on the base of mountain at the opening of village stream. A heavily constructed hall houses the machines, which seemed to have unattended and dusted for long time. The villagers appreciated the construction quality of distribution lines, poles and cables that cover all the households of the village. They were happy with the MHP unit but complained of its breakdown again and again due to incompetency of operators, and unavailability of technical staff to take the MHP unit.

Development Indicators

The village depends on agriculture and animal husbandry carried out at subsistence level. Enjoying a large forest land of silver oak and juniper above the mountains, the villagers keep goats and other animals, and also grow wheat and maize crops. Agriculture activities are carried out mainly by women while men take animals to mountains and bring down firewood for household consumption as well as to sell in the market.

Men in the village were seen cleanly dressed in shalwar qamis, while children played around in dirty dresses throwing up the dust at each other. We were offered water in a neat jug and glass when we asked for on a door opening into the street. They said that there is no permanent drinking water system in the village. COVID-19 lock down has left the village children wondering in the streets, and playing cricket on roadsides.

A saw machine in the center of village along with some shops make one of the main features of village life in Pursat. Silver and Oak tree forest along the mountains seems to make the villagers sit in the midst of wealth. As the forest belongs to the villagers, they are the owner and custodians of local forest land.

Figure 2: Figure 3: April 26, 2021, FGD in progress in Pursat

Figure 1 April 26 ,2021, pathway leading to village, pursat, district Chitral

1.4 BISHOO, DISTRICT DIR UPPER

Date_____April 24, 2021 Time_____02:30 pm

Village_____Bishoo Tehsil_____Kalakot

UC_____Patrak District_____Upper Dir

Change Indicators	Rating	Detail
1. Accessibility, Circulation and Environment		
1.1. Accessibility (Travel time to village from the main road - Minutes)		One and half hour drive along the river deep into valley
1.2. Condition of internal roads	Poor	The toad is kacha and there were no internal roads
1.3. Condition of Houses	Poor	Mostly kacha and terraced houses and the walls were intact with beams
1.4. Drainage Situation	Poor	Wastewater drains into the side of houses, streets and stream
1.5. Solid Waste Management Situation	Poor	Throw into water and sides, and burnt in some cases
1.6. Signs of open defecation	None	No sign of open defecation

Change Indicators	Rating	Detail
2. Quality of Electrical System provided under the Project		
2.1. Construction Quality – Micro-hydro / Solar PV	Very Good	People are happy with construction quality
2.2. Construction Quality Distribution Lines (poles, conductors, cables)	Very Good	Safe and nicely erected
2.3. Percentage of Houses Connected to the Village/Cluster Grid	100%	100% coverage
2.4. Street lights provided	No	No street lights
2.5. Conditions of solar panels		
2.6. Condition of batteries		
3. Development Indicators		
3.1. Activities within village (social, cultural and economic-particularly role of women)	Stagnant	Man do labor work and women take care of animals
3.2. Conditions of health and hygiene	Poor	Sitting areas were unhygienic and in some parts of villages no clean drinking water
3.3. Out of School Children (No. of School Age Children in the Streets)	Poor	Children were in the streets

Change Indicators	Rating	Detail
3.4. What is special in the village,		Beautiful forest area with grass land above
3.5. Condition of people (dress, facial expressions, social status etc.)	Poor	People were poor dressed, and children were bare footed children running around

DATA ANALYSIS

Accessibility, Circulation and Environment

Bishoo village is situated at one and half hour drive from Dir city. Driving along the Bishoo river on a rough road it passes by various small villages which have been electrified by the Bishoo MHP. The villages on the side of the valley do not have road access and people walk up to their houses from the river base. Most of the houses were found kacha, built using mud and stones. It was informed that not all the houses had toilet built in them, and the toilets were said to be drained into ground tank. Open defecation was also observed on the road side. Plastics were observed littering the slope walkways along the kacha houses.

Quality of Electrical System

People were satisfied with the construction quality of the MHP Unit, and showed around referring to machines imported from abroad. MHP has been built on flood bed on the river side, and big boulders near the MHP unit shows that it was flood once. People urged to build protection wall towards the river side to protect the Unit in case of any flood. The poles were observed having long distances between them crossing over the river, they have however covered the villages along the slope. The local people understand that electrification has supported night time walk by charging the emergency lights, but were requesting that if they were provided with street lights to make it easy to walk to mosques and shops at night time.

Development Indicators

Women were observed grazing goats and cows, and working in wheat and maize fields along the slope. Men commute to Dir city on daily basis for business and labor work. Guest houses, set with traditional beds, were smelly and unattended, and walks along the slope were littered with papers and plastic. Due to COVID-19 pandemic it was hard to identify whether the children wandering around in the village were

out of school children or simply enjoying school off days due to lock down. All the men and young boys were dressed in shalwar qamis with shawl hanging over shoulders. Men, walking along the road and hanging over the cars sounded lively and active.

1.5. SAR KALEY VILLAGE DISTRICT BUNER

Transect Walk Village Sar Kaley, Buner

Date_____April 23, 2021 Time_____ 11:00 am

Village_____Sar Kaley Tehsil_____Pandhair

UC_____Gagra District_____Buner

Change Indicators	Rating	Description
1. Accessibility, Circulation and Environment		
1.1. Accessibility (Travel time to village from the main road - Minutes)		It takes more than an hour to reach the village from the city
1.2. Condition of internal roads	Poor	Kacha road and no internal roads
1.3. Condition of Houses	Poor	Mud built and roofed houses
1.4. Drainage Situation	Poor	Wastewater drains into the side of houses and walk ways
1.5. Solid Waste Management Situation	Poor	Solid waste is thrown into the streets
1.6. Signs of open defecation	None	
2. Quality of Electrical System provided under the Project		
2.1. Construction Quality – Micro-hydro / Solar PV	Very Good	Beautifully constructed building and finely placed machines

Change Indicators	Rating	Description
2.2. Construction Quality Distribution Lines (poles, conductors, cables)	Very Good	Nicely erected poles Lines passing closer to forest trees
2.3. Percentage of Houses Connected to the Village/Cluster Grid	100%	All the houses were reported to have covered
2.4. Street lights provided	No	No street lights and people were requesting lights on the way to mosque
2.5. Conditions of solar panels		
2.6. Condition of batteries		
3. Development Indicators		
3.1. Activities within village (social, cultural and economic-particularly role of women)	Stagnant	Women and girls were grazing animals, and men were sitting idle
3.2. Conditions of health and hygiene	Poor	No proper drinking water, and other things seemed cleaned
3.3. Out of School Children (No. of School Age Children in the Streets)	Poor	Children surround you on reaching the village
3.4. What is special in the village,		Green mountains and clean sky across
3.5. Condition of people (dress, facial expressions, social status etc.)	Poor	Women and children were seen poorly dressed and weak

DATA ANALYSIS

Accessibility, Circulation and Environment

It takes almost two hours to reach Sar Kaley from the main Buner Bazar. An about ten Kilometers long rough road departs at Pandhair village to enter into a beautiful green valley which finally leads to Sarkaley village. The road was hardly a few Kilometers ahead where during the last visit an excavator and roller and few laborers were working, to prepare it for blacktop. A number of cluster of houses at distances from each other make the village, which overlooks a narrow blue river flowing slowly over the settled white silt released from Marble factories back in Buner city. The cluster of houses within the village are connected through pathways along the slop. Most of the houses are kacha made of mud bricks roofed by heavy loaded mud. Waste water coming out of the cluster of houses drained into side walkways, which were also littered with plastics, animal droppings and dead leaves. When asked for toilet I was led to a small neat and functional toilet with drum of clean water put under leaked water tap.

Quality of Electrical System

The MHP unit is situated on the side of stream deep down the village. It was disclosed that most of months of the year the unit suffers water shortage and electricity is used just for lighting and running fans. One of the participants, however, sheepishly admitted that some of the villagers also use TV, oven, and Iron in off peak hours. The FGD participants sounded satisfied with transmission and distribution lines as well as machines installed in power unit. However, due to slope some of the lines hanged low to the ground, claimed some of the participants. They proudly said that the MHP unit had not created any issue thus far, and in case of break down parts were available in the Buner city market. All the target households within the village have been provided with electricity. There were no street lights, and people said that they went to Mosque at night time taking emergency lights or mobile lights with them.

Development Indicators

Life within the village seemed stagnant. Women were observed taking care of their animals around the houses. While men were supposed to collect fodder and firewood for the household consumption. Women were also seen making round brick of cow dung mixing it with mud to be used as firebricks. Houses have dried grasses stocked on sides, which they use to feed the cows and goats during winter.

Majority of men and children we met around in the village had shalwar qamis hardly washed for the last month. However, people looked physically fit and cheerful. During the FGD children crowded around and the host had to shout them away. They said that Corona had left the children walk around the village purposely instead to being in schools. The village is featured by lush green slopes around covered above by sparkling blue sky. Despite of the presence of MHP in the village, the forest around is vulnerable to villagers' daily use of firewood, as electricity is too low to be used for cooking and other household purposes.

1.6. AZAR KHEL DISTRICT KARAK

Date_____ April 25, 2021 Time_____ 03:15 pm

Village_____Azar Khel Tehsil_____Karak

UC_____Palosa Sar District_____Karak

Change Indicators	Rating	Description
1. Accessibility, Circulation and Environment		
1.1. Accessibility (Travel time to village from the main road - Minutes)		More than three hours four-wheel drive
1.2. Condition of internal roads	Poor	Car drive on stream beds
1.3. Condition of Houses	Poor	Hut like mud houses
1.4. Drainage Situation	Poor	No drainage system and house sides smell foully
1.5. Solid Waste Management Situation	Poor	House sides are full plastic litters
1.6. Signs of open defecation	None	No open defecation
2. Quality of Electrical System provided under the Project		
2.1. Construction Quality – Micro-hydro / Solar PV	Very Good	Beautifully constructed solar systems in clusters
2.2. Construction Quality Distribution Lines (poles, conductors, cables)	Very Good	Poles seemed erected far from each other

Change Indicators	Rating	Description
2.3. Percentage of Houses Connected to the Village/Cluster Grid	100%	Hundred percent coverage
2.4. Street lights provided	No	Few bulbs in front of houses
2.5. Conditions of solar panels	Very Good	Look nice
2.6. Condition of batteries	Very Good	Nicely set inside a room
3. Development Indicators		
3.1. Activities within village (social, cultural and economic-particularly role of women)	Stagnant	Women mostly graze animals and few men were seen taking water on donkeys
3.2. Conditions of health and hygiene	Poor	No safe drinking water and children seem without washing hands for days
3.3. Out of School Children (No. of School Age Children in the Streets)	Poor	Children were wondering with no purpose
3.4. What is special in the village,		Gorges and barren land with no drinking and irrigation water
3.5. Condition of people (dress, facial expressions, social status etc.)	Poor	Poorly dressed

1.7 SAROBI IZA KHEL DISTRICT KARAK

Date_____ April 25, 2021 Time_____ 3:45 pm

Village_____Sarobi Iza Khel Tehsil_____ Karak

UC_____ Palosa Sar District_____ Karak

Change Indicators	Rating	Description
1. Accessibility, Circulation and Environment		
1.1. Accessibility (Travel time to village from the main road - Minutes)		More than two hour drive
1.2. Condition of internal roads	Poor	Kacha road and no internal roads
1.3. Condition of Houses	Poor	Mostly hut like katcha houses with mud roof
1.4. Drainage Situation	Poor	Wastewater drains into the pathways
1.5. Solid Waste Management Situation	Poor	Saw people burning solid wastes on some places
1.6. Signs of open defecation	None	
2. Quality of Electrical System provided under the Project		
2.1. Construction Quality – Micro-hydro / Solar PV	Very Good	Nicely set solar system

2.2. Construction Quality Distribution Lines (poles, conductors, cables)	Very Good	Poles stand too far, but lines are insulated
2.3. Percentage of Houses Connected to the Village/Cluster Grid	100%	The HHs have been covered
2.4. Street lights provided	No	No street lights
2.5. Conditions of solar panels	Very Good	Beautifully erected
2.6. Condition of batteries	Very Good	Nicely placed in a room
3. Development Indicators		
3.1. Activities within village (social, cultural and economic-particularly role of women)	Stagnant	Women were seen taking care of animals, adult male go for labor work and few elderly people were seen in the village
3.2. Conditions of health and hygiene	Poor	No drinking water taken from far away springs which dries up in summer
3.3. Out of School Children (No. of School Age Children in the Streets)	Poor	Children were seen wondering around
3.4. What is special in the village,		Huge gorges and barren slopes
3.5. Condition of people (dress, facial expressions, social status etc.)	Poor	Women and children were poorly dressed

1.8. SHAMSHAKI DISTRICT KARAK

Date_____ April 26, 2021 Time_____ 01:25 pm

Village_____Shamshaki Tehsil_____ Karak

UC_____Palosa Sar District_____ Karak

Change Indicators	Rating	Description
1. Accessibility, Circulation and Environment		
1.1. Accessibility (Travel time to village from the main road - Minutes)		Around two hour drive
1.2. Condition of internal roads	Poor	Kacha road along the gorges
1.3. Condition of Houses	Poor	Poorly built kacha houses
1.4. Drainage Situation	Poor	No water and no drainage
1.5. Solid Waste Management Situation	Poor	Thrown in to side of houses
1.6. Signs of open defecation	None	No signs were found
2. Quality of Electrical System provided under the Project		
2.1. Construction Quality – Micro-hydro / Solar PV	Very Good	Nicely built

2.2. Construction Quality Distribution Lines (poles, conductors, cables)	Very Good	High quality
2.3. Percentage of Houses Connected to the Village/Cluster Grid	100%	100% houses have been covered
2.4. Street lights provided	No	No streets and no lighting
2.5. Conditions of solar panels	Very Good	Nicely kept in a safe place
2.6. Condition of batteries	Very Good	Best and running in their full
3. Development Indicators		
3.1. Activities within village (social, cultural and economic-particularly role of women)	Dormant	Children and women were busy with animal grazing
3.2. Conditions of health and hygiene	Poor	Dusty room and litters outside the houses
3.3. Out of School Children (No. of School Age Children in the Streets)	Poor	Children wondering around
3.4. What is special in the village,		Dusty and dry mountains
3.5. Condition of people (dress, facial expressions, social status etc.)	Poor	Bare footed children and poorly footed children

DATA ANALYSIS

Accessibility, Circulation and Environment

The villages of Azar Khel, and Sarobi Iza Khel are located in the remotest of valley of Karak in Palosar Union Council. Driving towards the North from Karak city a narrow road ascends to a mountain, and then descend down to a gorge. A dried streambed which flows only in torrential rains makes road for the few local four wheeled cars that carry the villagers to and from the city. Lying at the distance of two hour drive the villages remain cut off during flood in the stream. Another target village, Shamshaki, in Karak district lies toward the West, driving into another gorge. The houses lie on either side of the dried stream located in raised places away from flood bed, and households around one cluster often belong to same tribe. Hut like kacha houses do not often have toilet attached to them, and water waste drains to the narrow walkways along the houses, littered with plastics, wood pieces and animal drops. Open defecation was visible on the side of houses, for which the house children are blamed.

Quality of Electrical System

Construction quality of Solar PV were reported to be very good. Solar panels are erected next to the cluster of houses on a plain space donated by one the families. A neatly built concrete room, next to the panels, houses the batteries, inverters, charge controllers and other relevant solar machines. The villagers take you around to show the machines proudly. The targeted households have been connected through insulated distribution line, and people sounded satisfied with the system. All the households have been connected, however, the FGD participants showed concern about the absence of guideline in case of new connection requests. No street lights were observed as there were no street as such. Solar panels in Shamshaki village were observed damaged. Local people said that it was hit by bullets, but the damage seemed of big stone rather than a bullet. They disclosed that they had arranged money to buy new one and wait for relevant officials to get them replaced. Batteries, well arranged in a concrete room, seemed of high quality, and people reported no malfunctioning thus far.

Development Indicators

Life in the targeted villages sounded stagnant. Men were observed in a few small shops looking at occasionally passersby or busy with exchanging cheap quality chips and sweet items with children, standing outside firmly having ten-rupee notes at hand. We also passed by men trying to catch with donkeys with water drums on back, and few women, dressed in red baggy clothes, who turned their back to us till we had our backs towards them.

Poor health and hygiene condition is understandable in targeted villages in the absence of water for drinking and other uses. Wet spots around the villages are captured by flies and insects to quench their thrust from what is left over from human being and animals. People are dressed in Shalwar Qamis, and look happy, and of heavy physique. Dry slopes with wild olive trees and other wild shrubs, with gorges made of floods make the dominant feature of the target areas.

1.9 BADGA DISTRICT SWABI

Date_____April 16, 2021 Time_____10:00 am

Village_____Badga Tehsil_____ Swabi

UC_____Gani Chatra District_____Swabi

Change Indicators	Rating	Description
1. Accessibility, Circulation and Environment		
1.1. Accessibility (Travel time to village from the main road - Minutes)		One and half hour drive to down in the gorges
1.2. Condition of internal roads	Poor	No internal roads
1.3. Condition of Houses	Poor	Mostly Katcha mud walled and roofed houses
1.4. Drainage Situation	Poor	No system
1.5. Solid Waste Management Situation	Poor	No permanent system
1.6. Signs of open defecation	None	
2. Quality of Electrical System provided under the Project		
2.1. Construction Quality – Micro-hydro / Solar PV	Very Good	Nicely set panels and other parts
2.2. Construction Quality Distribution Lines (poles, conductors, cables)	Very Good	
2.3. Percentage of Houses Connected to the Village/Cluster Grid	100%	All the village has been covered
2.4. Street lights provided	No	Not provided but seem important
2.5. Conditions of solar panels	Very Good	Nicely set against the sunlight

2.6. Condition of batteries	Very Good	Beautifully built battery storage room
3. Development Indicators		
3.1. Activities within village (social, cultural and economic-particularly role of women)	Stagnant	Women were seen grazing animals and men sitting idle
3.2. Conditions of health and hygiene	Poor	Lack of drinking water and foul smelling side ways
3.3. Out of School Children (No. of School Age Children in the Streets)	Poor	Children wondering around
3.4. What is special in the village,		Greenery in 360 degree
3.5. Condition of people (dress, facial expressions, social status etc.)	Poor	Poorly dressed and gloomy faces

1.10 JABBA DISTRICT SWABI

Date_____ April 17, 2021 Time_____12:30 pm

Village_____Jabba Tehsil_____Sawabi

UC_____Gani Chatra District_____Swabi

Change Indicators	Rating	Description
1. Accessibility, Circulation and Environment		
1.1. Accessibility (Travel time to village from the main road - Minutes)		More than one hour form the main road
1.2. Condition of internal roads	Poor	Bumpy roads into the village and no internal road
1.3. Condition of Houses	Poor	Mostly Katcha houses, poorly built
1.4. Drainage Situation	Poor	Wastewater drains into pathways along the houses
1.5. Solid Waste Management Situation	Poor	Burnt and thrown into the slope forest area
1.6. Signs of open defecation	None	No sign of defecation
2. Quality of Electrical System provided under the Project		
2.1. Construction Quality – Micro-hydro / Solar PV	Very Good	Not yet constructed
2.2. Construction Quality Distribution Lines (poles, conductors, cables)	Very Good	Very nicely constructed
2.3. Percentage of Houses Connected to the Village/Cluster Grid		All the HH have been covered
2.4. Street lights provided	No	No street lights
2.5. Conditions of solar panels	Very Good	

2.6. Condition of batteries	Very Good	
3. Development Indicators		
3.1. Activities within village (social, cultural and economic-particularly role of women)	Stagnant	Men and women were busy with fodder collection
3.2. Conditions of health and hygiene	Poor	Unhygienic and foul-smelling rooms and pathways
3.3. Out of School Children (No. of School Age Children in the Streets)	Poor	Children are back at home due to COVID-19. Children working with men in fodder collection
3.4. What is special in the village,		Natural scene
3.5. Condition of people (dress, facial expressions, social status etc.)	Poor	People were poor dressed, but lively and smart

1.11 NOGRAM , DISTRICT SWABI

Date_____ April 17, 2021 Time_____2:00 pm

Village_____Nogram Tehsil_____ Swabi

UC_____Gani Chatra District_____Swabi

Change Indicators	Rating	Description
1. Accessibility, Circulation and Environment		
1.1. Accessibility (Travel time to village from the main road - Minutes)		More than two hours walk
1.2. Condition of internal roads	Poor	No internal road
1.3. Condition of Houses	Poor	Kacha and hut like houses
1.4. Drainage Situation	Poor	Wastewater drains into the side of houses
1.5. Solid Waste Management Situation	Poor	No permanent system, and side-walks are littered with plastic and paper
1.6. Signs of open defecation	None	
2. Quality of Electrical System provided under the Project		
2.1. Construction Quality – Micro-hydro / Solar PV	Very Good	People sounded satisfied
2.2. Construction Quality Distribution Lines (poles, conductors, cables)	Very Good	Nicely constructed
2.3. Percentage of Houses Connected to the Village/Cluster Grid	100%	All the village have been covered
2.4. Street lights provided	No	Not provided but seem important
2.5. Conditions of solar panels	Very Good	Beautifully erected
2.6. Condition of batteries	Very Good	Batteries are nicely set

3. Development Indicators		
3.1. Activities within village (social, cultural and economic-particularly role of women)	Stagnant	Women were seen grazing animals around
3.2. Conditions of health and hygiene	Poor	No drinking water and poor WASH conditions
3.3. Out of School Children (No. of School Age Children in the Streets)	Poor	Schools were closed and children wonder around
3.4. What is special in the village,		All green around due to rains
3.5. Condition of people (dress, facial expressions, social status etc.)	Poor	People were poor dressed but active

DATA ANALYSIS

Accessibility, Circulation and Environment

The villages of Badga, Nogram and Jabba root off from the main road at Ghani Chatra towards the left. One hour drive along the dense forest slope towards South leads to the villages of Jabba and Nogram, while Badga village is situated at the base, connected with rough road driving down the slope for about an hour. Houses are situated in small clusters on raised lands along the slope, and are made of mud bricks and stones roofed with mud, which are loaded with heavy stock of dried grass fodder. Waste water runs into walkways along the cluster of houses leaving foully smell, and walkways are littered with plastic bags and coverings of cheap sweets and chips. No open defecation was observed.

Quality of Electrical System

Local people sounded satisfied with the solar systems based in plain areas donated by the villagers. People were satisfied with construction quality of Solar PV, and were happy with the way the houses were connected with Solar system with insulated main wire. We were told about few houses who had refused to join the electrification system, but now the community deny to give them connection due to absence of their role in solar system construction. Some village people argued to forgive them their fault, which they didn't know would cost them that big. People showed us machine rooms which house big batteries and other systems, and the panels looked nicely in all the three villages.

Development Indicators

1.12 Bazid Korona, District Lakki Marwat

Date_____April 27, 2021 Time_____01:20 pm

Village_____Bazid Korona Tehsil_____ Ahmed Khel

UC_____Lakki Marwat District_____Lakki Marwat

Change Indicators	Rating	Description
1. Accessibility, Circulation and Environment		
1.1. Accessibility (Travel time to village from the main road - Minutes)		One and half hours
1.2. Condition of internal roads	Poor	Have to make road in the desert
1.3. Condition of Houses	Poor	Mostly Katcha houses
1.4. Drainage Situation	Poor	Wastewater drains into the side of houses
1.5. Solid Waste Management Situation	Poor	Thrown outside houses
1.6. Signs of open defecation	None	
2. Quality of Electrical System provided under the Project		
2.1. Construction Quality – Micro-hydro / Solar PV	Very Good	People sounded satisfied Nicely set panels and safe battery room
2.2. Construction Quality Distribution Lines (poles, conductors, cables)	Very Good	
2.3. Percentage of Houses Connected to the Village/Cluster Grid		All the village has been covered
2.4. Street lights provided	No	No street exist
2.5. Conditions of solar panels	Very Good	Clean and untouched
2.6. Condition of batteries	Very Good	Nicely placed

3. Development Indicators		
3.1. Activities within village (social, cultural and economic-particularly role of women)	Stagnant	No activities were going on
3.2. Conditions of health and hygiene	Poor	Things didn't seem clean Everything is dusty People drink water from rain water lake
3.3. Out of School Children (No. of School Age Children in the Streets)	Poor	Didn't observe any child wondering around
3.4. What is special in the village,		
3.5. Condition of people (dress, facial expressions, social status etc.)	Poor	People were poorly dressed and barefooted Children seemed weak and malnourished

1.13. DHODA, DISTRICT LAKKI MARWAT

Date_____ April 27, 2021 Time_____10:15 am

Village_____Dhoda Tehsil_____ Ahmed Khel

UC_____Lakki Marwat District_____Lakki Marwat

Change Indicators	Rating	Description
1. Accessibility, Circulation and Environment		
1.1. Accessibility (Travel time to village from the main road - Minutes)		One and half hour
1.2. Condition of internal roads	Poor	Temporary road over the dessert land
1.3. Condition of Houses	Poor	Mostly Katcha houses
1.4. Drainage Situation	Poor	Wastewater drains into the side of houses
1.5. Solid Waste Management Situation	Poor	Thrown outside of houses
1.6. Signs of open defecation	None	
2. Quality of Electrical System provided under the Project		
2.1. Construction Quality – Micro-hydro / Solar PV	Very Good	People sounded satisfied
2.2. Construction Quality Distribution Lines (poles, conductors, cables)	Very Good	
2.3. Percentage of Houses Connected to the Village/Cluster Grid		All the village has been covered
2.4. Street lights provided	No	No streets People have bulbs outside their house gates
2.5. Conditions of solar panels	Very Good	Nicely placed

2.6. Condition of batteries	Very Good	Inside a well constructed and tiled room
3. Development Indicators		
3.1. Activities within village (social, cultural and economic-particularly role of women)	Stagnant	Some women were seen grazing cows and goats
3.2. Conditions of health and hygiene	Poor	Unhygienic water and environment Food and water is unhygienic
3.3. Out of School Children (No. of School Age Children in the Streets)	Poor	children wondering around and playing
3.4. What is special in the village,		
3.5. Condition of people (dress, facial expressions, social status etc.)	Poor	People were poor dressed Elder men were seen bare footed

1.14. HAZAR DHARAK, DISTRICT LAKKI MARWAT

Date_____ April 27, 2021 Time_____02:00 pm

Village_____Hazar Dharak Tehsil_____ Ahmed Khel

UC_____Lakki Marwat District_____Lakki Marwat

Change Indicators	Rating	Description
1. Accessibility, Circulation and Environment		
1.1. Accessibility (Travel time to village from the main road - Minutes)		one hours
1.2. Condition of internal roads	Poor	Temporary road
1.3. Condition of Houses	Poor	Mostly Katcha houses
1.4. Drainage Situation	Poor	Wastewater drains into the side of houses
1.5. Solid Waste Management Situation	Poor	No permanent system
1.6. Signs of open defecation	None	
2. Quality of Electrical System provided under the Project		
2.1. Construction Quality – Micro-hydro / Solar PV	Very Good	People sounded satisfied
2.2. Construction Quality Distribution Lines (poles, conductors, cables)	Very Good	
2.3. Percentage of Houses Connected to the Village/Cluster Grid		All the village has been covered
2.4. Street lights provided	No	Not provided but seem important
2.5. Conditions of solar panels	Very Good	
2.6. Condition of batteries	Very Good	

3. Development Indicators		
3.1. Activities within village (social, cultural and economic-particularly role of women)	Stagnant	Children were grazing cows and goats
3.2. Conditions of health and hygiene	Poor	Cow dungs and litters around
3.3. Out of School Children (No. of School Age Children in the Streets)	Poor	Didn't observe any child wondering around
3.4. What is special in the village,		
3.5. Condition of people (dress, facial expressions, social status etc.)	Poor	People were poorly dressed

1.15 GHAFAR KORONA, DISTRICT LAKKI MARWAT

Date_____ April 28, 2021 Time_____10:30 am

Village_____Ghafar Korona Tehsil_____ Ahmed Khel

UC_____Lakki Marwat District_____Lakki Marwat

Change Indicators	Rating	Description
1. Accessibility, Circulation and Environment		
1.1. Accessibility (Travel time to village from the main road - Minutes)		One hour
1.2. Condition of internal roads	Poor	Roads over the sandy land
1.3. Condition of Houses	Poor	Katcha houses
1.4. Drainage Situation	Poor	Wastewater drains out of house to side ways
1.5. Solid Waste Management Situation	Poor	Thrown outside of houses
1.6. Signs of open defecation	None	
2. Quality of Electrical System provided under the Project		
2.1. Construction Quality – Micro-hydro / Solar PV	Very Good	People sounded satisfied
2.2. Construction Quality Distribution Lines (poles, conductors, cables)	Very Good	Nicely set lines
2.3. Percentage of Houses Connected to the Village/Cluster Grid		All the village has been covered
2.4. Street lights provided	No	Not provided but seem important
2.5. Conditions of solar panels	Very Good	Beautifully set

2.6. Condition of batteries	Very Good	Inside a room
3. Development Indicators		
3.1. Activities within village (social, cultural and economic-particularly role of women)	Stagnant	No one was seen outside
3.2. Conditions of health and hygiene	Poor	Unhygienic Plates and utensils put outside in the dust
3.3. Out of School Children (No. of School Age Children in the Streets)	Poor	Didn't observe any child wondering around
3.4. What is special in the village,		
3.5. Condition of people (dress, facial expressions, social status etc.)	Poor	People were poorly dressed

1.16 MATORA KORONA, DISTRICT LAKKI MARWAT

Date_____ April 28, 2021 Time_____10:50 am

Village_____Matora Tehsil_____ Ahmed Khel

UC_____Lakki Marwat District_____Lakki Marwat

Change Indicators	Rating	Description
1. Accessibility, Circulation and Environment		
1.1. Accessibility (Travel time to village from the main road - Minutes)		One half hour
1.2. Condition of internal roads	Poor	Temporary road
1.3. Condition of Houses	Poor	Mostly Katcha houses
1.4. Drainage Situation	Poor	Wastewater drains into the side of houses
1.5. Solid Waste Management Situation	Poor	No permanent system
1.6. Signs of open defecation	None	
2. Quality of Electrical System provided under the Project		
2.1. Construction Quality – Micro-hydro / Solar PV	Very Good	People sounded satisfied
2.2. Construction Quality Distribution Lines (poles, conductors, cables)	Very Good	
2.3. Percentage of Houses Connected to the Village/Cluster Grid		All the village has been covered
2.4. Street lights provided	No	Not provided but seem important
2.5. Conditions of solar panels	Very Good	
2.6. Condition of batteries	Very Good	

3. Development Indicators		
3.1. Activities within village (social, cultural and economic-particularly role of women)	Stagnant	Women collecting fodder
3.2. Conditions of health and hygiene	Poor	Dirt around
3.3. Out of School Children (No. of School Age Children in the Streets)	Poor	Children were playing outside
3.4. What is special in the village,		
3.5. Condition of people (dress, facial expressions, social status etc.)	Poor	People were poor dressed

1.17 MEKHAN KHEL, DISTRICT LAKKI MARWAT

Date_____ April 28, 2021 Time_____12:30 pm

Village_____Mekhan Khel Tehsil_____ Ahmed Khel

UC_____Lakki Marwat District_____Lakki Marwat

Change Indicators	Rating	Description
1. Accessibility, Circulation and Environment		
1.1. Accessibility (Travel time to village from the main road - Minutes)		One hour and half walking distance
1.2. Condition of internal roads	Poor	Temporary road made on self help basis
1.3. Condition of Houses	Poor	Mostly Katcha houses
1.4. Drainage Situation	Poor	Wastewater drains into the side of houses
1.5. Solid Waste Management Situation	Poor	No permanent system
1.6. Signs of open defecation	None	
2. Quality of Electrical System provided under the Project		
2.1. Construction Quality – Micro-hydro / Solar PV	Very Good	People sounded satisfied
2.2. Construction Quality Distribution Lines (poles, conductors, cables)	Very Good	
2.3. Percentage of Houses Connected to the Village/Cluster Grid		All the village has been covered
2.4. Street lights provided	No	Not provided but seem important

2.5. Conditions of solar panels	Very Good	Nicely constructed
2.6. Condition of batteries	Very Good	Proper room for batteries
3. Development Indicators		
3.1. Activities within village (social, cultural and economic-particularly role of women)	Stagnant	few women were busy with agriculture activities
3.2. Conditions of health and hygiene	Poor	Dirty clothes and bare footed
3.3. Out of School Children (No. of School Age Children in the Streets)	Poor	Children were playing outside houses
3.4. What is special in the village,		
3.5. Condition of people (dress, facial expressions, social status etc.)	Poor	People were poorly dressed and malnourished

1.18 SHAH HASSAN KHEL, DISTRICT LAKKI MARWAT

Date_____ April 29, 2021 Time_____05:00 pm

Village_____Shah Hassan Tehsil_____ Ahmed Khel

UC_____Lakki Marwat District_____Lakki Marwat

Change Indicators	Rating	Description
1. Accessibility, Circulation and Environment		
1.1. Accessibility (Travel time to village from the main road - Minutes)		One hour
1.2. Condition of internal roads	Poor	Temporary road
1.3. Condition of Houses	Poor	Mostly Katcha houses
1.4. Drainage Situation	Poor	Wastewater drains into the side of houses
1.5. Solid Waste Management Situation	Poor	No permanent system
1.6. Signs of open defecation	None	
2. Quality of Electrical System provided under the Project		
2.1. Construction Quality – Micro-hydro / Solar PV	Very Good	People sounded satisfied
2.2. Construction Quality Distribution Lines (poles, conductors, cables)	Very Good	
2.3. Percentage of Houses Connected to the Village/Cluster Grid		All the village has been covered
2.4. Street lights provided	No	Not provided but seem important
2.5. Conditions of solar panels	Very Good	
2.6. Condition of batteries	Very Good	

3. Development Indicators		
3.1. Activities within village (social, cultural and economic-particularly role of women)	Stagnant	Few men collecting firewood grass
3.2. Conditions of health and hygiene	Poor	Dirty with flies and mosquitoes
3.3. Out of School Children (No. of School Age Children in the Streets)	Poor	Children were playing outside
3.4. What is special in the village,		
3.5. Condition of people (dress, facial expressions, social status etc.)	Poor	People were poor dressed

APPENDIX-2 FOCUS GROUP DISCUSSION DATA

2.1. FGD IN GAZEN, DISTRICT CHITRAL

Organizational infrastructure in the village

- Mixed type organizations
- Regularly meet
- Involved in planning, design and implementation
- Community operated and maintained

Functionality, operation and quality of Hydro/Solar PV Units

- Operational
- People are satisfied
- Operational responsibility (community operated/operated by private entity/any other)
- Maintenance technician is available
- People pay per month basis at the rate PKR 5 pe unit after paying first PKR 600 mandatory fee.
- Best quality of technology
- Best Quality of distribution lines
- 100% village is covered

Expected change in village education and health status

- Children study time has increased
- Increased play time during day and study at night
- A few use computers
- Children also spend time in front of TV
- There is no access to internet
- Use of electricity as alternate source of HH fuel spares women from smoke and smoke caused diseases
- No health center in the village
- Hot water available relieving people from diseases caused by cold
- People are safe from harmful insects / animals e.g. snakes \

Expected change in village business and employability

- Electricity provided to village shops, and few saw machine, power mills and welding machines have been introduced

Expected change in disaster management and forest conservation/development

- Safe evacuation during night in the light of electricity in case of earthquake, floods and other disasters has been possible
- Introduction of mobile phones have improved early warning system
- Forest cover is expected to increase due to use of electricity as an alternate source of fuelwood.

2.2. FGD IN GOLEN, DISTRICT CHITRAL

Organizational infrastructure in the village

- Only men organizations
- Meet when need
- Involved in planning, design and implementation
- Community operated and maintained

Functionality, operation and quality of Hydro/Solar PV Units

- Operational
- People are satisfied
- Community operated
- Maintenance technician is available
- People pay per month basis at the rate PKR 5 per unit
- Best quality of technology
- Best Quality of distribution lines
- 100% village is covered

Expected change in village education and health status

- Children study time has increased
- Increased play time during day and study at night
- A few use computers
- Few houses have TV set
- No internet
- Use of electricity as alternate source of HH fuel spares women from smoke and smoke caused diseases
- Village has one dispensary
- Hot water available relieving people from diseases caused by cold

- People are safe from harmful insects / animals e.g. snakes \

Expected change in village business and employability

- Electricity provided to village shops, and few saw machine and power mills have been introduced

Expected change in disaster management and forest conservation/development

- Safe evacuation during night in the light of electricity in case of earthquake, floods and other disasters has been possible
- Forest cover is expected to increase due to use of electricity as an alternate source of fuelwood.

2.3. FGD in Pursat, District Chitral

Organizational infrastructure in the village

- Only men organizations
- Meet on need basis
- Involved in planning, design and implementation
- Community operated and maintained

Functionality, operation and quality of Hydro/Solar PV Units

- Operational
- People are satisfied
- Community based operation
- Maintenance technician is available, but people demand engineer level expert
- Monthly bill payment on per unit basis
- Best quality of technology
- Best Quality of distribution lines
- 100% village is covered

Expected change in village education and health status

- Children study time has increased
- Increased play time during day and study at night
- Few HH were reported to have computers
- Children also spend time in front of TV
- Village has recently been connected with 4G network

- Use of electricity as an alternate source of HH fuel spares women from smoke and smoke caused diseases
- Village dispensary functions at night when needed
- Hot water available relieving people from diseases caused by cold
- People are safe from harmful insects / animals e.g. snakes \

Expected change in village business and employability

- Electricity provided to village shops, and few saw machine, power mills and welding machines have been introduced

Expected change in disaster management and forest conservation/development

- Safe evacuation during night in the light of electricity in case of earthquake, floods and other disasters has been possible
- Introduction of mobile phones have improved early warning system, and due to access to internet people become aware of weather forecast
- Forest cover is expected to increase due to use of electricity as an alternate source of fuelwood.

2.4. FGD in Bishoo, District Upper Dir

Organizational infrastructure in the village

- Only men organizations
- Meet on need basis
- Involved in planning, design and implementation a
- Community operated and maintained

Functionality, operation and quality of Hydro/Solar PV Units

- Operational
- People are satisfied
- Community based operation
- Maintenance technician is available
- People pay per month basis
- Best quality of technology
- Best Quality of distribution lines
- 100% village is covered

Expected change in village education and health status

- Children study time has increased
- Increased play time during day and study at night
- A few use computers
- Children also spend time in front of TV
- There is no access to internet
- Use of electricity as alternate source of HH fuel spares women from smoke and smoke caused diseases
- No health center in the village
- Hot water available relieving people from diseases caused by cold
- People are safe from harmful insects / animals e.g. snakes \

Expected change in village business and employability

- Electricity provided to village shops, and a few saw machines, and power mills have been introduced

Expected change in disaster management and forest conservation/development

- Safe evacuation during night in the light of electricity in case of earthquake, floods and other disasters has been possible
- Introduction of mobile phones have improved early warning system
- Forest cover is expected to increase due to use of electricity as an alternate source of fuelwood.

2.5 FGD IN SARKALEY, DISTRICT BUNER

Organizational infrastructure in the village

- Only men organizations
- Meet on need basis
- Involved in planning, design and implementation
- Community operated and maintained

Functionality, operation and quality of Hydro/Solar PV Units

- Operational
- People are satisfied
- Community based operation
- Maintenance technician is available

- People pay per month basis at per unit rate
- Best quality of technology
- Best Quality of distribution lines
- 100% village is covered

Expected change in village education and health status

- Children study time has increased
- Increased play time during day and study at night
- A few use computers
- Children also spend time in front of TV
- Recently been connected
- Not used as alternate for fuelwood
- No health center in the village
- No hot water as electricity is used for lighting only
- People are safe from harmful insects / animals e.g. snakes \

Expected change in village business and employability

- Electricity used only for lighting purpose and running fans

Expected change in disaster management and forest conservation/development

- Safe evacuation during night in the light of electricity in case of earthquake, floods and other disasters has been possible
- Introduction of mobile phones have improved early warning system
- No impact on forest cover as MHP unit is not used on full due to water shortage

FGD DATA ANALYSIS FOR MHP UNITS

Organizational infrastructure

MHPs in the target areas are operated by the village based organizations. Except Gazen village all the organizations consist of men members, while three women were reported to have membership in Golen village organization dominated by men. The organizations were active during the MHP construction process, while fewer members participate when a meeting is called nowadays, it was disclosed. However, power committee members normally meet once they are required to discuss any issue. Since the formation of power companies, general members are rarely invited to meetings, and FGD participant in Golen complained.

Once the MHPs have been operational, they are managed by power committees. Though not yet registered with any formal legal entity, the committees are formed around 8 to 20 members headed by chair person, and a secretary. Though target communities have understanding of managing the MHPs through getting legally registered, having bank account, and carrying out simple financial management, it was long process to register with legal entity, and banks were too far to open account.

It was disclosed during FGD that TOR had been provided for Management Committee, and Professional Committee, Chairperson, Manager and Operators, and due to their long involvement in design, implementation and operation they are familiar with these TORs. They disclosed that as a result of training on MHP management they have got familiar with the details. However, they said that more complicated financial management was issue due lack of education of the village people. They said that those who are educated migrate out for better job opportunities, and the villages are left behind with less or uneducated people.

To conclude, target communities have organized themselves around MHPs in form of power committees, management committees, and professional committees. They are yet to register themselves with legal entities, and have to open bank account to carry out formal financial management. Community in Gazen village have registered themselves with Cooperative Societies, but do not have bank account on the name of the organization.

Functionality, operation and quality of MHP Unit

However, people in all the MHP areas sounded to have active ownership of the MHPs as seen by their engagement through appreciating, and at the same time criticizing operation and management. In Pursat village FGD members criticized the donors and implementing agencies for not providing any permanent technical person to take care of the MHPs. “Millions of rupees have been spent on construction of MHPs to put in the disposal of uneducated/less educated village operators. There should be a dedicated and well trained technical person for Chitral district who could take care of the 3 MHPs in Chitral. For the last few months we have witnessed two major breakdowns in the system caused by the inability of the operators. When the breakdown is reported to Islamabad it takes days for the engineer to come around and diagnose the fault”, (participant of FGD in Pursat village, Chitral).

The operators are mainly too little educated to run the MHPs, it was disclosed. Selection of operators in Bishoo and Pursat MHPs was reported to be based on their share in donating land for MHP rather than their competence and training. FGD participants in Golen, Gazen and Sarkaley sounded satisfied with operators though they are also not educated or undereducated. The participants acknowledged that operators were getting training from time to time, still local people believe that MHP machines are too sophisticated for them to understand.

Electricity tariff and salary for staff are different from village to village. In Gazen in order to encourage the use of energy against the issue of under usage they have freed the first PKR 600 free at the rate of PKR 5 per unit. After 600 limit is over they charge according to unit rate. People are then obliged to pay PKR 600 even if they use electricity or not. During winter it was reported that some households paid tariff as high as PKR 3000. In Golen village consumer have to opt between either PKR 1000 fix rate for as much unit they consume or PKR 7 per unit, and it was reported that the trend is that most of the consumers prefer to pay PKR 1000 fix tariff rate. In Bishoo and Sarkaley they pay PKR 7 per unit. Salaried for operators range from PKR 2000 to 5000 depending most on number of employees they keep.

People also sounded satisfied with machines, transmission lines, distribution lines and connections, and said that they have got the best system among MHPs in Chitral. They complained of parts not being available and lack of availability of service facility in the local market. They also complained that quality electric devices were very costly, and they could only buy inferior quality china products, which breakdown quickly.

Health

Women in MHP electrified villages perceive access to hydro power in terms of relief from health issues caused by the use of freezing water for various purposes during winter. *"Every time I washed clothes during winter, I got sick of flue and fever. Now that we have electricity my husband has bought a drum (locally made geyser), I enjoy washing clothes in warm water; and the last winter past without getting sick of cold water"* (Women FGD participant in Onavich, Gazen, Upper Chitral). Women in Chitral carry out all the activities including cooking, washing, cleaning caring of animals etc. Electrification has then not only helped women empowered through relieving them from diseases, but also enabling them to carry out their role within household in a better way.

A few FGD (Men) participants in Golen Chitral village also expressed their appreciation of electrification saving them from diseases which cause by smoke and coldness. Winters in Golen village Chitral, which lies deep into the Golen valley, are unbearably cold. The traditional houses are warmed by burning firewood in the middle of a big living room called "Dur". The living room remains full of smoke until the firewood burns to ashes, which causes the diseases of eye aching and asthma. *"I spent the winter putting a small heater under a table covered by blanket, and got rid of the traditional pot of hot coals I would use under the table. Everyone in the village can afford a small heater, and most of the houses in the village have it. "*, (Man FGD participant in Golen village, lower Chitral).

Scorpion bite count as village story in Pursat village Chitral. The news scorpion biting spreads the whole village within no time with who was bitten, how painful it has been, the visit of the effected person to

the only village dispensary to find the dispenser absent for the last few days, and the claim of villager healer that cure of scorpion biting being a spiritual mater rather than feeding medicine. Scorpions normally bite in the dark when touched by a person. Electrification has enabled people to check things before using it in the light of bulb if it has any scorpion hidden in it. Mostly women, work at home, in animal shed, are bitten by scorpion, and electrification has gendered impact by sparing women from dangerous poison. *"I have asked my husband to arrange light bulbs in the store and in animal shed, and this summer I hope to get rid of scorpions working under the light as clear as day"*, (A young mother, FGD participant in Pursat village, Lower Chitral).

People in the Bishoo village in Upper Dir also see electrification in terms of improved health conditions. Access to geyser and heater run by electricity has come as relief from bone chilling living condition and freezing water which they used within household. *"In this elderly age you get cold the moment you touch cold water. Early in the morning, when it is still dusk outside, I wake up to the call of Azan (call for prayer), and the thing that makes me happy is light and the warm water. Now I rarely miss my prayer and never got sick of coldness"*, (Elderly Man, FGD participant in Bishoo village, Upper Dir).

Education

The target communities see electrification as an opportunity for the young people who study in schools and colleges. COVID-19 has made online education as an evitable component of education activities. This works in both offnet and on net areas. In Gazen area upper Chitral some of the school and college students are provided with online lessons in USBs. Most households own TVs, connected to a satellite receiver. Children connect the USB in the receiver to be displayed in the TV screen, and regularly do their lessons. *"Last winter I bought a TV on the insistence of my children so that they could do their homework given to them saved in USB at school. They do their lesson at day time and I watch news and drama at night"*, (Men FGD participant in Dobargar, Gazen, Upper Chitral). A few of the households were also reported to have computers, which children use for school lessons.

In Pursat, Lower Chitral, the electrification has accompanied with net connectivity through 4G mobile network. Though the target community do not have access to education opportunities beyond primary at local level, they expect that electrification and net connectivity will have impact of enhanced awareness among parents to send their children to schools in nearest town for education beyond primary. Children are quicker to learn using smart phones, said an FGD participant who works in government office in nearby town. *"When I get back home after office I never get hold of my phone and see it controlled by one of my children who wins the fight to control it, normally the youngest one. Sometime I ask my children while getting problem in using the phone"*, he said. Electrification then is seen as enabling the children with computer and smart phone literacy. However, there were reported to have few who afford computer and smart phone, and have balance for net connection.

Business and Employability

On the sides of village roads local people have built small shops which provide basic needs of village people such as sugar, tea, cooking oil, rice and other items. Electrification has facilitated them to remain open late into the night, and help them store things in the fridge such as chicken and soft drinks. Other

businesses in the targeted villages revolve around the local needs such as welding workshops, puncture shops, mills, saw machines, and carpentry. Local carpenters, who used to work with manual tools, have now set up wood workshops with a planner machine run by electricity. “Carpentry was tiresome activity working with manual tools, and it would take the whole day to set a single door. With power machines now it takes few hours to put together the same door. It would take the whole take to earn PKR 1000, and now I earn it in few hours”, (Jamil Khan, a local carpenter in Pursat village, lower Chitral).

A young man in Zhupoo village puts together steel shutters for shops, lawn gates and garages. He says that before the village people would transport steel gates from Chitral town, and transporters would charge fare as high as the price of the gate. “I was working in a workshop in Chitral town, and thanks to the electrification I have set up my own workshop in the village with a welding machine. This has saved the villagers half of what they would spend to buy a gate from Chitral town, and I run my house living close to my children”, (Saeed Aman, welder, Zhupoo, Gazen, Upper Chitral).

In Unavich village, Upper Chitral the water mills situated deep into the stream far from village have been replaced with a power mill in the middle of village. They villagers said that they would travel to water mill a mile or two taking grains on their back or on donkey to grind it, and a bag of grain would take the whole day to get grinded. They say that now it takes minutes for the children to push a bag of grain on cart, and get it grinded in the power mill. They disclosed that they would stock flour for the whole winter as the water mills would get frozen in winter. Life, therefore, sounds quite easy for village people thanks to the electrification. However, they said that households with less cash income still take their grains to the water mill.

Local poplar trees provide for construction wood for the villagers in Gazen and Golen villages, Chitral, while people in Pursat in Chitral, Bishoo village in Dir and Sarkaley village in Buner use Oak trees for construction. They would normally take their wood to saw machine located in other villages with facility of electricity or generator run saw machines. Electrification in the target communities has encouraged them to set saw machines. All the target villages in Chitral and Bishoo village in Dir Upper now have saw machines, to prepare wood for construction purpose. Though at limited level, the above business activities have created jobs for the village people. Households in Sarkaley, Buner district are allowed to use electricity only for lighting and running fans due to water shortage, and they are not allowed to use electricity for cooking, heating and warming water.

Disaster Management

The target villages of MHP project are prone to natural disasters including floods, earthquake, avalanches and landslide. Local people see mobile phones made possible by electricity is viewed as blessing in disaster situations. “ It was early March this year when it snowed heavily for a week. We were waiting for avalanche on the mountain side where it usually happens. We fled the house toward the village market on a roaring noise of avalanche in the middle of night. When the avalanche passed we returned to our house to see it spared. We then had to receive phone calls from the villagers asking about our safety, and I was pleased to feel how the village people care about us”, (FGD participant in

Dubargar, Gazen, Upper Chitral). Here the mobile phone, though, did not come to safety by enabling early warning but it empowered the villagers by making them informed about the disaster situation.

Before electrification Bishoo village, Upper Dir, had mobile connection in the village but had no electricity to charge it. Only those villagers who had to commute to Dir city for business or job were able to keep mobile and get it charged from the city. When the MHP was commissioned last year almost every household in Bishoo village was reported to have had mobile phone. “Whenever I have bad dreams I remain worried about my son who do labor work in down country. After we have electricity in our home we have bought a mobile phone. Now when I have bad dreams I ask my husband to call to my son next morning, and thank God knowing that my son is safe and sound”, (woman FGD participant in Bishoo village, Upper Dir).

Sarkaley village in Buner district has got mobile net connection after electrification. The area gets heavy rainfall in Summer turning into flashfloods when it rains heavily. The villagers send their animals to the nearby mountains for grazing, and goats and cows are sometimes washed away in case of flush floods. Also, the villagers collect fodder, and they get damaged when it rains before they collect the fodder to safer place. Now thanks to the electricity and mobile connection they know about weather in advance and make arrangement for their animal safety. “The village sons have got mobile and tell us when it is sunny and when it rains. Now I am used to asking my son how the weather is like today, and what he says wonderfully comes true by the grace of God. This helps me managing my fodder and crops on time and save from being soaked and get rotten”, (Man FGD participant in Sarkaley village, Buner).

Forest Conservation

Electrification was reported to have decreased the use of firewood during the last winter in Chitral and Dir Upper District. In some of the houses people have bought heater, cooker/oven and geyser, and used electricity instead of firewood. This was also evident from the increased Kw usage of electricity by the villagers and their unusually high electricity bill payment. “I normally would buy a small truck load of firewood from down Chitral every year, but this year I didn’t buy any, and relied on local wood and electricity. Though I had to pay around PKR 3000 per month during winter, but this was negligible amount as compared to what I spent on firewood amounting to PKR 10,000 to 15,000 per month”, (Man FGD participant in Gazen village, Upper Chitral). Some of the participants were of the view that last winter had not been as hard as earlier years. They were, however, of the view that whatever be the winter condition they would transport firewood, but this year some of the families relied on electricity and local firewood. Electricity has then helped lesser use of firewood, and that definitely contributes to forest conservation. Also, in Pursat village Lower Chitral, where firewood is easily accessible than money, FGD participants said that collecting firewood was not easy in the mountains, and it took the whole day labor to collect firewood enough for few days. They reported that people tended to electric devices for cooking, heating and warming water during the last winter, and claimed that use of forest as firewood dropped significantly as compared to other years.

Other Social Impacts

In villages people make sense of life in terms of interaction with each other as well as with the nature, and tend to relate access to electricity with their social life, and how it enables them to negotiate with nature. “This winter we had a disaster of rolling stone hitting the channel of power house. We remained in dark for a week and so. During this power breakdown period we had a death in our village. We had to hurry to repair the channel, and thanks God we restored the power by the night when we had to arrange Chiragh Rawshan (lighting the candle: death ceremony among Ismaili Muslims)”, (Man FGD participants in Unavich village, Upper Chitral). Electricity then becomes important in the “play” of relation of local people with nature and God.

Electricity has also strengthened human interaction reinforcing the traditional value of hospitality. people understand that guests are served with more generosity then before as the local believe that a warm house in winter is chamani (a feast), and with modern heaters, imported from China, they keep their guests warm and happy. FGD participants in Golen village, Chitral, disclosed that it was so costly to keep a guest room warm with firewood in winter nights. They said that it would take hour to set fire in the guest room chimney, and now it was so quick to heat up the room turning the button on.

2.6 FGD IN AZAR KHEL, DISTRICT KARAK

Organizational infrastructure in the village

- Men only organizations
- Meet when needed
- Involved in planning and implementation
- Community operated and maintained

Functionality, operation and quality of Hydro/Solar PV Units

- Operational
- People are satisfied
- Community operated
- Maintenance technician is available
- People pay on per unit per month basis
- Best quality of technology
- Best Quality of distribution lines
- 100% village is covered

Expected change in village education and health status

- Children study time has increased
- Increased play time during day and study at night
- No computers
- Few have TV

- There is no access to internet
- No health center in the village
- Solar unit is just for lighting
- People are safe from harmful insects / animals e.g. snakes \

Expected change in village business and employability

- Just use for lighting and running fans

Expected change in disaster management and forest conservation/development

- Safe evacuation during night in the light of electricity in case of earthquake, floods and other disasters has been possible
- Introduction of mobile phones have improved early warning system
- Not used as alternate to fuelwood

2.7 FGD IN SAROBI IDA KHEL, DISTRICT KARAK

Organizational infrastructure in the village

- Men only organizations
- Regularly meet
- Involved in planning, design and implementation
- Community operated and maintained

Functionality, operation and quality of Hydro/Solar PV Units

- Operational
- People are satisfied
- community operated
- Maintenance technician is available
- People pay per month per unit basis
- Best quality of technology
- Best Quality of distribution lines
- 100% village is covered

Expected change in village education and health status

- Children study time has increased
- Increased play time during day and study at night
- No computers
- Few TVs available in the village

- There is no access to internet
- Used only for lighting and fans
- People are safe from harmful insects, like snakes / scorpions

Expected change in village business and employability

The systems support lighting only. No major change in village business and employment is expected. However, women can work into night on income generating activities, such as knitting and embroidery.

Expected change in disaster management and forest conservation/development

- Safe evacuation during night in the light of electricity in case of earthquake, floods and other disasters has been possible
- Introduction of mobile phones have improved early warning system
- No impact on forest cover

2.8. FGD IN SHAMSHAKI, DISTRICT KARAK

Organizational infrastructure in the village

- Men only organizations
- No regular meeting
- Involved in planning, and implementation
- Community operated and maintained

Functionality, operation and quality of Hydro/Solar PV Units

- Operational
- People are satisfied
- Community operated
- Maintenance technician is available
- People pay per month per unit basis
- Best quality of technology
- Best Quality of distribution lines
- 100% village is covered

Expected change in village education and health status

- Children study time has increased
- Increased play time during day and study at night
- No computers

- A few TVs
- There is no access to internet
- No health center in the village
- People are safe from harmful insects / animals e.g. snakes \

Expected change in village business and employability

The systems support lighting only. No major change in village business and employment is expected. However, women can work into night on income generating activities, such as knitting and embroidery.

Expected change in disaster management and forest conservation/development

- Safe evacuation during night in the light of electricity in case of earthquake, floods and other disasters has been possible
- Introduction of mobile phones have improved early warning system
- Just used for lighting

2.9. FGD in Badga, District Swabi

Organizational infrastructure in the village

- Men only organizations
- Regularly meet
- Involved in planning, and implementation
- Community operated and maintained

Functionality, operation and quality of Hydro/Solar PV Units

- Operational
- People are satisfied
- Community operated
- Maintenance technician is available
- People pay per month per unit basis
- Best quality of technology
- Best Quality of distribution lines
- 100% village is covered

Expected change in village education and health status

- Children study time has increased
- Increased play time during day and study at night

- A few use computers
- Few TV sets
- There is no access to internet
- Electricity is not used as an alternate to fuelwood
- No health center in the village
- No hot water, just used for lighting
- People are safe from harmful insects / animals e.g. snakes \

Expected change in village business and employability

The systems support lighting only. No major change in village business and employment is expected. However, women can work into night on income generating activities, such as knitting and embroidery.

Expected change in disaster management and forest conservation/development

- Safe evacuation during night in the light of electricity in case of earthquake, floods and other disasters has been possible
- Introduction of mobile phones have improved early warning system
- No impact on forest cover

2.10 FGD in Jabba, District Swabi

Organizational infrastructure in the village

- Men only organizations
- Regularly meet
- Involved in planning, and implementation
- Community operated and maintained

Functionality, operation and quality of Hydro/Solar PV Units

- Operational
- People are satisfied
- Community operated
- Maintenance technician is available
- People pay per month per unit basis
- Best quality of technology
- Best Quality of distribution lines
- 100% village is covered

Expected change in village education and health status

- Children study time has increased
- Increased play time during day and study at night
- A few use computers
- Children also spend time in front of TV
- There is no access to internet
- Not used as alternate to fuelwood
- No health center in the village
- Hot water available relieving people from diseases caused by cold
- People are safe from harmful insects / animals e.g. snakes

Expected change in village business and employability

- Just enough for lighting

Expected change in disaster management and forest conservation/development

- Safe evacuation during night in the light of electricity in case of earthquake, floods and other disasters has been possible
- Introduction of mobile phones have improved early warning system
- No impact on forest cover

2.11 FGD IN NOGRAM, DISTRICT SWABI

Organizational infrastructure in the village

- Men only organizations
- Meet when needed
- Involved in planning, and implementation
- Community operated and maintained

Functionality, operation and quality of Hydro/Solar PV Units

- Operational
- People are satisfied
- Community operated
- Maintenance technician is available
- People pay per month per unit basis
- Best quality of technology
- Best Quality of distribution lines

- 100% village is covered

Expected change in village education and health status

- Children study time has increased
- Increased play time during day and study at night
- Few computers
- Few TV
- There is no access to internet
- Electricity is used just for lighting
- No health center in the village
- People are safe from harmful insects / animals e.g. snakes \

Expected change in village business and employability

- Just for lighting

Expected change in disaster management and forest conservation/development

- Safe evacuation during night in the light of electricity in case of earthquake, floods and other disasters has been possible
- Introduction of mobile phones have improved early warning system
- No impact on forest cover

7.12 FGD IN BAZID KORONA, DISTRICT LAKKI MARWAT

Organizational infrastructure in the village

- Men only organizations
- Meet when needed
- Involved in planning, and implementation
- Community operated and maintained

Functionality, operation and quality of Hydro/Solar PV Units

- Operational
- People are satisfied
- Community operated
- Maintenance technician is available
- People pay per month per unit basis
- Best quality of technology
- Best Quality of distribution lines

- 100% village is covered

Expected change in village education and health status

- Children study time has increased
- Increased play time during day and study at night
- Few computers
- Few TV
- There is no access to internet
- Electricity is used just for lighting
- No health center in the village
- People are safe from harmful insects / animals e.g. snakes \

Expected change in village business and employability

- Just for lighting

Expected change in disaster management and forest conservation/development

- Safe evacuation during night in the light of electricity in case of earthquake, floods and other disasters has been possible
- Introduction of mobile phones have improved early warning system
- No impact on forest cover

7.13 FGD IN DHODA, DISTRICT LAKKI MARWAT

Organizational infrastructure in the village

- Men only organizations
- Meet when needed
- Involved in planning, and implementation
- Community operated and maintained

Functionality, operation and quality of Hydro/Solar PV Units

- Operational
- People are satisfied
- Community operated
- Maintenance technician is available
- People pay per month per unit basis
- Best quality of technology
- Best Quality of distribution lines

- 100% village is covered

Expected change in village education and health status

- Children study time has increased
- Increased play time during day and study at night
- Few computers
- Few TV
- There is no access to internet
- Electricity is used just for lighting
- No health center in the village
- People are safe from harmful insects / animals e.g. snakes \

Expected change in village business and employability

The systems support lighting only. No major change in village business and employment is expected. However, women can work into night on income generating activities, such as knitting and embroidery.

Expected change in disaster management and forest conservation/development

- Safe evacuation during night in the light of electricity in case of earthquake, floods and other disasters has been possible
- Introduction of mobile phones have improved early warning system
- No impact on forest cover

7.14. FGD IN HAZAR DHARAK, DISTRICT LAKKI MARWAT

Organizational infrastructure in the village

- Men only organizations
- Meet when needed
- Involved in planning, and implementation
- Community operated and maintained

Functionality, operation and quality of Hydro/Solar PV Units

- Operational
- People are satisfied
- Community operated
- Maintenance technician is available
- People pay per month per unit basis

- Best quality of technology
- Best Quality of distribution lines
- 100% village is covered

Expected change in village education and health status

- Children study time has increased
- Increased play time during day and study at night
- Few computers
- Few TV
- There is no access to internet
- Electricity is used just for lighting
- No health center in the village
- People are safe from harmful insects / animals e.g. snakes \

Expected change in village business and employability

- Just for lighting

Expected change in disaster management and forest conservation/development

- Safe evacuation during night in the light of electricity in case of earthquake, floods and other disasters has been possible
- Introduction of mobile phones have improved early warning system
- No impact on forest cover

7.15. FGD GHAFAR KORONA, DISTRICT LAKKI MARWAT

Organizational infrastructure in the village

- Men only organizations
- Meet when needed
- Involved in planning, and implementation
- Community operated and maintained

Functionality, operation and quality of Hydro/Solar PV Units

- Operational
- People are satisfied
- Community operated
- Maintenance technician is available

- People pay per month per unit basis
- Best quality of technology
- Best Quality of distribution lines
- 100% village is covered

Expected change in village education and health status

- Children study time has increased
- Increased play time during day and study at night
- Few computers
- Few TV
- There is no access to internet
- Electricity is used just for lighting
- No health center in the village
- People are safe from harmful insects / animals e.g. snakes \

Expected change in village business and employability

The systems support lighting only. No major change in village business and employment is expected. However, women can work into night on income generating activities, such as knitting and embroidery.

Expected change in disaster management and forest conservation/development

- Safe evacuation during night in the light of electricity in case of earthquake, floods and other disasters has been possible
- Introduction of mobile phones have improved early warning system
- No impact on forest cover

7.16. FGD IN MATORA KORONA, DISTRICT LAKKI MARWAT

Organizational infrastructure in the village

- Men only organizations
- Meet when needed
- Involved in planning, and implementation
- Community operated and maintained

Functionality, operation and quality of Hydro/Solar PV Units

- Operational
- People are satisfied

- Community operated
- Maintenance technician is available
- People pay per month per unit basis
- Best quality of technology
- Best Quality of distribution lines
- 100% village is covered

Expected change in village education and health status

- Children study time has increased
- Increased play time during day and study at night
- Few computers
- Few TV
- There is no access to internet
- Electricity is used just for lighting
- No health center in the village
- People are safe from harmful insects / animals e.g. snakes \

Expected change in village business and employability

The systems support lighting only. No major change in village business and employment is expected. However, women can work into night on income generating activities, such as knitting and embroidery.

Expected change in disaster management and forest conservation/development

- Safe evacuation during night in the light of electricity in case of earthquake, floods and other disasters has been possible
- Introduction of mobile phones have improved early warning system
- No impact on forest cover

7.17 MEKHAN KHEL, DISTRICT LAKKI MARWAT

Organizational infrastructure in the village

- Men only organizations
- Meet when needed
- Involved in planning, and implementation
- Community operated and maintained

Functionality, operation and quality of Hydro/Solar PV Units

- Operational
- People are satisfied
- Community operated
- Maintenance technician is available
- People pay per month per unit basis
- Best quality of technology
- Best Quality of distribution lines
- 100% village is covered

Expected change in village education and health status

- Children study time has increased
- Increased play time during day and study at night
- Few computers
- Few TV
- There is no access to internet
- Electricity is used just for lighting
- No health center in the village
- People are safe from harmful insects / animals e.g. snakes \

Expected change in village business and employability

The systems support lighting only. No major change in village business and employment is expected. However, women can work into night on income generating activities, such as knitting and embroidery.

Expected change in disaster management and forest conservation/development

- Safe evacuation during night in the light of electricity in case of earthquake, floods and other disasters has been possible
- Introduction of mobile phones have improved early warning system
- No impact on forest cover

7.18 SHAH HASSAN KHEL, DISTRICT LAKKI MARWAT

Organizational infrastructure in the village

- Men only organizations
- Meet when needed
- Involved in planning, and implementation
- Community operated and maintained

Functionality, operation and quality of Hydro/Solar PV Units

- Operational
- People are satisfied
- Community operated
- Maintenance technician is available
- People pay per month per unit basis
- Best quality of technology
- Best Quality of distribution lines
- 100% village is covered

Expected change in village education and health status

- Children study time has increased
- Increased play time during day and study at night
- Few computers
- Few TV
- There is no access to internet
- Electricity is used just for lighting
- No health center in the village
- People are safe from harmful insects / animals e.g. snakes \

Expected change in village business and employability

The systems support lighting only. No major change in village business and employment is expected. However, women can work into night on income generating activities, such as knitting and embroidery.

Expected change in disaster management and forest conservation/development

- Safe evacuation during night in the light of electricity in case of earthquake, floods and other disasters has been possible
- Introduction of mobile phones have improved early warning system
- No impact on forest cover

FGD DATA ANALYSIS FOR SOLAR UNITS

Organizational infrastructure

Villages electrified under Solar PV Units have clusters of Solar systems in more than one location. In Karak there are three villages covered by Solar systems, and within village the systems are located in a number of clusters. Similarly, in Swabi and Lakki Marwat there are cluster of solar system within various villages. In each village, therefore, there are two type of organizations including cluster level organizations and then the cluster come together to form Community Organizations (COs). Solar systems are managed at CO level. COs generally consist of as much members as number of clusters ensuring representation of all the clusters. However, there are COs having more than one-member representation from any cluster.

A CO is headed by a chairperson and a secretary, and members of COs have selected operators to manage and operate the solar units. All the COs have opened bank account, and revenue from the electricity bills go to CO account after deducting salaries for the operators. Inter cluster conflicts has led to issues in management. for example, in Shamshaki, Karak, one of the clusters have stopped paying electricity bills to the operator who belongs to another cluster. In Lakki Marwat one of the clusters has developed differences with the next cluster over location of expected solar water pump plant, and have not been paying bills for the last several months.

Functionality, operation and quality of MHP Unit

Financial management is carried out through distributing bills on simple format filled after checking the meters. Electricity tariff ranging from PKR 5 to 10 per unit, and people reported satisfaction with the amount of bill they pay per month. “Though it is hard to pay electricity bill for people who earn from labor, they regularly pay the bills which helps us to pay the operators”, CO chairman in Shamshaki, Karak). The operators are paid variously including fixed amount ranging from PKR 1500 to PKR 3000 per month and 20 to 30 percent of the collected amount from monthly bills.

Operators have been provided training, and local people said that since the start of operation they have not seen any load shedding. In Shamshaki and Swabi in two clusters it was reported to have experienced damage to solar panel and meter, and complained of delayed response from the responsible organizations. “It has been months since we have reported damage to the solar panel, and breakdown of a meter. We are ready to pay for the panel and meter from our account, but are not clear who to contact to replace the damaged parts”, (FGD participants in Rabat, Swabi).

People are satisfied with the quality of Solar setup including batteries and other machines. “Though the electricity from solar system is meant just for lighting and running fans, we are proud that our system has not broken down for a single day. We remain careful when it is too hot in summer, and the system runs on its full due to use of fans”, (FGD participants in Matora, Lakki Marwat).

Health

In Karak and Lakki Marwat health issues are directly linked with unavailability of drinking water. In one of the FGDs in Lakki Marwat we asked for water as our water bottle had emptied after day long visit. We were offered colored water which we had to drink as mater of courtesy. Later when we asked about source of drinking water they use, they referred to a pond down the slope thanks to the rain a few weeks earlier. “We fell sick suffering with fever and high temperature every week or so. This is because of hot weather in summer and lack of safe drinking water. Cows, goats, chickens and human drink from the same pond. When the pond dries up we bring water in drums on donkeys back travelling miles. We have come to know that solar panel could be used to pump up water from the well. If the Idara (organization) could help us with water pump, we may get rid of high fever”, (Male FGD participant sin Matura village of Lakki Marwat). Local people then link better health with the way electricity enables them arrange safe drinking water.

However, people in solar electrified areas understand that lighting and fans have spared them from mosquitos and other insects. “ Before the solar lighting we would sleep early to serve ourselves to the mosquitos through the whole night. Now under the rushing fans it is not only cool to sleep but also never see mosquitos and other insects. Lights have also exposed scorpions which would come out in the dark, and would bite our children”, (Female FGD participant sin Matura village of Lakki Marwat). One of the male FGD participant in Batga, Swabi said that nothing was more smoothening than fresh air of fan after he stretched under it when returned home after collecting wood.

Education

The impact of electrification on education is seen in the way it facilitates children increasing their study time at night. Children often play and help their parents with small household works at day time. But at night as they settle at home they did their homework. When asked about if electricity had helped their children with studies, one of the men FGD participants said that after the availability of light his son gets better grades in school. Very few reported availabilities of TV and computers as the electricity was meant for lighting and running few fans. They acknowledged that safe and smooth sleep under the fans at night makes the children wakeup fresh in the morning to go to school.

Business and Employability

No business was observed in the village as the electricity was just meant for lighting and running the fans. In Lakki Marwat, however, women were reported to spent more time over making carpets, ropes and other crafts from the grass they collect around their houses. Most of the grasses are directly sold in the market, which earns them necessary household items.

Disaster Management

The target villages under the solar electrification system are prone to floods when it rains in torrents along the village slope of Swabi and Karak and over the sand dunes of Lakki Marwat. Electrification has

helped them not only by lighting their houses, but also charging their emergency lights and mobile lights. “Though our houses are safe from floods, still we feel it safe to gather in one safer place outside when it rains at night. Almost every house in the village have emergency lights with them, which they use to reach to the safer place.

In Lakki Marwat they mentioned heatwave in summer sometime turning into disaster situations, and said that after the solar electricity and introduction of fans, the incidences of heatwave effect have almost disappeared.

Other Social Impact

People in the target villages compare their lives with the rest of communities around them in terms of having access to permanent electricity system. There is a sense of empowerment among local people when they say that unlike rest of the Pakistan they do not suffer with load shedding. “ I have spent my life in the cities doing labor work, and know how people suffer when lights go off in Summer nights. For the last one year I am in the village, and haven’t seen a single day with lights off. Solar are very faithful, and we care about them”, (a male FGD participant in Azarkhel, Karak).

Access to electricity and therefore mobile phones means a piece of mind for village mothers who live without their sons around them as most of the men do labor work in down Pakistan to earn cash income. They also see mobile phones as better and fast means of communication in times of human sufferings such as death, and say that it would take days to inform relatives who lived in far areas about death in the family. Now relatives get updated of every moment of sorrow and happiness, they assert.

APPENDIX-3 SURVEY TABLES

3.1.HOUSEHOLD STRUCTURE

Table 1. Number of households by structure and district

District	Number			Percentage		
	Family Type		Total	Family Type		Total
	Joint	Nuclear		Joint	Nuclear	
Buner	8	10	18	44.4	55.6	100
Chitral	111	84	195	56.9	43.1	100
Upper Dir	74	74	148	50.0	50.0	100
Karak	11	52	63	17.5	82.5	100
Lakki Marwat	21	30	51	41.2	58.8	100
Swabi	2	67	69	2.9	97.1	100

3.2. HOUSING CONDITION

Table 2. Percentage of household by housing condition and district

District	Housing condition			Total
	Kacha	Pacca	Semi Pacca	
Buner	70	7	23	100
Chitral	60	10	30	100
Upper Dir	85	6	9	100
Karak	74	5	21	100

Lakki Marwat	86	0	14	100
Swabi	13	0	87	100

3.3. SOURCES OF DRINKING WATER

Table 3. Percentage of household by Source of drinking water and district

District	Source of drinking water				Total
	Dug Well	Hand pump	Drinking water supply scheme	Any other	
Buner	0	0	98	2	100
Chitral	3	5	90	2	100
Upper Dir	4	1	42	53	100
Karak	26	67	0	6	99
Lakki Marwat	2	6	2	90	100
Swabi	0	0	84	16	100

3.5. AUTHORITY INSTALLED WATER SUPPLY SCHEMES

Table 4. Percentage of household by authority installed water supply scheme and district

District	authority installed water supply scheme				Total
	Government	NGO	Self	Any other	
Buner	0	0	100	0	100
Chitral	11.28	72.82	9.23	6.67	100
Upper Dir	22.3	1.35	60.81	15.54	100
Karak	1.59	26.98	50.79	20.63	99.99
Lakki Marwat	1.96	5.88	74.51	17.65	100
Swabi	0	0	100	0	100

3.6. SANITATION

Table 5. Percentage of household by sanitation facility and district

District	sanitation facility				Total
	Defecate in open	Pit latrine	Flash	Any other	
Buner	30	6	64	0	100
Chitral	6	20	73	1	100
Upper Dir	14	36	49	1	100
Karak	19	10	71	0	100
Lakki Marwat	63	0	37	0	100
Swabi	23	7	70	0	100

3.7. WASTE WATER MANAGEMENT

Table 6. Percentage of household by waste water management system and district

District	waste water management system				Total
	Common sewerage system	Ground Tank	Discharge to land or river	Any other	
Buner	0	50	50	0	100
Chitral	7	81	1	11	100

Upper Dir	3	72	15	9	100
Karak	2	87	10	2	100
Lakki Marwat	20	25	55	0	100
Swabi	36	61	3	0	100

3.8. DISPOSITION OF SOLID WASTE

Table 7. Percentage of household by disposition of solid waste and district

District	disposition of solid waste				Total
	Burning	Thrown into the river	Disposed near the house in open area	Any other	
Buner	20	0	80	0	100
Chitral	70	5	25	0	100
Upper Dir	20	4	74	2	100
Karak	59	3	38	0	100
Lakki Marwat	49	6	45	0	100
Swabi	10	4	86	0	100

3.9. USE OF ELECTRICITY

Table 8. Primary Uses of Electricity (Overall)

Use of Electricity for	All Districts

	Total items	Items per HH	% of item in all HH
Refrigerator	5	0	0.92
Micro Wave	0	0	0.00
Oven	4	0	0.74
Generator	1	0	0.18
No. of bulbs per HH	1070	2	196.69
Roti maker	0	0	0.00
Iron	117	0	21.51
Fan	375	1	68.93
. Water heating Rod	7	0	1.29
Weigh machine	25	0	4.60
Juicer	8	0	1.47
TV	51	0	9.38
Electric Stove	0	0	0.00
Music Player	4	0	0.74
mobile phones	1080	2	198.53

3.10. HOUSEHOLD HAVING APPLIANCES

Table 9. Households having appliances (Overall)

Appliances	All Districts	
	Number of HH	% of HH
Refrigerator	5	0.91
Micro wave	0	0.00
Oven	4	0.73
Generator	1	0.18
Bulb	461	83.97
Roti maker	0	0.00
Iron	117	21.31

Fan	167	30.42
Water heating rod	5	0.91
Weigh machine	25	4.55
Juicer	6	1.09
TV	51	9.29
Electric stove	0	0.00
Music player	4	0.73

3.11. ENERGY EXPENDITURE

Table 10. Monthly Energy Expenditure by purpose, source and village

Purpose	Source of Energy	Village											
		Sar Kalay		Golain Istore		Gazeen		Pursat		Bishoo		Azar Khel	
		Total	Per HH	Total	Per HH	Total	Per HH	Total	Per HH	Total	Per HH	Total	Per HH
Lighting	Candle	0	0	0	0	0	0	0	0	0	0	0	0
	Batteries	0	0	0	0	0	0	0	0	0	0		0
	Generator	0	0	0	0	0	0	0	0	0	0		0
	Kerosene	0	0	0	0	0	0	0	0	0	0		0
	Hydro Electricity	10300	572	1629	58	6790	70	0	0	10015	68	5900	369
	Solar Electricity	0	0		0	0	0	3243	47	5382	36	0	0
Cooking	Firewood	171000	9500	256000	9143	1174000	12103	1027000	14671	1551500	10483	120000	7500
	LPG	0	0	0	0	0	0	0	0	0	0		0

Heating	Firewood	87000	4833	0	0	652000	6722	261300	3733	788000	5324	16000	1000
	LPG	0	0	128000	4571	0	0	0	0	0	0		0
Total		**268300**	**14905**	**385629**	**13772**	**1832790**	**18895**	**1288300**	**18451**	**2354897**	**15913**	**141900**	**8869**

Table 11. Monthly Energy Expenditure by purpose, source and village

Purpose	Source of Energy	Village											
		Sarobi Ida Khel		Shamshaki		Bazid Karona		Dhoda		Ghafar Karona		Hazar Dharak	
		Total	Per HH	Total	Per HH	Total	Per HH	Total	Per HH	Total	Per HH	Total	Per HH
Lighting	Candle	0	0	0	0	0	0	0	0	0	0	0	0
	Batteries	0	0	0	0	0	0	0	0	0	0	0	0
	Generator	0	0	0	0	0	0	0	0	0	0	0	0
	Kerosene	0	0	0	0	0	0	0	0	0	0	0	0
	Hydro Electricity	0	0	0	0	0	0	0	0	0	0	0	0
	Solar Electricity	5200	306	8250	275	1850	370	1800	360	2600	520	12600	700
Cooking	Firewood	102000	6000	189000	6300	34000	6800	40000	8000	33000	6600	127000	7056
	LPG	0	0	0	0	0	0	0	0	0	0	0	0
Heating	Firewood	19400	1141	35000	1167	18000	3600	5000	1000	10000	2000	50500	2806
	LPG	0	0	0	0	0	0	0	0	0	0	0	0
Total		**126600**	**7447**	**232250**	**7742**	**53850**	**10770**	**46800**	**9360**	**45600**	**9120**	**190100**	**10561**

3.12. EDUCATION

Table 12. Percentage distribution of household members - Overall

Education	All Districts		
	Male	Female	Both
not literate	20.45	25.79	46.25
basic literacy	1.88	1.10	2.98
Primary	9.03	7.94	16.97
Middle	8.84	5.39	14.23
Metric	5.70	3.08	8.77
Intermediate	3.08	1.22	4.29
Degree	1.48	1.14	2.62
Master	0.81	0.31	1.12
Diploma	0.21	0.10	0.31
Madrassa	1.48	0.98	2.46

3.13. HOUSEHOLD HEALTH STATUS

Table 13. Households attending health facilities and average distance covered by district

District	Households attending health facility						Average distance to health facility (KM)
	Number			Percentage			
	Yes	No	Total	Yes	No	Total	
Buner	18	0	18	100.00	0.00	100.00	29
Chitral	191	4	195	97.95	2.05	100.00	4
Upper Dir	145	3	148	97.97	2.03	100.00	9
Karak	63	0	63	100.00	0.00	100.00	13
Lakki Marvat	51	0	51	100.00	0.00	100.00	8
Swabi	69	0	69	100.00	0.00	100.00	8
Overall	**537**	**7**	**544**	**98.71**	**1.29**	**100.00**	**12**

3.14. HOUSEHOLD ENERGY EXPENDITURE

Table 14. Average Monthly Household Expenditures in Target Villages District Chitral

S#	Items	Gollen			Gazen			Pursat		
		Mid-line Status (Sep 2019)	End-line Status (Apr 2021)	Variance	Mid-line Status (Sep 2019)	End-line Status (Apr 2021)	Variance	Mid-line Status (Sep 2019)	End-line Status (Apr 2021)	Variance
1	A. Average Monthly Household Non-Energy Expenses (PKR)	16200	17150		14100	17652		14100	13450	
2	B. Average Monthly Household Energy Expenses (PKR)	13772	9850		18,895	12460		18451	15675	
	Total	29972	27000		32,995	30112		32551	29125	
3	Share of Energy in Total HH Expenses (%)	46	36.5	9.5	57	41.4	15.6	56.68	53.4	3.3

Table 15. Average Monthly Household Expenditures in Target Village District Dir Upper

S#	Items	Dir District		
		Mid-line Status (Sep 2019)	End-line Status (Apr 2021)	Variance

1	A. Average Monthly Household Non-Energy Expenses (PKR)	14,100	19560	Y
2	B. Average Monthly Household Energy Expenses (PKR)	15,913	11245	Y
	Total	30,030	30805	Y
3	Share of Energy in Total HH Expenses (%)	53	36.5	16.5

Table 16. Average Monthly Household Expenditures in Target Village District Buner

S#	Items	Bagaria Khwar		
		Mid-line Status (Sep 2019)	End-line Status (Apr 2021)	Variance
1	A. Average Monthly Household Non-Energy Expenses (PKR)	11,610	10,550	1060
2	B. Average Monthly Household Energy Expenses (PKR)	14905	19950	5045
	Total	26,515	30,500	3985
3	Share of Energy in Total HH Expenses (%)	56.21	65.41	9.2%

Table 17. Average Monthly Household Expenditures in Target Villages District Karak

S #	Items	Azar Khel			Sarobi Ida Khel			Shamshaki		
		Mid-line Status (Sep 2019)	End-line Status (Apr 2021)	Variance	Mid-line Status (Sep 2019)	End-line Status (Apr 2021)	Variance	Mid-line Status (Sep 2019)	End-line Status (Apr 2021)	Variance
1	A. Average Monthly Household Non-Energy	11,100	12250		14,000	15152		16110	15550	

	Expenses (PKR)									
2	B. Average Monthly Household Energy Expenses (PKR)	8,869	9750		7447	9450		7742	8675	
	Total	19,969	22000		21,447	24602		23852	24225	
3	Share of Energy in Total HH Expenses (%)	44.4	44.32		34.72	38.41		32.46	35.81	

Table 18. Average Monthly Household Expenditures in Target Villages District Swabi

S #	Items	Badga			Jabba			Nogram		
		Mid-line Status (Sep 2019)	End-line Status (Apr 2021)	Variance	Mid-line Status (Sep 2019)	End-line Status (Apr 2021)	Variance	Mid-line Status (Sep 2019)	End-line Status (Apr 2021)	Variance
1	A. Average Monthly Household Non-Energy Expenses (PKR)	15,870	16120		11,260	11800		11,430	10213	
2	B. Average Monthly Household Energy Expenses (PKR)	12711	14100		10013	12121		11,300	13240	
	Total	28,581	30220		21,273	23921		22,730	23453	
3	Share of Energy in	44.47	46.66		47.07	50.67		49.71	56.45	

	Total HH Expenses (%)									

Table 19. Average Monthly Household Expenditures in Target Villages District Lakki Marwat

		Average Monthly Household Non Energy Expenses	Average Monthly Household Energy Expenses	Total Expenses	Share of Energy in total Household expenses (%)	Variance (+/-)
Bazid Korona	Midline	12000	12036	24036	50.07	4.8
	End-line	11460	13934	25394	54.87	
Dhoda	Midline	14,100	12,026	26,126	46.03	0.62
	End-line	15872	13879	29751	46.65	
Ghafar Korona	Midline	17100	12886	29986	42.97	5.3
	End-line	15278	14254	29532	48.27	
Hazar Dharak	Midline	13910	9366	23276	40.24	5.9
	End-line	11890	10200	22090	46.17	
Matora Korona	Midline	17100	12615	29715	42.45	4.3
	End-line	16789	14721	31510	46.71	
Mekhan Khel	Midline	13100	9457	22557	41.92	5.5
	End-line	11498	10351	21849	47.38	
Shah Hassan Khel	Midline	17,200	9683	26883	36.02	2.3
	End-line	15991	9921	25912	38.29	

3.16. WOMEN EMPOWERMENT

UTILIZATION OF INCOME

Table 20. Percentage of Households reporting decision making regarding utilization of income by district

Village	Decision making at household level - utilization of income

	men only	mainly men	women only	mainly women	Both	Total
Buner	42	22	0	0	36	100
Chitral	28	42	3	0	27	100
Upper Dir	70	13	0	2	15	100
Karak	76	12	0	0	12	100
Lakki Marvat	59	8	0	0	33	100
Swabi	98	0	0	0	2	100

Table 21. Percentage of Households reporting decision making regarding HH expenditure by district

District	Decision making at household level - HH expenditures					
	men only	mainly men	women only	mainly women	Both	Total
Buner	36	25	0	0	39	100
Chitral	21	40	2	7	30	100
Upper Dir	68	16	1	0	15	100
Karak	77	15	0	2	6	100
Lakki Marvat	65	25	0	0	10	100
Swabi	96	0	0	0	4	100

APPENDIX-4 PICTURE GALLERY

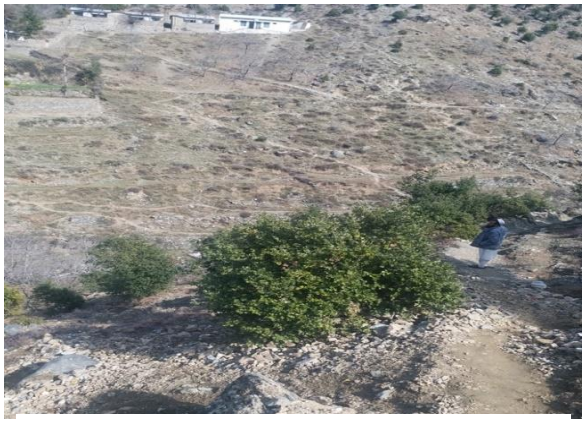
1.. April 30, 2021, Gazen, MHP Unit, District Chitral

2. April 30, 2021, A Gazen village street, in District Chitral

3. April 28, 2021, Golen, Chitral, FGD in Progress

4. April 28, 2021, MHP Control Panel in Golen District Chitral

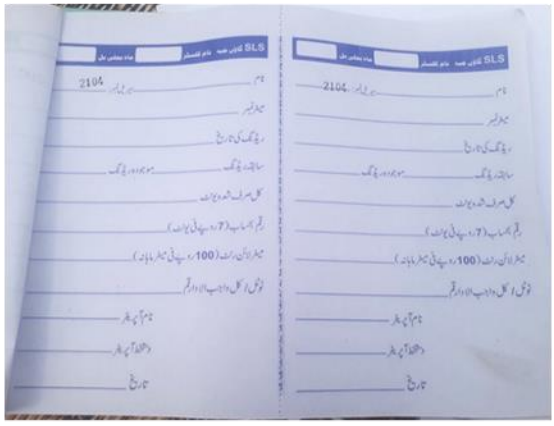
5. April 26, 2021, FGD in progress in Pursat



6. April 26 ,2021, pathway leading to village, Pursat, district Chitral

7. April 18, 2021 Solar Sysem in Village Nogram, District Swabi,

8. April 18, 2021 Solar Sysem in Village Nogram, District Swabi,



9. April 17, 2021, Electricity Bill in Village Jabba, District Swabi

10. April 17, 2021, Satellite Dish TV in Nogram Village of District Swabi

11. April 16, 2021, Solar System in Badga, Swabi

12. April 17, 2021, Solar Batteries in Jabba, District Swabi

13. April 16, 2021, Protection of Barbed Wire Around Solar System in Badga, District Swabi

14. Solar System in Mekhan Khel, Lakki Marwat

15. FGD in Progress in Bazid Korona, Lakki Marwat

APPENDIX-5 SURVEY INSTRUMENTS

4.1. CHECKLIST FOR TRANSECT WALK

Midline Survey of Mini/Micro Hydropower and Solar PV Projects

Village Transect Walk Checklist

Date_____ Time _____

Village_____ UC_____

Tehsil_____ District_____

Accessibility, Circulation, and Environment

1. Accessibility (Travel time to village from the main road - Minutes) > 60 / 30-60 / < 30
2. Condition of internal roads Poor / Good / Very Good
3. Condition of Houses Poor / Good / Very Good
4. Drainage Situation Poor / Good / Very Good
5. Solid Waste Management Situation Poor / Good / Very Good

6. Signs of open defecation None / A few / Numerous

Remarks / Brief Description of Observations

Quality of Electrical System provided under the Project

7. Construction Quality – Micro-hydro / Solar PV Poor / Good / Very Good

8. Construction Quality Distribution Lines (poles, conductors, cables) Poor / Good / Very Good

9. Percentage of Houses Connected to the Village/Cluster Grid <50 % / 50-90 % / >90 %

10. Street lights provided Yes / No

11. Conditions of solar panels Poor / Good / Very Good

12. Condition of batteries Poor / Good / Very

Remarks / Brief Description of Observations

Development Indicators

13. Activities within village Stagnant / Active / Very Active
(social, cultural and economic-particularly role of women)

14. Conditions of health and hygiene Poor / Good / Very Good
15. Out of School Children (No. of School Age Children in the Streets) Poor / Good / Very Good
16. What is special in the village, Heritage, Religious, History
17. Condition of people (dress, facial expressions, social status etc.) Poor / Good /

Remarks / Brief Description of Observations

4.2. CHECKLIST FOR FOCUS GROUP DISCUSSION

Midline Survey of Mini/Micro Hydropower and Solar PV Projects

Village FGD Checklist

Date_____ Time _____

Village_____ UC_____

Tehsil_____ District_____

Group Gender_____

A. Organizational infrastructure in the village

- Types of Organizations (men/women/mixed)
- Activeness of organizations (regular/irregular/dormant)
- Role of the organizations in the hydropower/Solar PV project identification
- Role of the organizations in the hydropower/Solar PV project implementation
- Role of the organizations in the hydropower/Solar PV project operation and maintenance

Notes

_____
____

_____
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_____
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_____
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B. Functionality, operation and quality of Hydro/Solar PV Units

- Operational
- Not yet operational
- Satisfaction if operational
- Expectations if not operational
- Operational responsibility (community operated/operated by private entity/any other)
- Availability of Maintenance Technicians (Within Village / Nearby Village / Nearby Town (Give Distance)
- Monthly electricity contribution – How much and mode of collection) By the Utility as tariff / Collection by 0&M Committee / Flexibility according to ability to pay
- Quality of technology
- Quality of construction/erection in case of solar panels
- Quality of distribution lines
- Village coverage

Notes

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_____

C. Expected change in village education and health status

- Increased study time for children
- Increased play time during day and study at night
- Use of computers
- More time in front of TV
- Access to internet
- Use of electricity as alternate source of HH fuel spares women from smoke and smoke caused diseases
- Availability of cold storage to store medicines and vaccines

- Availability of hot water relieving people from diseases caused by cold
- Keeping away / visibility of harmful insects / animals e.g. snakes

Notes

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D. Expected change in village business and employability

- Introduction of/improvement in businesses run on electricity
- Enhanced handicraft production using electricity
- Other business development activities

Notes

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E. Expected change in disaster management and forest conservation/development

- Safe evacuation during night in the light of electricity in case of earthquake, floods and other disasters
- Better early warning system
- Increased forest cover due to water lift irrigation and using electricity as alternate source of fuel replacing wood

Notes

_____

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4.3. SURVEY QUESTIONNAIRE

HOUSEHOLD SURVEY QUESTIONNAIRE

A. Respondent details

101. Name of Respondent		102. Age of Respondent	
103. Education of Respondent 1=Illiterate 2= Basic Literacy3=Primary passed 4=Middle passed 5=Metric 6=Madrasa 8= above Matric		104. Name of Household head (if other than the respondent)	
105. Gender of Household head 1=Man 2=Woman		106. Village Name	

B. Household structure

107. Family Type: 1=Joint (more than one family) 2=Nuclear (one couple and their children or individual without couple)	

Household composition (age break-up of household members)

108. Less than 5		**109. 5-9 Years**		**110. 10-14 years**		**111. 15-65 years**		**112. Above 65 years**	
Boys	Girls	Boys	Girls	Boys	Girls	Men	Women	Men	Women

Housing condition and lifestyle

Questions	**Responses**
113. Housing condition:	

1=Kacha, 2=Pacca, 3=Semi pacca, 4=Any other	
114. Source of drinking water: 1=Dug well, 2=Hand pump, 3=Drinking water supply scheme, 4=Any other	
115. Drinking water scheme installed by: 1=Government, 2=NGOs, 3=Self, 4=Any other	
116. Type of Household sanitation facility: 1=Defecate in open, 2=Pit latrine, 3=Flash, 4=Any other	
117. Waste water management system: 1=Common sewerage system, 2=Ground tank, 3=Discharge to land or river, 4=Any other	
118. Solid waste are disposed by: 1=Burning, 2=Thrown into the river, 3=Disposed near the house in open area, 4=Any other	

C. Education

Literacy level of family member above year 10

119. Not literate		**120. Basic Literacy**		**121. Primary**		**122. Middle**		**123. Metric**		**124. Intermediate**	
M	F	M	F	M	F	M	F	M	F	M	F
125. Degree		**126. Master**		**127. Diploma**		**128 Madrasa**		**129. Others (specify)**			
M	F	M	F	M	F	M	F	F	M		

Total hours spent on studies at home by students

Education Level	**Average No. hours spend at home by children on study (hours/day)**	
	Boys	**Girls**
130. Primary school (1-5 grade)		
131. Middle school (6-8 grade)		
132. High school (9-10 grade)		
133. College/University		

Perception of advantages of electrification for education

Advantages	**Perception**	
	Boys	**Girls**
134. DO you think that access to electricity will improve education quality? 1=Yes, 2=No (If yes go to Q 135, otherwise skip)		
135. Advantages of access to electricity in education: 1=Lighting,		

2=use of computer, 3=access to internet, 4=Any other		

D. Health

Health status of the household members

Details	Response
136. Distance to nearest health facility (KM)	
137. Do you go to health facility in case of illness Yes =1, No=0	
138. If yes what type of health facility you go in case of illness 1=BHU 2=AKHS Medical Facilities 3=Civil Hospital 4=MCH centre 5= DHQ 6=Private Clinic 7=Hakim 8=Traditional Healers 9=Home Doc 10. Dispensers	
139. Satisfaction health facilities Codes 1=yes 2=No	
140. Satisfaction with doctors and other staff members: 1=Yes. 2=No	
141. Frequency of visits to hospitals during last year (number)	
142. Total travelling expenditure on health (Amount)	
143. Total Children born (last 5 years) in your family (Number)	
144. Death of under five 5 year child in the last 12 months (Number)	
145. Children born at home during last 12 months (Number)	
146. Children born in at health center/hospital during last 12 months (Number)	
147. Children under 1 year age died during last five 12 month (Number)	
148. Pregnant women visits to health facilities for pre/postnatal checkups 1=yes, 2=No	
149. Number of visits to health facilities for pre/postnatal checkups (Number)	
150. Pre/postnatal death of mother in the family in last 12 month.	

E. Membership in community organizations

151. No. of family Member in men organizations		152. No. of family Member in women organizations	
153. Saving (PKRs.)		154. Saving (PKRs)	

F. Household Fuel Consumption and access to electricity

Type of fuel used within household

Type of fuel	**Used for** 1= Lighting 2= Cooking 3= Heating 4= Iron 5= Water heating
155. Electricity	
156. Generator	
157. Firewood	
158. Coal	
159. Animal's Dung	
160 LPG	
161. Solar	
162. Candle	

163. Kerosene	
164. Biomass gas	
165. Bio briquette	
165.1. Small Batteries (AA/AAA)	
165.2 Others, specify	

Household expenses on fuel and readiness to adopt electricity as an alternate

fuel (note: if the expenses are not known ask for hours of use or of weight or numbers; please ask the price per unit in the respective village)

166. Average Monthly expenditure on existing fuel source for:	
166.1 Lighting (PKRs.)	
Candles	
Batteries	
Generator	
Kerosene	
Other fuel	
	Total:
166.2 Cooking (PKRs.)	
Firewood	
Coal	
LPG	
Kerosene	
Biomass briquettes	

Other fuel	
	Total:
Iron (PKRs.)	Total:
166.3 Heating (PKRs.)	
Firewood	
Coal	
LPG	
Kerosene	
Biomass Briquettes	
Other fuel	Total:
166.4 Monthly expenditure on electricity (PKRs)	
166.5 Monthly expenditure on generator (PKRs)	
166.6 Monthly expenditure on mobile charging Number of mobile phones per HH: Frequencies of charging phones per week: Cost per charging: Total cost for mobile phone charging per HH per month:	
167. How much you are ready to pay for electricity bill if electricity will be provided as alternate to existing source of fuel for lighting, cooking, iron, and heating (PKRs)	
168. Will you pay expenses of electrification charges in your house if you will provide electricity connection to your house	
169. Existing main fuel source is firewood (1=yes, 2=No) if yes than answer Q 170-173 otherwise skip them	
170.What is the main source of firewood 1=Agro forestry 2=Natural forest 3=Both equally 4=mainly from agro forestry (more than 70%), 5=Mainly Natural forest (more than 70%)	
171 Duration of wood collection activity (No of months)?	

171.1 Months in which HH collecting wood (type of month) 1= January, 2= February, 3=March, … 12=December	
172 No. of family member engages for firewood collection (No)?	
172.1 Who is mainly engaged for firewood collection? 1=Male adults 2=Female adults 3=Male children 4=Female children	
173 Time requires collecting wood from the source (Hours for round trip)?	

Household expenditure on non energy items

172.3 Household Expenses on non energy items (PKRs.)	Food	
	Clothing	
	House Rent	
	Health	
	Education	
	Miscellaneous	
	Other	

Nature of access to electricity

174. Grid connected 1=WAPDA, 2=PEDO, 3= Any other	
175. Off Grid 1=Community based, 2=NGO based, 3=private, 4=Any other	

Service regularity

176. How regular is the access to electricity? 1=24 hours, 2= During night, 3=At evening and morning time, 4=from 6 to 12 pm at night	
177. What alternate sources of power available in case of breakdown or maintenance of the existing system? 1=solar, 2=generator, 3=Lamp, 4=Any other	

Bill payment

178. Average Monthly electricity bills (in PKR): 1=Less than 100, 2=100 to 500, 3=501 to 1000, 4=Above 1000	
178.1 Amount of electricity bill in **Summer** (July 2019) (in PKR)	
178.2 Amount of electricity bill in **Winter** (January 2019) (in PKR)	
179. Comfortability with bill payment: 1=I affordable, 2=hardly affordable, 3=beyond affordability	

Electrical appliances owned by household

Name of Item	180. Refrigerator	181. Micro Wave	182. Oven	182.1 generator	181.2 No. of bulbs per HH	183. Roti maker	184. Iron	185. Fan	186. Water heating Rod	187. Weigh machine	188. Juicer	189. TV set	190. Electric Stove	191. Music Player	192. mobile phones	192.1 others items, please specify
Number																
Utilization of appliances: 1=Adult Male, 2=Adult Female, 3=Both, 4=Children																

Perception of advantages of electricity

Description	Female	Male
193. What are the advantages of electricity? 1=lighting, 2=Use of appliances, 3=Studies, 4=Work, 5=security, 6= better health 7=Any other, please specify		

Perception about the supply of electricity

Description	Female	Male
194. From your point of view, what kind of impacts will have the provision of electricity for working hours for income generation? 1= hours will increase 2= hours remain the same 3= hours will decrease 4= don't know		
194.1 From your point of view, what kind of impacts will have the provision of electricity for working hours for firewood & water collection? 1= hours will increase 2= hours remain the same 3= hours will decrease 4= don't know		
195. Do you agree that provision of electricity will improve living standard of local people: 1=yes, 2=No		
196. Is the existing supply of electricity consistent and sufficient: 1=yes, 2=No		

197. Would you start any new activities when you have a consistent electricity supply 1=yes, 2=No		
198. Would you like to start up a business if you have safe and reliable electricity supply 1=yes, 2=No		

Operation and Maintenance of Electricity

199. Who operates and maintains the electricity system in your community: 1=Community, 2=WAPDA/PEDO, 3=NGO, 4=Any other	
200. What are major operation and maintenance issues: 1=low power, 2=short circuit, 3=line losses, 4=theft, 5=switches, 6= O&M, 7=Any other	
201. Who you contact to fix the issue? 1=Community operator, 2=private service provider, 3=WAPDA/PEDO staff	
202. After complaint how long it took to resolve the issue? 1=immediately, 2=few days, 3=weeks, 4= never	
203. Do you pay for maintenance? 1=yes, 2=No	
204. Are you satisfied with the level of maintenance and operation? 1=yes, 2=No	
205. If not what are the reasons?	
206. Do you regularly pay your monthly electricity bill of mini gird? 1=Yes, 2=No	
206.1 Do you pay per unit or flat rate? 1= per unit 2= per flat rate	
207. Where do you buy household electric appliances? 1=in local market, 2=from main town, 3= from down Pakistan, 4=others	

Perception of impact of electrification environment

208. Do you think that electricity from hydro power is good for environment? 1=Yes, 2=No, 3=Don't know	
209. In what way will electricity impact the village environment? 1= Conserving trees through replacing fuel wood, 2= Irrigating new land through water lifting, 3=Any other, please specify	
210. Do you have land to be irrigated through water lifting? 1= Yes, 2=No	

G. Daily activity chart and women workload ***(Question directly by female enumerator to woman)***

Activity	**Carried Out By** **1=Women; 2=Men; 3=Both**	**Number of persons doing the task per day**	**Distance Covered (KM)**	**Time Consumed (Hours per day per person)**
Fetching Water	211	211.1	212	213
Collecting Fuel Wood/Cow Dung	214	214.1	215	216
Fodder Collection	217	217.1	218	219
Cooking	220	220.1		221
Water Heating	222	222.1		223
Washing	224	224.1		225
Milking/Milk Processing	226	226.1		227

Activity	Carried Out By 1=Women; 2=Men; 3=Both	Number of persons doing the task per day	Distance Covered (KM)	Time Consumed (Hours per day per person)
Ironing	228	228.1		229
House Cleaning	230	230.1		231
Wool Weaving	232	232.1		233
Fodder Grinding	234	234.1		235

H. Land holding, livelihood and food security

236. ~~Do you have Owned Cultivable lands?~~ Does your household (all members!) own cultivable lands? 1=Yes 2= No		237. Do you have access to cultivable land on lease 1=Yes 2=No	
If yes to Q1, please answer question 2, 3 and 4 other wise skip these question		If yes to Question 5, answer Q6 and Q7.	
238. Own cultivable land (Kanal)	239. Owned land cultivated (Kanal)	240.Reasons for non-cultivation 1=Insufficient water 2=Lack of input 3=Lack of human resource 4=Others	241. Leased for money (Kanal)	242. Land leased for share Cropping (Kanal)

Source of livelihood (household members engaged)

Description	No. of Persons engaged	
	Men	Women
243. Farming		
244. Services		

Description	No. of Persons engaged	
	Men	Women
245. Business		
246. Skilled labor		
247. Unskilled Labor		
248. Transfers		
248.1 Land lease		
249. Others (Specify)		

Household Income

249.1 How many family members contributes to your monthly HH income

Male members =_____ Female members = _____ Total HH members= _____

249.2 What is the share of income generated by women to total monthly HH income?

_____ % of total monthly income

249.3 what are the main income generating activities of women in your HH? *Please describe*

a) e.g. handicraft knotting carpets)

b) e.g. selling agricultural products.

c) e.g. labor

249.4 What is your average daily monetary HH income, if any?

PKR per day/HH

249.5 What is your average monthly HH income? (PKR)

A) 0 – 5,000
B) 5,000 – 20,000
C) 20,000 – 40.0000
E) More than 40.000

Household food security

250. Is food grain production enough for the household year around 1=Yes 2=No		251. If no, no of deficit months 1=2 to 4 months 2=4 to 6 months 3=6 to 8 months	
252. Management of food deficit 1=Buying 2=Laboring 3=Borrowing 4=Others		253. Reasons for insufficient production 1=Little land holding 2=Low productivity 3=Large household size 4=Others	

I. Women Empowerment

Decision making at household level

254. Utilization of Income earns	255 HH expenditures	256 Assets purchase	257 Assets sale
258 Take loan(s)	259 Utilize loan (s)	260 Savings (s)	261 Family Planning
262.Work outside HH	263 Child rearing	264 Access to Health service	265 Children's education
266 Where to send children for studies	267. Whom to send for studies	268 Male Children Marriages	269 Female Children Marriages

Note: Put appropriate code in the above, i.e., 1= men only 2= mainly men 3= women only 4= mainly women 5= both men and women equally

269.1 How many female household members possess an ID Card? (No)

Mobility for Women

Do women attend the following events? (Yes=1, and No=0)	270. Festivals	271. Ceremonies including religious	272 Weddings	273 Attending social events
Do women allowed to visit following alone when needed? (Yes=1, and No=0)	274 Health facilities	275 Relatives place/home	276 Jobs	277 Market for purchasing
Do women allowed to visit above facilities, places and events when needed accompanied by men or other family members? (Yes=1, and No=0)	278	279	280	281

Data Check

Q1. Enumerator's Name	Signature:	Date:
Q2. Checked by	Signature:	Date:
Q3. Data Entered by	Signature:	Date: