

Baseline Report for the Project

Ensuring Energy Security in TEA GARDENS



March 2025

Switchon foundation



Founded in 2008, the Environment Conservation Society (ECS), also known as SwitchON Foundation, has been actively offering sustainable solutions for the vulnerable Indian population. With a commitment to clean energy, climate-resilient agriculture, and sustainable cities, ECS is working towards creating opportunities for 10 million people by 2030, promoting equitable growth through innovative business models and technologies.

Central to its efforts is the CRA-DRE (Integrating Climate Resilient Agriculture with Distributed Renewable Energy) program, where ECS integrates renewable energy solutions with climate-resilient farming practices within a Farm-to-Fork ecosystem. This program focuses on the collectivization of producers, enhancing their capabilities in value addition to primary produce, and establishing robust market linkages.

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Abbreviation

BDO- Block Development Officer

CBIs- Community Based Institutions

CBOs- Community Based Organizations

CISTA- The Confederation of Indian Small Tea Growers Association

CMOH- Chief Medical Officer Health

DPA- Darjeeling Planters Association

DRE - Decentralized Renewable Energy

FGDs- Focused Group Discussion

FPO- Farmers Producers Organization

KIIs- Key Informant Interviews

NGO- Non-Governmental Organizations

PHC- Primary Health Centre

STG- Small Tea Grower

TGW- Tea Garden Worker

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Executive Summary

The baseline study conducted by SwitchON Foundation aimed to provide a comprehensive assessment of the current status of small tea growers and tea garden workers in North Bengal's districts of Jalpaiguri, Darjeeling, and Kalimpong. The focus was on evaluating the community's awareness, engagement, and resource utilization related to decentralized renewable energy (DRE) technologies, sustainable livelihood practices, and socioeconomic conditions. Key finding below -

1. Electricity Supply and Provision – Community and Household:

- **Awareness:** The study indicates a significant lack of awareness regarding DRE technologies among the community members. Out of 550 respondents, only **18%** are familiar with DRE technologies such as solar lighting and solar pumps. A mere **0.18%** of the entire respondent set possess knowledge of their financial aspects.
- **Adoption:** The utilization of renewable energy technologies is remarkably low. Less than **1%** of the respondents use solar lighting, solar pumps, or solar cookstoves. Maintenance responsibilities are unclear, posing challenges for sustainable adoption.

2. Water – Availability, Quality, Consumption, Irrigation

- **Quality and Access:** In Jalpaiguri, **54.6%** of respondent households rely on borewell/tubewell water, facing issues with water quality. The study underscores the need for solar-powered water pumps and purifiers to address these challenges.
- **Consumption:** Water scarcity during summer is a significant issue. Households and tea garden workers face shortages of clean drinking water and water for daily use.

3. Agriculture – Processing, Marketing:

- **Processing:** The tea industry requires substantial amounts of energy for various processes. With policy and regulatory support, solar energy can meet these energy needs, reducing costs and greenhouse gas emissions.
- **Marketing:** Small tea growers face challenges with marketing their products, finance issues, and lack of coordination between buyers and producers. Establishing cooperatives and providing market linkages can help overcome these challenges. The cooperative will establish linkages with small producers, especially farmers, enabling them to collectively access larger markets and secure better prices through improved negotiation.

4. Green Livelihoods:

- **Youth Education and Employment:** **61%** of the youth have education above the 10th grade, yet **44%** are unemployed. This indicates a substantial opportunity for skill development training.
- **Sustainable Practices:** Awareness and engagement in sustainable livelihood practices are low. Only **9%** of respondents are aware of sustainable livelihood practices, and **2%** are actively engaged in sustainable practices such as natural farming.

5. Community Institutions:

- **Representation:** Only **14%** of families have representatives in any Community-Based Institutions (CBIs), indicating limited involvement in community governance.
- **Effectiveness:** The role of CBIs in facilitating market linkages, technology adoption, and access to finance is limited. Most CBIs are not actively involved in these areas.



1. Introduction

1.1 ABOUT THE PROJECT

The “Ensuring Energy Security in Tea Gardens” project has been designed to address the multifaceted challenges faced by the small tea growers and tea garden workers. By providing a basket of Decentralized Renewable Energy (DRE) solutions, there is opportunity to address the immediate energy needs of the target community while also promoting **alternative livelihood opportunities**. Based on the terrain of tea-garden and the availability of land, a few environmentally compatible value chain options could be **Eco-tourism** and **Hospitality** (homestays, cultural experiences), Small scale organic farming (Spices, Herbs etc.), beekeeping and honey production, dairy and livestock farming, making of sal-leaf plates, mushroom cultivation, horticulture (fruit-bearing trees, mushroom, medicinal plants, herbal plants). However, the choice of suitable livelihood options will depend on factors including such as the availability of spare land, access to forest resources, marketability, community preferences etc.

The central focus of the Project is to help **2,500 small tea growers and 2,500 tea garden workers** from three tea gardens in Darjeeling, Kalimpong, and Jalpaiguri districts meet their energy needs. Resources are being invested in raising community awareness about alternative sustainable livelihood options using an ecosystem approach to enhance their resilience to future challenges. Among the targeted 5,000 families (including both tea garden workers and small tea growers), some risk-takers are emerging to explore and adapt new livelihood avenues on a small scale with assured markets. Their success stories inspire others to explore alternate livelihood opportunities.

SwitchON Foundation registered as the Environment Conservation Society, has grown as a dynamic, award-winning not-for-profit, working across four major verticals – **Clean Energy, Climate Smart Agriculture, Skilling, and Just Transition & Environment, and Climate Change**. We have expanded our focus from farmer livelihood development in India by promoting renewable energy solutions, organic farming practices, and farmer-producer organizations using regenerative agriculture promotion, to upskilling and capacity building, empirical research, policy advocacy, and dissemination of information.

1.2 OBJECTIVES

- OBJECTIVE- 1:** Enhanced awareness of tea garden communities and stakeholders regarding energy requirements and appropriate technology solutions towards enhancement of living conditions and diversified livelihood.
- OBJECTIVE- 2:** Facilitating ecosystem around renewable energy solutions and associated resilient livelihood value chains to ensure access to schemes, credits, technology inputs and market (including job market) across the value chains.
- OBJECTIVE- 3:** Improved living conditions and diversified income earning opportunities of the tea garden communities through improved access, capacity and skill development and adaptation around renewable energy solutions and associated livelihood value chains.

1.3 THE PROJECT STRATEGY

1. Conduct research for needs assessment
2. Identify and source of appropriate technologies
3. Build skills and capacity around technology and processes and
4. Establish an ecosystem that connects stakeholders across the value chain.

1.4 PURPOSE OF THE BASELINE STUDY:

The primary objectives of the baseline study are to comprehensively assess the current state and status of awareness, engagement, and resource utilization among tea garden workers and small tea growers in Darjeeling, Kalimpong and Jalpaiguri districts of West Bengal.

The baseline study addresses the following broad objectives:

- **Awareness and Knowledge:** Assess the current level of awareness and identify knowledge gaps among tea garden communities and stakeholders regarding energy requirements and suitable technology solutions for enhancing living conditions and livelihoods.
- **Ecosystem Gaps:** Identify existing ecosystem gaps related to renewable energy solutions and associated resilient livelihood value chains, including access to schemes, credits, technology inputs, and market opportunities.
- **Living Conditions & Income Opportunities:** Evaluate the living conditions and income-generating opportunities of tea garden communities and their capacity and willingness to adapt to renewable energy solutions and associated livelihood value chains.

1.5 PROJECT AIM:

- Evaluate the **level of awareness** and association with Distributed Renewable Energy (DRE) utilities for improving living conditions and livelihoods
- Assess the **extent of community engagement** in diversified livelihood activities, particularly among youth and women
- Examine **asset ownership** and **socio-economic** participation of women
- Analyse the **level of linkages** with **market traders** for livelihood products
- Evaluate the **extent of interaction** with **external stakeholders** for resource linkages.



1.6 EXPECTED OUTCOMES

1. Increased awareness in at least 80% of the intervention community to recognize the potential of renewable energy-based technology solutions in improving their existing livelihood and living conditions (health, education, water, safety, and security).
2. Heightened awareness among at least 60% of the intervention community regarding sustainable livelihood practices within an ecosystem approach, including the interlinkages between technology, schemes, finance, production chains, and markets.
3. Voluntary enrollment of at least 40% individual households in the intervention community will voluntarily enroll in livelihood enhancement and/or diversification plans, which include training and or resource linkages for infrastructure development.
4. Community institutions to assume responsibility in initiating resource linkages (schemes, finance, and technology).
5. 40% employment uptake of youth in tea garden worker communities about the prospect of green jobs as a viable livelihood option within and beyond the tea garden region.
6. Access (scheme, credit, technology) to and adoption of renewable energy-based technologies by at least 40% the intervention community to enhance their living conditions.
7. Access (scheme, credit, technology) to and adoption of renewable energy-based technologies by at least 40% the intervention community to enhance scope of associated livelihood value chains.
8. Proactive participation of at least 50% women across the livelihood value chains embraced by the community.
9. Community institutions will function as nodal points for market and customer linkages, leading to optimal pricing.
10. Stakeholder agencies will adapt policy and implementation guidelines to facilitate seamless resource and market linkages, enabling the replication of successful models in other tea gardens in the region.



2. Methodology

The Baseline study employed a mixed-methods approach, combining quantitative and qualitative techniques to comprehensively assess the current status of key indicators.

i. Quantitative Data Collection and Analysis:

Household Surveys: Conducted structured surveys with a representative sample of households from tea garden communities (Tea Garden Workers and Small tea growers) to assess socio-economic indicators, energy usage patterns, livelihood strategies, and awareness levels.

ii. Qualitative Data Collection and Analysis:

Desk Review: Reviewed existing literature, reports, and data related to tea garden communities, renewable energy, and livelihood interventions in the target districts.

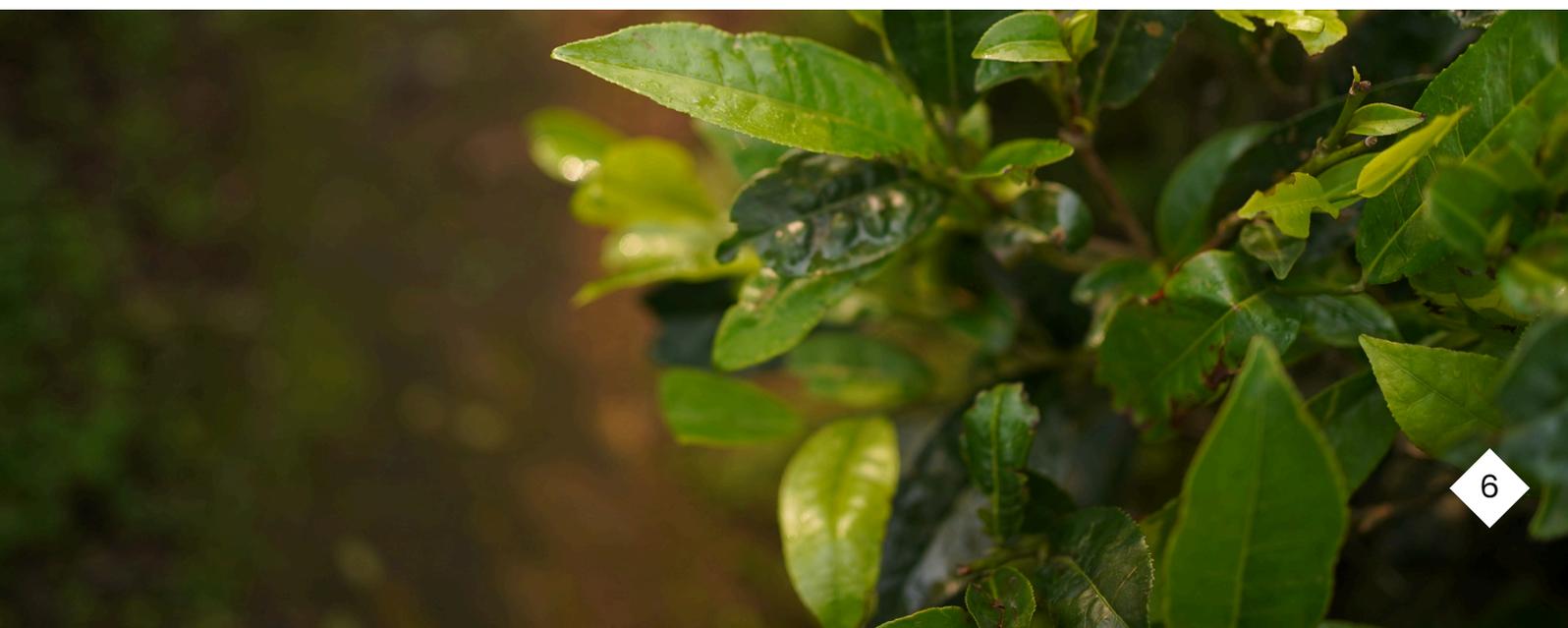
Key Informant Interviews: Conducted interviews with key stakeholders including tea garden workers, small tea growers, community leaders, government officials, and NGOs to understand perspectives, challenges, and opportunities.

Focus Group Discussions (FGDs): Organized FGDs with representatives from different segments of the tea garden communities to gather insights, perceptions, and priorities regarding energy, livelihoods, and technology adoption.

Mapping Exercise: Mapping existing resources, infrastructure, and institutions relevant to renewable energy and livelihoods within the project area.

2.1 SURVEY TOOLS :

- **Household Survey (Interview schedule)** - Tea Plantation Workers, Small tea growers
- **FGD Schedules**- Panchayat, Tea Plantation Workers, Small tea growers
- **KII (Interview schedule)**- Community Leaders, Tea Garden Management, local FPOs, Tea Board and The Confederation of Indian Small Tea Growers Associations (Cista), Darjeeling Planter's Association, Hospital Management at PHC level, CMOH, Authority at Local Schools, DI-Primary and Secondary, Bankers, NGOs (PRERNA- formerly RCDC etc.), KABIL, Sanjukta Vikas Cooperative (SVC), Missionaries, Singell Tea estate (Darjeeling).



2.2 SAMPLING

Based on the objectives of the study and the specific context of tea garden workers and small tea growers in West Bengal's Darjeeling, Kalimpong and Jalpaiguri districts, a multi-stage sampling approach was employed..

Sampling framework:

Selection of Study Areas: Identify representative tea garden communities in each target district based on geographical spread, population size, and diversity of characteristics.

Sampling Units:

- a. Tea Garden Workers: Tea Garden estates within the selected communities.
- b. Small Tea Growers: Small tea grower associations or clusters within the selected communities.

Sampling Method: Use a combination of probability and non-probability sampling techniques:

a. Probability Sampling:

- Random Sampling: Randomly select tea garden estates or small tea grower associations from the list of eligible units.
- Systematic Sampling: Select every nth tea garden estate or small tea grower association from the list.

b. Non-Probability Sampling:

- Convenience Sampling: Include tea garden estates or small tea grower associations that are easily accessible and willing to participate.
- Snowball Sampling: Utilize existing contacts and networks within tea garden communities to identify additional participants.

2.3 PROJECT BENEFICIARIES:

Direct:

- Tea Garden Worker
- Small tea grower (Permanent and Temporary)
- Women and youth

Indirect:

- Government Bodies
- Financial Institutions
- Tea Garden Management
- Small tea growers' association
- CBOs/NGOs/FPOs
- Research Institutions



2.4 SAMPLE TABLE:

Name of the District	Category	HH Interview	FGD	No. of FGD Participants	KIIs
Jalpaiguri	Small Tea Grower	181	4	41	12
	Tea Garden Worker	178	15	169	
Jalpaiguri Total		359	19	210	12
Kalimpong	Small Tea Grower	21	3	35	5
	Tea Garden Worker	14			
Kalimpong Total		35	3	35	5
Darjeeling	Small Tea Grower	6	1	13	3
	Tea Garden Worker	150	3	43	
Darjeeling Total		156	4	56	3
Kolkata	Small Tea Grower	0	0	0	1
	Tea Garden Worker	0	0	0	
Kolkata Total		0	0	0	1
Grand Total		550	26	301	21

2.5 SAMPLE SIZE DETERMINATION:

The sample size was determined by considering factors such as the population size of tea garden workers and small tea growers, the variability within the population, and the desired level of precision and confidence interval for study outcomes. Statistical formulas and guidelines for sample size calculation were employed to ensure adequate representation of the target population was employed.

Sampling Calculation:

Available Data:

Population of Tea Garden Workers (TGW):

150,000 (Darjeeling: 70,000, Kalimpong: 9,000, Jalpaiguri: 71,000)

Population of Small Tea Growers (STG):

23,625 (Darjeeling: 3825, Kalimpong: 104, Jalpaiguri: 19696)

Confidence level:

95% (Z-Score=1.96)

Margin of error:

5% (0.05)

Population Proportion:

50% (Default)

Working formula with finite population correction:

$$n = \frac{Z^2 \times p \times (1-p)}{E^2} \times \frac{N}{N+n-1}$$

Where:

- n = sample size
- Z = Z-score corresponding to the desired confidence level
- p = estimated population proportion
- E = margin of error
- N = population size

The calculated sample size for **Tea Garden Workers (TGW)** is **approximately 369**, and for **Small Tea Growers (STG)** is **approximately 379**. (Rounded off to nearest integer)

Total Population Size Required: **748** (369+379)

Assumptions:

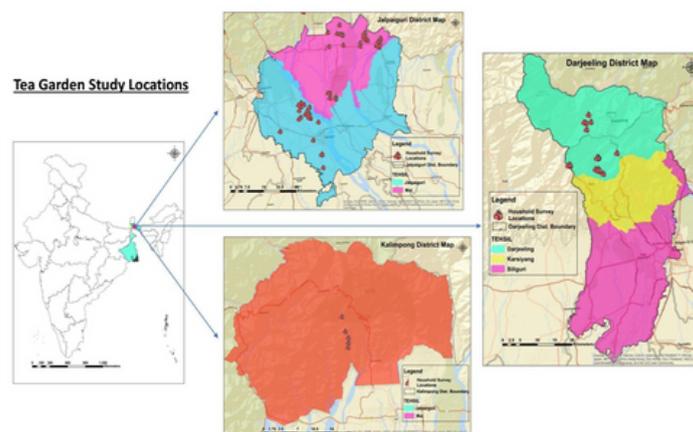
1. Targeted Population per district is proportionate to the actual available population of the district of each category (TGW or STG)
2. Equal weightage is given to Household Survey and FGDs, i.e. 50:50 distribution of sample size
3. Population Distribution of Permanent and Wage TGW is 80:20 % ratio

2.6 DATA COLLECTION:

Standardized data collection methods were implemented, such as surveys, interviews, focus group discussions and observations. Data collection tools were developed for the specific target Groups to ensure accurate and relevant gathering of data.

- i. Household Survey Schedule- This was done through Mobile Data Collection Tool (Kobo Collect). A Total of 550 household interviews were conducted with the Small Tea Growers (STGs) and Tea Garden Workers (TGWs) across the districts of Jalpaiguri, Kalimpong and Darjeeling. .
- ii. FGD Schedule- FGD Schedule was prepared to conduct FGDs with the Sample. A total of 26 FGDs were conducted with 301 participants from the Tea Garden Community.
- iii. KII Schedule- Target specific KII Schedule was prepared for different stakeholders. A total of 21 KIIs were conducted with different stakeholders, starting from Tea Garden Managements, Government officials, NGOs, Labour Unions, Tea Boards, etc.

2.7 STUDY AREA MAP



2.8 DATA ANALYSIS :

The analysis was conducted through a meticulous and multi-faceted approach, integrating both qualitative and quantitative methodologies to ensure a comprehensive understanding of the subject.

Qualitative Analysis:

Data Collection: Qualitative data was gathered through various methods such as interviews, focus groups, KIIs, and observations.

FGDs and KIIs: Transcripts, notes, and responses from FGDs and KIIs were systematically coded and analysed using qualitative analysis software (QDA Miner lite) and manual coding methods. Themes and patterns within the data were identified through coding processes, allowing for the extraction of key insights and narratives.

Once themes and patterns were identified, they were interpreted within the context of the research objectives.

Quantitative Analysis:

Data Collection: Quantitative data was collected through HH surveys (Mobile Data Collection Tool- Kobo Toolbox).

Data Cleaning and Preparation: Raw quantitative data underwent a thorough cleaning process to address any inconsistencies, missing values or outliers and duplicate. Data was then organized and formatted to facilitate analysis using excel.

Statistical Analysis: Statistical techniques such as descriptive statistics were employed to explore relationships, trends, and patterns within the quantitative data.

Visualization: Data visualization techniques such as charts, graphs, and tables were utilized to present quantitative findings in a clear and concise manner.

Finally, qualitative and quantitative findings were integrated to provide a holistic understanding of the subject matter. Triangulation of findings from different data sources was conducted to validate conclusions and ensure reliability.





3. Findings

3.1. PROFILE AND DEMOGRAPHY OF THE RESPONDENTS

Table 1: Type of the Respondent

Type of Respondent	No. of Respondent	% of Respondent
Small Tea Grower	208	37.82%
Tea Garden Worker	342	62.18%
Grand Total	550	100%

Analysis and Observations:

- The household study was conducted with both permanent and temporary small tea growers and Tea Garden workers. The distribution shows that 37.82% of the respondents are Small Tea Growers and 62.18% are Tea Garden workers. This distribution is based on the proportion of their population in three study districts.





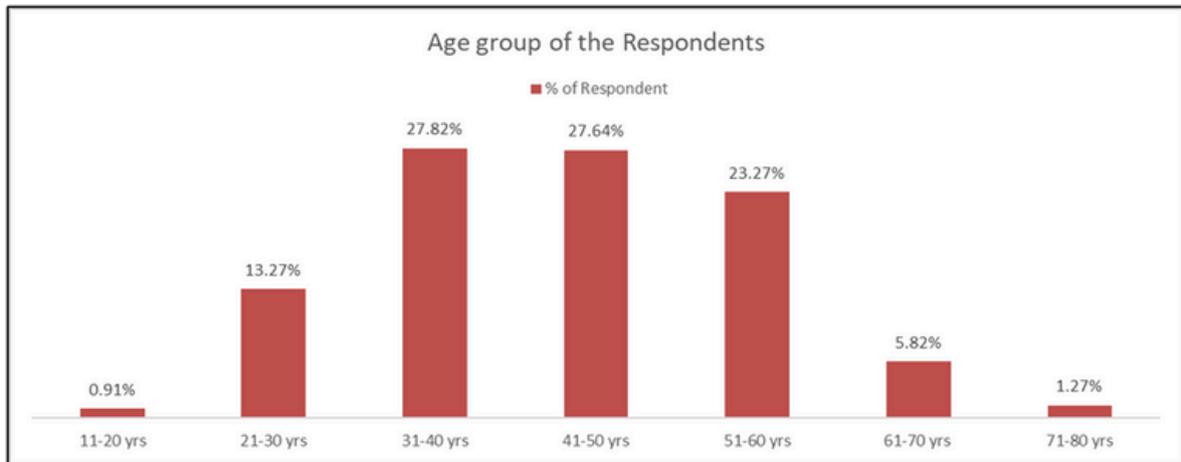


Figure 1: Age Group of Respondents

Analysis and observation:

- The data shows that most of the respondents are 31yrs to 60yrs, which consists of 78.73% of the respondents.



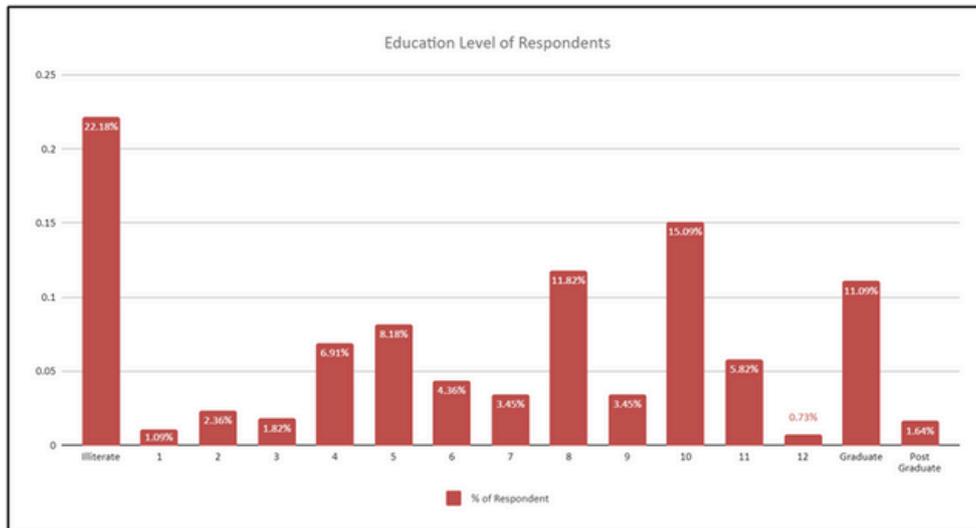


Figure 2: Education Level of Respondents

Analysis and observation:

- The Data shows a very low-level literacy rate among the respondents, 22.18% respondents are illiterate, and 58.55% of respondents have completed Class 10th. Only 11.09% are graduates, and 1.64% are postgraduates.
- The tea garden communities face financial hardships due to low wages, forcing many children to prioritize earning over learning. A lack of awareness about the long-term benefits of education further discourages investment in learning beyond basic levels.



Table 2: District-wise Data

Name of the District	No. of Respondents	% of Respondents
Darjeeling	156	28.36%
Jalpaiguri	359	65.27%
Kalimpong	35	6.36%
Grand Total	550	100%

Analysis and observation:

- The majority of respondents (65.27%) are from Jalpaiguri districts. Darjeeling and Kalimpong together account for 34.72% of the total respondents, with Darjeeling contributing 28.36% and Kalimpong 6.36%.

Table 3: District-wise respondents' details

District	Type of Respondent	No. of Respondents	% of Respondents
Darjeeling	Small Tea Grower	6	1.09%
	Tea Garden Worker	150	27.27%
Jalpaiguri	Small Tea Grower	181	32.91%
	Tea Garden Worker	178	32.36%
Kalimpong	Small Tea Grower	21	3.82%
	Tea Garden Worker	14	2.55%
Grand Total		550	100%



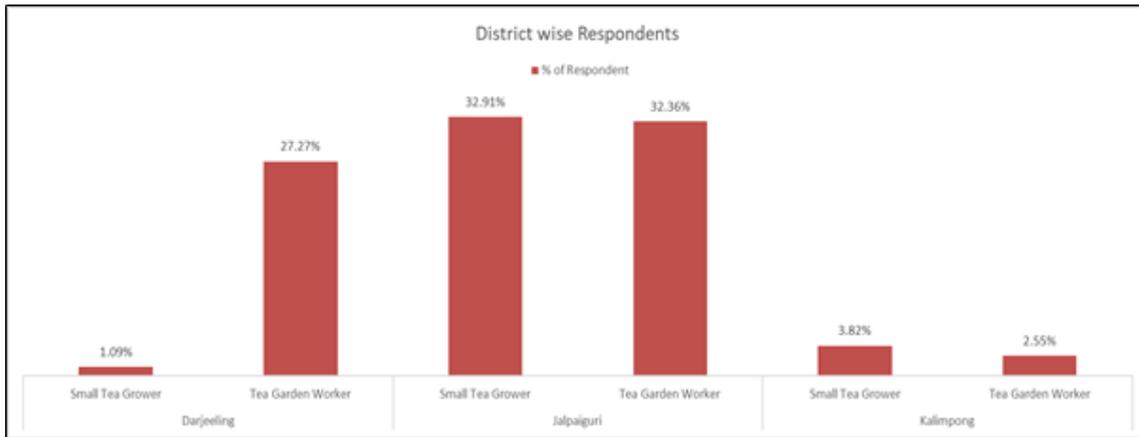


Figure 3: District-wise respondents (cohorted)

The distribution and selection of the Small Tea Growers and Tea Garden Workers are based on the proportion to their populations in the respective Districts.

Analysis and Observations:

- Darjeeling: The majority of respondents (27.27%) are tea garden workers, with a small portion (1.09%) being small tea growers.
- Jalpaiguri: The respondent group is almost equally split between small tea growers (32.91%) and tea garden workers (32.36%).
- Kalimpong: Small tea growers make up 3.82% of respondents, while tea garden workers account for 2.55%.

3.2. INDICATOR SPECIFIC BASELINE STATUS:

Level of awareness of the intervention community to recognize the potential of renewable energy-based technology solutions in improving their existing livelihood and living conditions (health, education, water, safety, and security) is assessed.

Table 4: Level of DRE Tech awareness for Lighting

Level of DRE Tech awareness for Lighting	No. of Responses	% of Respondents
Don't Know	449	81.27%
Knows the Name	99	18.00%
Knows the Scheme	2	0.36%
Knows the Financial Scope	1	0.18%
Have Access	0	0.00%
Is using DRE	1	0.18%

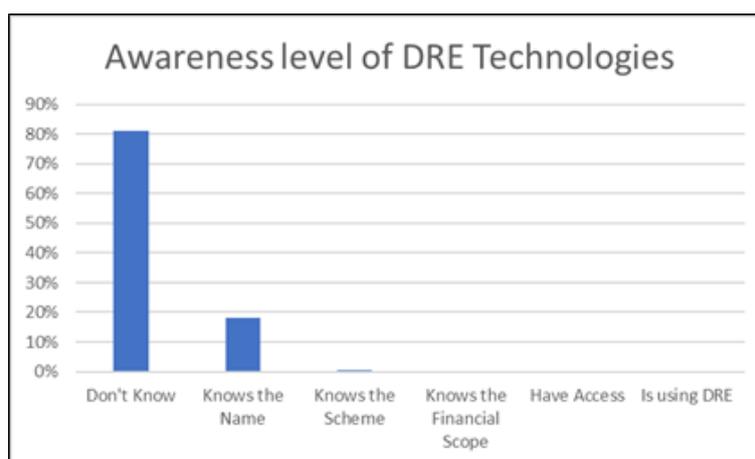


Figure 4: Awareness level of DRE Technologies

Analysis and Observations:

- The majority of respondents (81.64%) indicated that they are unaware of DRE technology for lighting, highlighting a considerable knowledge gap regarding renewable energy solutions.
- 18% of respondents are aware of the name or existence of DRE technology for lighting. While this indicates some level of awareness, it is still relatively low compared to the total number of respondents.
- Only a negligible percentage (0.36%) of respondents mentioned awareness of specific schemes related to DRE technology for lighting, pointing to a lack of familiarity with governmental or organizational initiatives promoting these solutions.
- Only a very small percentage (0.18%) of respondents are aware of the financial aspects or funding opportunities associated with DRE technology for lighting. This suggests a lack of knowledge about potential financial support mechanisms available for adopting renewable energy solutions.
- No respondents reported having access and only one respondent (0.18%) currently using DRE technology for lighting. This indicates a complete absence of adoption or implementation of renewable energy-based lighting solutions among the intervention community.

Table 5: District Segregated Data on Level of DRE Tech awareness for lighting

Level of DRE Techawareness for Lighting	Darjeeling	Jalpaiguri	Kalimpong
Don't Know	99.36%	72.70%	94.29%
Knows the Name	0.64%	27.02%	2.86%
Knows the Scheme	0.00%	0.56%	0.00%
Knows the Financial Scope	0.00%	0.28%	0.00%
Have Access	0.00%	0.00%	0.00%
Is using the DRE technology	0.00%	0.00%	2.86%
Total	100.00%	100.00%	100.00%

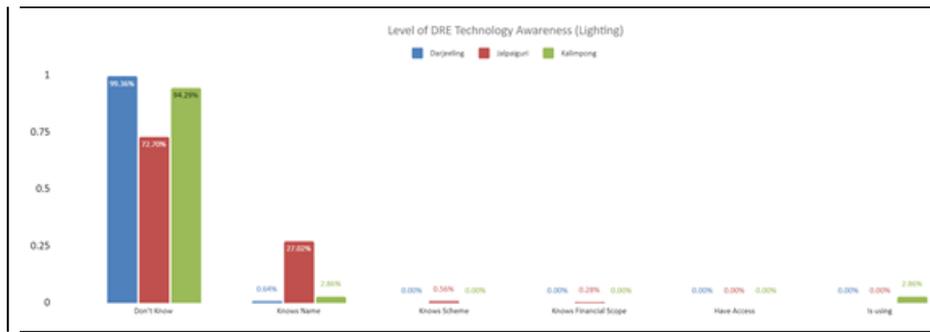


Figure 5: Level of DRE Technology Awareness (Lighting)

Analysis and Observations:

- The District segregated data shows that 27.02% of the respondents from Jalpaiguri knows the name of DRE tech whereas very nominal 0.64% and 2.86% respondents form Darjeeling and Kalimpong respectively know the name of DRE Tech.
- The FGDs shows that most individuals are unaware of renewable energy-based technology solutions. Only a few of them are familiar with the term "solar panel," but lack awareness regarding the financing options, linkages, and schemes associated with these solutions. Some respondents are aware of the Solar Lights and Solar pumps but they are unaware about the technology and schemes. In some villages they have seen Solar street lights funded by Panchayats or MLA funds but these are rare.

Table 6: Sources of Knowledge on DRE Technologies Among Small Tea Growers and Tea Garden Workers

Source of DRE knowledge	No. of Respondents	% of Respondents
Friends or Other Colleagues	78	77.23%
NGO Activities	22	21.78%
Social Media, TV and Others	7	6.93%
Awareness campaigns, Workshops or Training	4	3.96%
Others	1	0.99%

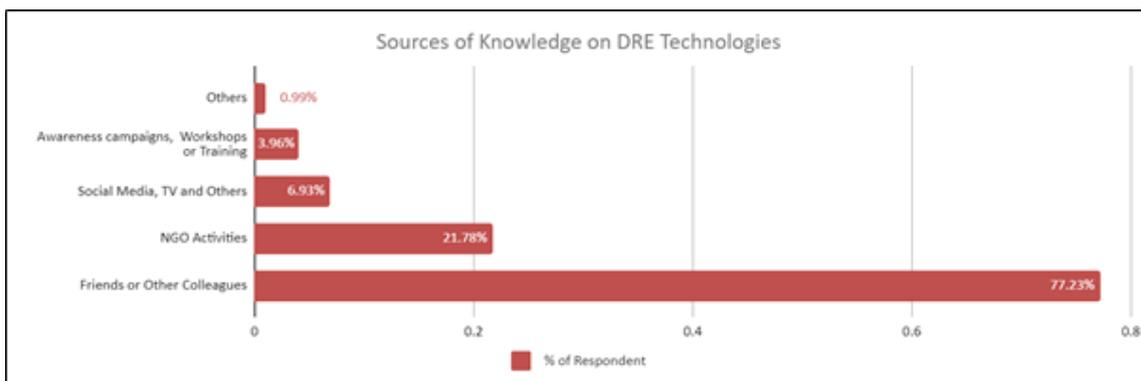


Figure 6: Sources of Knowledge on DRE Technologies

Analysis and observations:

- Out of the 101 respondents who are aware of DRE technologies, the majority acquired their knowledge from friends or other colleagues, constituting 77.23% of the respondents. This indicates that informal networks and peer-to-peer communication play a significant role in disseminating information about DRE technologies within this community.
- NGO activities emerged as the second most common source of DRE knowledge, with 22 respondents or 21.78% citing this as their source. NGOs likely play an active role in conducting awareness programs, workshops, and training sessions, which contribute to raising awareness about DRE technologies among small tea growers and tea garden workers.
- A smaller percentage of respondents, 6.93%, gained knowledge about DRE technologies from social media, TV, and other similar channels. This suggests that while traditional media platforms contribute to awareness, their impact might not be as pronounced as interpersonal networks or organized NGO activities.
- A very small percentage of respondents, only 3.96%, mentioned awareness campaigns, workshops, or training programs specifically as their source of DRE knowledge. This indicates that while these formal initiatives exist, they are not as prevalent or influential as informal networks or NGO activities.
- Only 0.99% of respondents cited 'Others' as their source of DRE knowledge, suggesting that this category represents a marginal and miscellaneous source of information.

FGDs indicate that those who possess some knowledge about Distributed Renewable Energy (DRE) have gained it from their colleagues, the internet, or electronic media sources.

• Level of awareness among the intervention community

Table 7: Awareness on Sustainable Livelihood practices

Response	No. of Respondent	% of Respondent
No	499	91%
Yes	51	9%
Grand Total	550	100%

Analysis and observations:

- The majority (91%) of respondents indicated that they have no knowledge of sustainable livelihood practices that focus on increasing livelihoods while also caring for the environment. This suggests a significant gap in understanding among the respondents regarding the concept of sustainable livelihoods and its integration with environmental conservation efforts.
- Only a small percentage (9%) of respondents reported being aware of sustainable livelihood practices that incorporate renewable energy in the value chain. While this indicates some level of awareness among a minority of respondents, the overall awareness level remains quite low.

Table 8: Percentage of People Engaged in Sustainable Livelihood Practices

Response	No. of Respondent	% of Respondent
No	541	98%
Yes	9	2%
Grand Total	550	100%

Analysis and Observations:

- The majority of respondents (98%) reported that they are not engaged in sustainable livelihood practices. This indicates a low level of involvement within the respondents.
- Only a small percentage (2%) of respondents indicated that they are involved in sustainable livelihood practices. This suggests that while there are some individuals who are actively pursuing sustainable livelihood strategies, they represent a minority within the surveyed population.

Table 9: Adopted Sustainable Practices with Choice of Crop

Response	No. of Respondent	% of Respondent
Doing organic kitchen garden and organic flower	1	11%
Rice	1	11%
Vegetables	7	78%
Grand Total	9	100%

Analysis and Observations:

The Data shows that out of all the 9 respondents who are practicing Sustainable livelihood they are engaged in-

- **Organic Kitchen Gardening:** A very small percentage (11%) of respondents mentioned practicing organic kitchen gardening and growing organic flowers as part of their sustainable livelihood activities. This indicates a focus on organic farming methods and possibly diversification of agricultural activities to include non-traditional crops such as flowers.
- **Rice Cultivation:** Similarly, a single respondent (11%) reported practicing rice cultivation as part of their sustainable livelihood activities.
- **Vegetable Cultivation:** The majority of respondents (78%) mentioned practicing vegetable cultivation as part of their sustainable livelihood activities. Growing vegetables is a common and accessible form of sustainable agriculture, often requiring less land and resources compared to other crops.

FGDs shows that almost all the small tea growers in the hills (Darjeeling and Kalimpong) practice organic farming. The study indicates that in the hills, all plantations are organic. This is because factories exclusively accept organic tea and conduct regular checks on the product. If any farmer uses chemical fertilizers or pesticides, their product would fail the tests. Consequently, the entire community prohibits the use of such substances in any crop to protect the tea from being contaminated, resulting in all products from the hills being organic by default. However they do organic farming they failed to comprehend it as a Sustainable Livelihood Practice, which indicates that there is very less awareness on the understanding of sustainable livelihood practices.

In contrast, in the plains, most small farmers and tea gardens across Jalpaiguri utilize fertilizers and pesticides for tea and other agricultural purposes.

- **Status of voluntary enrolment of individual households in the intervention community**

Table 10: Enrollment in Diversification: Current Trend

Response	No. of Respondent	% of Respondent
No	532	97%
Yes	18	3%
Grand Total	550	100%

Analysis and Observations

- The majority of respondents (97%) are currently not enrolled in any livelihood enhanced and/or diversification Plan. This indicates that a low level of respondents have alternative plans
- Only a small percentage (3%) of respondents indicated that they are currently enrolled/involved in any livelihood enhancement and/or diversification plans.

Table 11: Inspiration for Participation

Response	No. of Respondent	% of Respondent
Self-motivated	9	50%
Family members	9	50%
Grand Total	18	100%

Analysis and Observations

The data shows that out of 18 respondents those who are enrolled into currently enrolled/involved in any livelihood enhancement and/or diversification plans:

- 50% of the respondents are self-motivated and 50 % receive support from family members for their livelihood diversification plans. It indicates that there are no other agencies which are motivating or encouraging the tea garden community to go for alternatives or diversification for their livelihood enhancement.

FGD Insights: The FGD analysis shows that the majority of respondents stated that they are not participating in any livelihood enhancement or diversification plans. Only one group from Rani Nagar, Jalpaiguri, mentioned that 80% of them are engaged in rubber and black pepper cultivation, while 10 farmers from Kalimpong are involved in organic ginger and big cardamom cultivation. Notably, approximately 5.09% of the population surveyed is involved in diversification activities.

- **Status of Community institutions to assume responsibility in initiating resource linkages (schemes, finance, and technology).**

Table 12: Family representation in Community-based Institutions

Response	No. of Respondent	% of Respondent
No	471	86%
Yes	79	14%
Grand Total	550	100%

Analysis and Observations:

- **Lack of Representation:** 86% of respondents indicated that their families do not have a representative in any Community Based Institutions (CBIs). This suggests a lack of direct involvement or representation within community-level organizations or institutions. This insulation from community organizations also correlates to poor awareness about various issues, technologies etc
- 14% of respondents reported that their families do have a representative in CBIs. This indicates that there is some level of participation or engagement with community-based organizations among a subset of respondents.



Table 13: District-wise Family representation in Community-based Institutions

Name of the District	Response	No. of Responses	% of Responses
Darjeeling	No	91	58.33%
	Yes	65	41.67%
Jalpaiguri	No	345	96.10%
	Yes	14	3.90%
Kalimpong	No	35	100.00%
Grand Total		550	

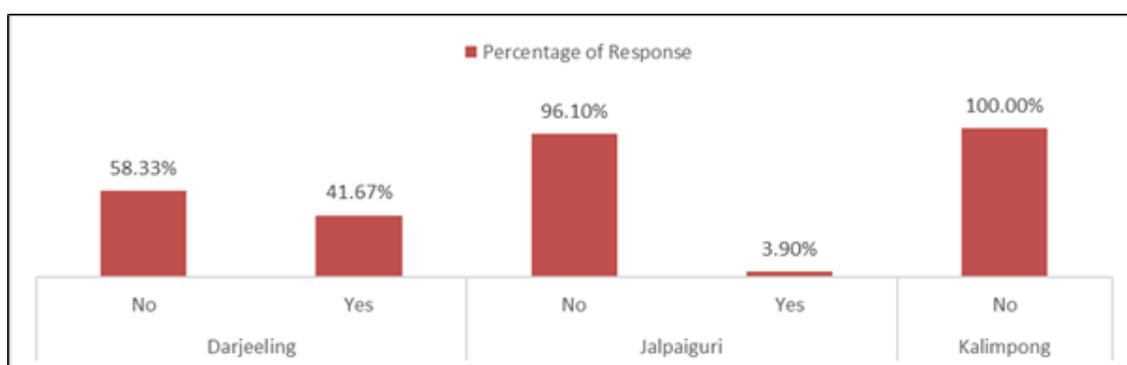


Figure 7: Family representation in Community-based Institutions

Analysis and Observations:

- **Darjeeling:** 41.67% of respondents have a family representative in CBIs.
- **Jalpaiguri:** 3.90% of respondents' families have a representative in CBIs.
- **Kalimpong:** No respondents have a family representative in CBIs.
- **Community Based Institutions (CBIs) helping in marketing of produce**

Table 14: Support for Marketing: CBIs' Role

Response	No. of Respondent	% of Respondent
No	540	98%
Yes	10	2%
Grand Total	550	100%

Analysis and Observations:

- The majority of respondents (98%) indicated that CBIs are not involved in marketing produce or establishing customer linkage. This suggests that most CBIs are not actively involved in facilitating the marketing of agricultural products or establishing connections with potential customers.
- A small percentage of respondents (2%) reported that CBIs are indeed assisting in the marketing of produce and customer linkage. While this proportion is minimal, it indicates that there are some instances where CBIs are actively supporting community members in marketing their agricultural products and establishing links with customers.

Table 15: Respondent’s Perspective on CBI’s Role in Marketing of Produce

Name of the District	Responses	No. of Respondents	%of Respondents
Darjeeling	No	156	100.00%
Jalpaiguri	No	349	97.21%
	Yes	10	2.79%
Kalimpong	No	35	100.00%
Grand Total		550	

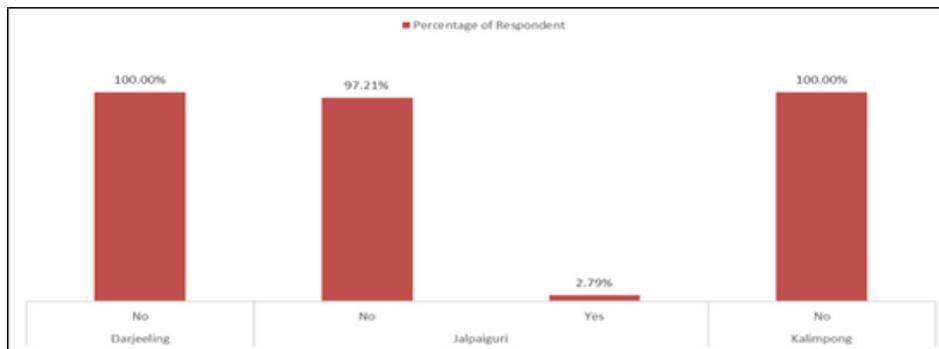


Figure 8: Family representation in Community-based Institutions

Analysis and Observations:

- The District segregated data shows that only 2.79% respondents from the total Jalpaiguri District have said that the CBIs are helping in marketing of produce (including customer linkage). This shows that the very low involvement of CBIs in Market linkages

Table 16: Involvement of CBIs in Adoption of Technology

Response	No. of Respondents	% of Respondents
No	528	96%
Yes	22	4%
Grand Total	550	100%

Analysis and Observations:

- The majority of respondents (96%) indicated that CBIs do not support technology linkage. This suggests that most CBIs are not actively involved in facilitating access to technology or promoting the adoption of technological innovations within the community.
- A small percentage of respondents (4%) reported that CBIs are indeed assisting in technology linkage. While this proportion is relatively low, it indicates that there are some instances where CBIs are actively supporting community members in accessing and adopting technology.

Table 17: Involvement of CBIs in Scheme Linkage

Response	No. of Respondent	% of Respondent
No	535	97%
Yes	15	3%
Grand Total	550	100%

Analysis and Observations:

- The majority of respondents (97%) indicated that Community-Based Institutions (CBIs) are not assisting in scheme linkage. Despite the focus of Community-Based Instruction (CBI) programs on empowering individuals and promoting sustainable livelihoods through training in agriculture, handicrafts, and entrepreneurship, only a small proportion (3%) of respondents reported receiving support from CBIs.

Table 18: Effectiveness of CBIs in Financial Linkages

Response	No. of Respondent	% of Respondent
No	497	90%
Yes	53	10%
Grand Total	550	100%

Analysis and Observations:

- The majority of respondents (90%) indicated that CBIs are not helping in finance/bank linkage. This suggests that most CBIs are not actively involved in facilitating access to financial services or establishing linkages with banks or financial institutions within the community.
- A minority of respondents (10%) reported that CBIs are indeed assisting in finance/bank linkage. While this proportion is relatively low, it indicates that there are some instances where CBIs are actively supporting community members in accessing financial services and establishing linkages with banks.

FGDs shows that the majority of respondents indicated a lack of assistance in resource linkages, with only a few mentioning the involvement of local NGOs, SHG groups, FPOs, and WBSRLM in facilitating resource linkages.

Moreover, most of the respondents shared that there are no such CBIs which are currently involved in initiating resource linkages within their community but in Darjeeling the STGs shared that some SHG Groups, FPOs and WBSRLM are working in resource linkages.

- **Status of employment uptake of youth in tea garden worker communities**

Table 19: No. of youth in the study population

No. of Youth in Houses	No. of Responses	Total No. of Youths
1	175	175
2	147	294
3	47	141
4	13	52
5	4	20
6	1	6
Grand Total	550	688

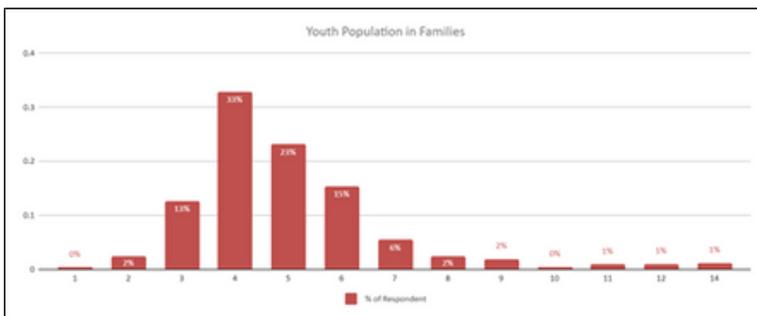


Figure 9: Youth Population in Family

Table 20: Gender-wise distribution of youth education

Gender	No. of Youth	% of Youth
Female	290	42.15%
Male	396	57.56%
Others	2	0.29%
Grand Total	688	100%

Table 21: Educational Status of the Youth

Education Level	No. of Youth	% of Youth
Illiterate	58	8%
1	4	1%
2	8	1%
3	13	2%
4	21	3%
5	26	4%
6	20	3%
7	15	2%
8	65	9%
9	36	5%
10	134	19%
11	33	5%
12	163	24%
Graduate	69	10%
Post Graduate	23	3%
Grand Total	688	100%

Analysis and Observations:

- The majority of youth are currently in grades 10 to 12, representing 48% of the total youth population.
- 24% of youth have completed 12th grade, while 19% have completed 10th grade.
- A significant portion, accounting for 10%, are graduates, indicating a higher level of education attainment.
- A smaller proportion, constituting 3%, have attained post-graduate qualifications.
- A notable portion of youth, 8%, are illiterate, indicating a need for basic education interventions.



Table 22: Gender Segregated- Educational Status of Youth

Educational Level	No. of Girls	% of Girls	No. of Boys	% of Boys	No. of Others	% of Others
1	0	0%	4	1.01%		
2	5	2.39%	3	0.76%		
3	5	2.39%	8	2.02%		
4	9	4.31%	12	3.03%		
5	15	7.18%	11	2.78%		
6	10	4.78%	10	2.53%		
7	6	2.87%	9	2.27%		
8	31	14.83%	34	8.59%		
9	14	6.70%	22	5.56%		
10	60	28.71%	74	18.69%		
11	14	6.70%	19	4.80%		
12	61	29.19%	102	25.76%		
Graduate	25	11.96%	44	11.11%		
Illiterate	22	10.53%	35	8.84%	1	50%
Post Graduate	13	6.22%	9	2.27%	1	50%
Grand Total	209	100.00%	396	100.00%	2	100%

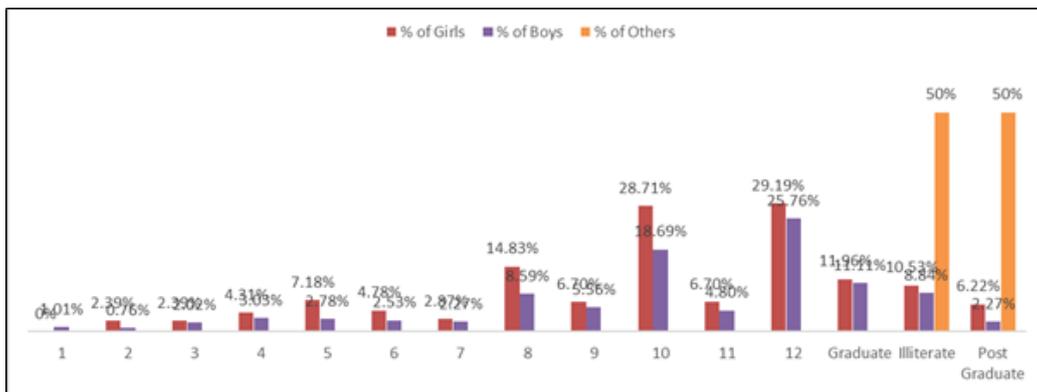


Figure 10: Gender Segregated Education Level

Analysis and Observations:

- The percentage of girls and boys at each educational level provides insights into the gender distribution within each level. The data shows that while at level 1, there are no girls, the percentage of girls gradually increases as the educational level progresses, reaching its peak at level 12 and then slightly decreasing at the graduate and postgraduate levels.
- There are disparities in gender representation across different educational levels. The Data indicates that the percentage of girls is relatively higher compared to boys. Moreover, as the educational level increases, the percentage of girls starts to surpass that of boys, particularly at higher secondary (level 10), senior secondary (level 12), and graduate levels, which indicates that the boys are dropping out after 10th or 12th more compared to girls.

Table 23: Employment Status of the youth

Primary Occupation	No. of Youth	% of Youth
Unemployed	305	44%
Tea Garden Worker (Permanent)	98	14%
Small tea grower	79	11%
Tea Garden Worker (Daily Basis)	64	9%
Daily Labour- Other work	49	7%
Private Employee	38	6%
Others	25	4%
Petty Business	15	2%
Skilled Labour	12	2%
Govt. Employee	3	0%
Grand Total	688	100%

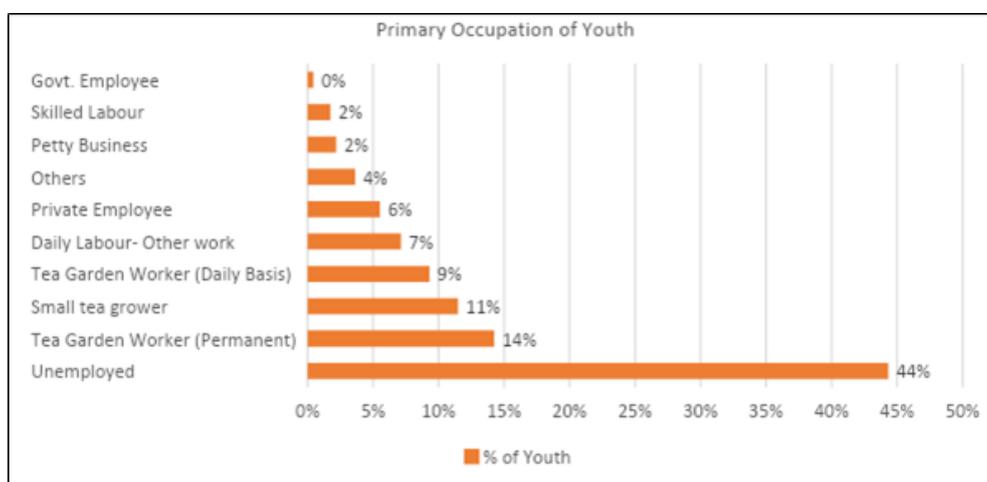


Figure 11: Occupation (Sector) of the Youth

Analysis and Observations:

- A significant portion of youth, comprising 44% of the total, are unemployed, indicating a considerable unemployment rate within the community.
- Tea garden employment, both on a permanent and daily basis, accounts for a substantial portion of youth employment, with permanent workers comprising 14% and daily wage workers comprising 9%.
- Additionally, a notable percentage of youth are engaged in small tea growing, constituting 11% of the total.

- Beyond tea-related occupations, a diverse range of employment opportunities exist for youth within the community. This includes engagement as daily labourers in other sectors (7%), employment in private companies (6%), petty businesses (2%), and skilled labour positions (2%).
- Only a negligible portion of youth, accounting for 0.43% of the total, are employed in government positions.
- The data suggests a prevalence of underemployment, as evidenced by the significant proportion of youth engaged in daily wage labour and petty businesses.
- Additionally, the reliance on tea-related occupations highlights the importance of diversifying employment opportunities to reduce dependency on a single sector.

Table 24: Gender segregated Data- Employment Status of the youth

Proportion of Youth (all) in different jobs	No. of Youth	Total Youth	Proportion of Young males in different jobs	Proportion of Young females in different jobs
Unemployed	305	44%	42%	47%
Others	98	14%	11%	19%
Tea Garden Worker(Permanent)	79	11%	12%	10%
Small tea grower	64	9%	13%	4%
Private Employee	49	7%	8%	6%
Tea Garden Worker (Daily Basis)	38	6%	2%	10%
Daily Labour- Other work	25	4%	5%	2%
Skilled Labour	15	2%	3%	1%
Petty Business	12	2%	3%	
Govt. Employee	3	0%	0%	1%
Grand Total	688	100%	100%	100%





Figure 12: Primary Occupation of the Youth (Gender Segregated)

Analysis and Observations:

- There are notable gender disparities across various occupations. For example, in tea garden worker (permanent) and small tea grower categories, males dominate, with 12% and 13% respectively, while females represent smaller percentages (10% and 4% respectively). Similarly, in private employment, males make up 8%, whereas females represent 6%.
- The data highlights a significant unemployment rate among youth, with 44% of the total youth being unemployed. Within this category, the percentage of unemployed females (47%) is higher than that of males (42%), although the difference is relatively small.

- **Adoption of Solar Lighting and Solar-Powered Systems status**

Table 25: Solar light Maintenance

Response	No. of Respondents	% of Respondents
Not applicable for non-users	549	99.82%
Provider of the solar light	1	0.18%
Grand Total	550	100.00%

Analysis and Observations:

- The majority of respondents (99.82%) reported that they are not using any solar lighting systems. Thus, there is no requirement for any maintenance services. This indicates a low adoption rate of solar lighting technology within the intervention community.
- Only one respondent is utilizing the solar lighting system and reported that the provider of the solar light is responsible for maintenance.
- The data reveals a significant gap between the availability of solar lighting systems and their utilization within the intervention community. Despite the potential benefits of renewable energy-based technologies, such as solar lighting, there seems to be limited uptake among community members.

Table 26: Maintenance of Solar-powered cookstove

Who is maintaining	No. of Respondents	% of Respondents
Not utilizing	550	100.00%
Grand Total	550	100.00%

Analysis and Observations:

- All respondents (100%) reported that they are not utilizing solar cookstoves. This indicates a complete lack of adoption of solar cookstove technology within the intervention community.
- Despite the potential benefits of solar cookstoves (including reduced workload for women and reduced costs of buying fuel wood) in terms of reducing reliance on traditional biomass fuels and mitigating indoor air pollution, there seems to be no uptake of this technology among community members.
- Since none of the respondents reported utilizing solar cookstoves, the question of maintenance responsibility does not apply. However, the absence of utilization implies that maintenance concerns related to solar cookstoves are not currently a priority or relevant issue for the intervention community, but might have to be considered at a future date once utilization starts.

FGDs data shows that

- No access to DRE Solutions
- The main obstacle to accessing Distributed Renewable Energy (DRE) solutions is a lack of awareness.
- Lack awareness about the schemes available for Renewable Energy Solutions.
- Some mentioned that they are aware that, in some villages the solar street lights were put under the Panchayats and MLA schemes.

Operational and Maintenance Challenges of Solar-Powered Agricultural Technologies

Table 27: Maintenance of Solar Pumps/Sprinklers

Response	No. of Respondents	% of Respondents
Not utilizing	208	100.00%
Grand Total	208	100.00%

Analysis and Observations:

- Out of the 208 STGs interviewed, 100% reported that they are not utilizing solar pumps/sprinklers.
- The data reveals a low utilization rate of solar pumps/sprinklers within the intervention community. Despite the potential benefits of these technologies in enhancing agricultural productivity and reducing reliance on fossil fuels, the majority of respondents are not utilizing them.
- The FGDs also support that none of the interviewed STGs use solar pumps/sprinklers.

Table 28: Barriers to Using Solar Pumps/Sprinklers

Response	No. of Respondents	% of Respondents
Don't have Access	208	100%
Grand Total	208	100%

Analysis and Observations:

- The FGDs reveal that none of the interviewed STGs use pumps/sprinklers and it may be attributed to various barriers, no access including affordability constraints, lack of technical knowledge or expertise, inadequate support infrastructure, and perceived risks associated with technology breakdown and maintenance.

Table 29: Maintenance of Solar Sprayers

Response	No. of Respondents	% of Respondents
Not utilizing	550	100%
Grand Total	550	100%

Analysis and observation:

- Among the respondents, 100% reported that they are not utilizing solar sprayers. The data reveals a lack of utilization of solar sprayers within the intervention community. Despite the potential benefits of this technology in reducing labor requirements and increasing efficiency in agricultural spraying, the majority of respondents are not utilizing solar sprayers.
- The FGDs also shows that there is not a single user of Solar sprayers in the surveyed population.

Table 30: Barriers to utilization of Solar Sprayers

Response	No. of Respondents	% of Respondents
Don't have access	550	100%
Grand Total	550	100%

Analysis and Observations:

- All respondents (100%) reported that they do not have access to solar sprayers.
- The data reveals that lack of access is the sole reason for not utilizing solar sprayers among respondents who have access.

FGDs Data shows that

- Almost all of them are not aware of the schemes for Renewable Energy solutions and equipment.
- Almost all of them are unaware of the credit options available for Distributed Renewable Energy (DRE), and none are familiar with the credit institutions offering financing for DRE technology and equipment, nor do they have access to such credit.
- None of them have adopted or utilizing any Distributed Renewable Energy (DRE) solutions or equipment for livelihood.
- From the discussion, lack of awareness and financial constraints emerged as the two primary reasons responsible for the non-utilization of any renewable energy technology.
- **Status of participation of women across the livelihood value chains embraced by the community**

Table 31: Number of women in working age group and number of women in engaged in livelihood value chains

No. of Women in Houses	Number of women in working age group	Number of women in engaged in livelihood value chains	% of Respondents
1	320	156	48.75%
2	158	77	48.73%
3	45	23	51.11%
4	8	0	0.00%
5	15	0	0.00%
Grand Total	546	256	46.89%

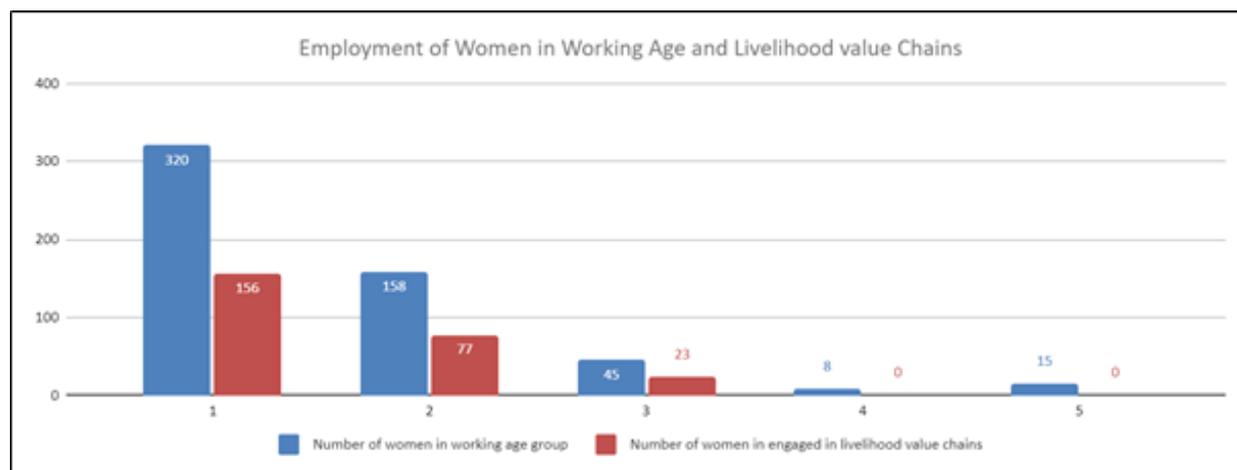


Figure 13: Employment of Women in Working Age and Livelihood value Chains

Analysis and Observations:

- The data shows that out of 546 women in the working age group, 256 are engaged in livelihood value chains. This indicates an overall participation rate of approximately 46.89% of women in the working age group being actively involved in livelihood activities.
- Larger households tend to have a higher number of women in the working age group, which can potentially lead to higher absolute numbers of women engaged in livelihood activities. However, this is not always the case, as evidenced by households with fewer women engaged in livelihood value chains despite not having multiple women of working age.
- The data indicates that, on average, women are almost equally represented in livelihood value chains compared to men, with a participation rate close to 50%. This suggests a relatively equitable participation of women in economic activities within the community, therefore indicating a greater scope and feasibility to engage women in future livelihood activities.

Table 32: Women Workforce Participation in Different Districts

Name of the District	Respondents	Total No. of Working age women	Total No of Women working	%Working
Darjeeling	Small Tea Grower	9	7	77.78%
	Tea Garden Worker	151	47	31.13%
Jalpaiguri	Small Tea Grower	176	73	41.48%
	Tea Garden Worker	192	126	65.63%
Kalimpong	Small Tea Grower	8	3	37.50%
	Tea Garden Worker	10	0	0.00%
Grand Total		546	256	46.89%

Analysis and Observations:

- There's noticeable variation in the percentage of women working across different districts and subsets. For instance, while Darjeeling has a high percentage of women working as small tea growers (77.78%), the percentage drops significantly for Tea Garden Workers (31.13%). This indicates a need for the implementation strategies and intervention plan to have a certain degree of context specificity for it to be successful
- Jalpaiguri stands out with relatively higher percentages of women working across all subsets, Small Tea Growers (41.48%) and Tea garden workers (65.63%).
- Kalimpong shows lower participation of women, particularly from Tea Garden workers' families (0.00%).
- Overall, out of 546 working-age women, 256 are employed, resulting in a total percentage of women working at 46.89%.

- **Status of Community institutions functioning as nodal points for market and customer linkages, leading to optimal setting of prices**

The focus group discussions (FGDs) and key informant interviews (KIs) indicate that there are only few Community Institutions functioning in the targeted study areas. There are only few organizations that are present and they are primarily working in different sectors like scheme linkages (Social Services, Aadhar linkages, entitlements) and not working as nodal points for market and customer linkages. The project needs to have a focus on both building capacities of the community institutions as well as exploring viable areas for them to focus and work on so as to create a meaningful impact on the tea communities.

Findings from the FGDs and KIs revealed that price determination in the tea industry primarily lies with the Tea Board, based on factors like quality and geographic considerations. Quality distinctions include organic versus non-organic, and variations in tea types such as green, black, and CTC. Furthermore, the final price is dictated by the factories purchasing the tea from local Small Tea Growers (STGs).

During the FGDs, it was revealed that factories hold a monopoly over price setting due to their stronghold in the local area. This dominance restricts farmers from seeking alternative factories due to the significant travel expenses involved. Since farmers must sell their leaves by evening on the same day they are harvested, once they arrive at the factories in the afternoon, they are compelled to accept whatever price is offered to them.

When questioned about why they do not lodge complaints with the Tea Board, respondents cited perceived bias among Tea Board officials toward the factories. Consequently, concerns raised by small tea growers (STGs) often go unheard. This indicates a scope for training STG associations and other community institutions on informing policy.



- **Status of Informed policy/implementation guidelines adaptations by stakeholder agencies to facilitate seamless resource and market linkages.**

Existing policies such as the Plantation Labour Act and schemes by the Tea Board of India aim to regulate working conditions and provide support to tea garden workers. However, these policies often lack specificity regarding the needs of small tea growers.

While some stakeholder agencies have made efforts to adapt policies, such as providing training and subsidies for mechanized equipment to small tea growers, these initiatives are often limited in scope and reach. For instance, the implementation of subsidy schemes may face delays due to bureaucratic processes, resulting in challenges for small growers in accessing these necessary resources.

There have been no observed instances of successful policy and guideline adaptations by stakeholder agencies to facilitate seamless resource and market linkages, as reported during the KIIs and FGDs.

In addition to the challenges outlined, it's important to note a significant regulatory gap regarding the classification of tea farming as agriculture in India. Despite its agricultural nature, tea farming is often not officially recognized as agriculture under Indian law. This exclusion has several implications for small tea growers and tea garden workers in these districts.

3.3. SUMMARY OF FINDINGS:

Awareness of Renewable Energy-Based Technology Solutions:

- Alarming, 81% of respondents were unaware of Distributed Renewable Energy (DRE) technologies for lighting, while 18% were only aware of the names.
- The study found that 18% of respondents demonstrated familiarity with renewable energy technologies, such as solar lighting and solar pumps. However, only a negligible 0.18% possessed knowledge of the financial scope associated with these technologies.

General Knowledge Source of DRE Technologies:

- 14.18% of respondents mentioned friends or other colleagues as their source of knowledge on DRE technologies. This indicates that informal networks play a role in disseminating information about renewable energy solutions within the community.
- Whereas 6.18% respondent cited NGO activities, awareness campaigns, workshops, training sessions and others as their source of knowledge on DRE technologies. This suggests limited exposure to formal educational initiatives aimed at promoting renewable energy awareness among small tea growers and tea garden workers.

Awareness of Sustainable Livelihood Practices:

- A staggering 91% of respondents were unaware of sustainable livelihood practices focused on increasing livelihood while caring for the environment.
- Data revealed a limited awareness of sustainable livelihood practices among the community, with only 9% of respondents reporting knowledge in this domain.

Participation in Sustainable Livelihood Practices:

- Only 2% of respondents reported engaging in sustainable livelihood practices, highlighting a stark lack of participation in environmentally friendly activities.
- Of those practicing sustainable livelihood practices, a significant 78% reported growing vegetables as part of their activities.

Renewable Energy Adoption (Solar Cookstove):

- A significant 100% of respondents were not utilizing solar cookstoves, indicating low adoption rates in this area.

Renewable Energy Adoption (Solar Pumps/Sprinklers):

- Almost every respondent does not use any solar pumps or sprinklers, and no respondent was able to state who is responsible for the maintenance of the same.
- Of those not utilizing solar pumps/sprinklers, 63% cited a lack of awareness as the reason, while 37% cited a lack of access.

Renewable Energy Adoption (Solar Sprayers):

- Almost every respondent does not use any solar Sprayers (93%), and no respondent was able to state who is responsible for the maintenance of the same.
- Notably, 100% of respondents lacked access to solar sprayers.

Community-Based Institutions (CBIs) - Representation:

- Only 14% of families had representatives in any Community-Based Institutions, indicating limited involvement in community governance.
- In terms of CBIs assisting in marketing produce, only 2% of respondents reported such assistance.
- Similarly, only 4% of respondents reported CBIs assisting in technology linkage, highlighting a gap in technological support.
- Regarding finance or bank linkage, only 10% of respondents reported CBIs offering assistance in this area.

Number of Women in Working Age Group:

- A detailed breakdown indicated that 46.89% of women in the working age group were engaged in different livelihoods.

Education Level of Youth and Employment:

- The majority of youth surveyed had attained education levels up to Grade 12, with 24% having completed 12th grade and 19% having completed 10th grade.

Youth Employment status is Low:

- A significant portion of youth, comprising 44% of the total, are unemployed, indicating a considerable unemployment rate within the community.
- Tea garden employment, both on a permanent and daily basis, accounts for a substantial portion of youth employment, with permanent workers comprising 14% and daily wage workers comprising 9%.



4. Key Learnings

RECAP OF THE BASELINE FINDINGS

Sl. No.	Indicator	Baseline Status
1	Level of awareness of the intervention community to recognize the potential of renewable energy-based technology solutions in improving their existing livelihood and living conditions (health, education, water, safety, and security).	18% of respondents are aware of the name or existence of DRE technology for lighting. Only a negligible percentage (0.36%) of respondents mentioned awareness of specific schemes related to DRE technology for lighting. Only a very small percentage (0.18%) of respondents are aware of the financial aspects or funding opportunities associated with DRE technology for lighting. Only one respondent is currently using DRE technology for lighting.
2	Level of awareness among the intervention community regarding sustainable livelihood practices within an ecosystem approach, including the interlinkages between technology, schemes, finance, production chains, and markets.	The majority (91%) of respondents indicated that they have no knowledge of sustainable livelihood practices that focus on increasing livelihoods while also caring for the environment. Only a small percentage (9%) of respondents reported being aware of sustainable livelihood practices that incorporate renewable energy in the value chain. Only 2% of respondents reported engaging in sustainable livelihood practices, highlighting a stark lack of participation in environmentally friendly activities.
3	Status of voluntary enrolment of individual households in the intervention community into the livelihood enhancement and/or diversification plan, which includes training and/or resource linkages for infrastructure development.	The majority of respondents (97%) are currently not enrolled in any livelihood enhanced and/or diversification Plan. Only a small percentage (3%) of respondents indicated that they are currently enrolled/involved in any livelihood enhancement and/or diversification plans.
4	Status of Community institutions to assume responsibility in initiating resource linkages (schemes, finance, and technology).	The majority of respondents (86%) indicated that their families do not have a representative in any Community Based Institutions (CBIs). The majority of respondents (98%) indicated that CBIs are not helping in the marketing of produce, including customer linkage. The majority of respondents (96%) indicated that CBIs are not helping in technology linkage. The majority of respondents (97%), indicated that the Community-Based Institutions (CBIs) are not assisting in scheme linkage. The majority of respondents (90%) indicated that CBIs are not helping in finance/bank linkage.
5	Status of employment uptake of youth in tea garden worker communities.	A significant portion of youth, comprising 44% of the total, are unemployed, indicating a considerable unemployment rate within the community. Tea garden employment, both on a permanent and daily basis, accounts for a substantial portion of youth employment, with permanent workers comprising 14% and daily wage workers comprising 9%. Additionally, a notable percentage of youth are engaged in small tea growing, constituting 11% of the total.
6	Status of Access (scheme, credit, technology) to and adoption of renewable energy-based technologies by the intervention community to enhance their living conditions.	The majority of respondents (92%) reported that they are not utilizing solar lighting systems. This indicates a low adoption rate of solar lighting technology within the intervention community. All respondents (100%) reported that they are not utilizing solar cookstoves.
7	Status of Access (scheme, credit, technology) to and adoption of renewable energy-based technologies by the intervention community to enhance scope of associated livelihood value chains.	Out of the 208 STGs interviewed, 84% reported that they are not utilizing solar pumps/sprinklers. A significant portion (16%) of respondents indicated that they are unsure who is responsible for maintaining solar pumps/sprinklers when they break down. The reason for not utilizing, a majority of respondents (63%) cited lack of awareness as the reason for not utilizing solar pumps/sprinklers. A significant portion of respondents (37%) indicated that they do not have access to solar pumps/sprinklers. Among the respondents, 93.82% reported that they are not utilizing solar sprayers.
8	Status of participation of women across the livelihood value chains embraced by the community.	The data shows that out of 546 women in the working age group, 261 are engaged in livelihood value chains. This indicates an overall participation rate of approximately 48% of women in the working age group being actively involved in livelihood activities.
9	Status of Community institutions functioning as nodal points for market and customer linkages, leading to optimal setting of prices.	There are only few organizations that are present and they are primarily working in different sectors like scheme linkages (Social Services, Aadhar linkages, entitlements) but they are not working as nodal points for market and customer linkages.
10	Status of Informed policy/implementation guidelines adaptations by stakeholder agencies to facilitate seamless resource and market linkages.	There have been no instances of successful adaptations of policies and guidelines observed during the KIIs and FGDs that adaptations by stakeholder agencies to facilitate seamless resource and market linkages.

INTERPRETATIONS FROM BASELINE FINDINGS

Awareness Gap:

The study highlights a significant gap in awareness regarding renewable energy-based technologies and sustainable livelihood practices within the community.

Despite some familiarity with technology names, understanding of their financial scope and practical application remains limited.

Low Adoption Rates:

Adoption rates for renewable energy technologies, such as solar lighting, cookstoves, pumps, and sprayers, are notably low, indicating barriers to access or awareness.

There is a clear need for targeted efforts to promote the adoption of these technologies and address barriers hindering their uptake.

Limited Engagement in Sustainable Practices:

The study reveals a lack of participation in sustainable livelihood practices among community members.

While some individuals engage in activities like vegetable cultivation, overall participation remains low, indicating the need for capacity-building initiatives.

Gender Disparities Persist:

Gender disparities persist in representation within Community-Based Institutions and participation in livelihood activities.

Women are under-represented in decision-making roles and face barriers to active participation, highlighting the need for gender-inclusive development strategies.

CBIs' Role and Effectiveness:

Community-Based Institutions play a vital role in providing support and resources to community members.

However, their effectiveness in facilitating market linkages, technology adoption, and access to finance is limited, suggesting opportunities for capacity-building and enhancement.

Importance of Targeted Interventions:

The study underscores the importance of targeted interventions to address awareness gaps, promote technology adoption, and enhance participation in sustainable practices.

Tailored capacity-building programs and awareness campaigns can empower community members to embrace renewable energy technologies and sustainable livelihood practices effectively.

5. Conclusion ---

The baseline study provides valuable insights and status of the indicators, which the project has set to monitor during the project period. This will inform the project team about the progress and results of the interventions in the project phase. By addressing key indicators and implementing targeted interventions, policymakers and stakeholders can support sustainable development and inclusive growth in the tea industry.

The findings underscore the need for holistic approaches that address intersecting challenges and leverage opportunities for sustainable development. Collaboration among stakeholders, including government agencies, NGOs, and community leaders, is essential for driving initiatives aimed at promoting renewable energy adoption, enhancing livelihood opportunities, and fostering gender equality.

In conclusion, the study provides valuable insights and status of the indicators. By addressing existing barriers and leveraging opportunities identified in the study, stakeholders can work towards building resilient and inclusive communities that thrive in the face of socio-economic and environmental challenges.



6. Appendices

1. HH SURVEY INTERVIEW SCHEDULE

HH SURVEY- INTERVIEW SCHEDULE TEA GARDEN STUDY

Research Query (Matching Outcome Harvest)	SL. No.	Probe Question	Options
Basic Information	1	Name of Participant?	Text
	2	Contact No.	Number
	3	Age	Number
	4	Gender	Male Female Others
	5	Education Level (Last Attended degree/class)	Illiterate,1,2,3,4,5,6,7,8,9,10,11,12,Graduate, Post Graduate
	6	Hamlet -Village - Panchayat - Block	Text1-Text2-Text3-Text4
	7	Name of the District	Darjeeling Kalimpong Jalpaiguri
	8	Are you primarily a small tea grower or Tea Garden Worker: (Select One)	Small Tea Grower,Tea Garden Worker (Permanent) Tea Garden Worker (Temporary)
	9	Number of total Family Members	
	10	Number of women in working age group (Above 18 years of Age)	
	11	Number of women in engaged in livelihood value chains	
	12	Number of 15-35 years' old (Youth) Family Members?	
	13	Youth Gender	Male Female Others
	14	Youth Education	Illiterate, 1,2,3,4,5,6,7,8,9,10,11,12, Graduate, Post Graduate
	15	Youth Present Primary Occupation	Unemployed Tea Garden Worker (Permanent) Tea Garden Worker (Daily Basis)Small tea grower Govt. Employee Private Employee Petty Business Daily Labour- Other work Skilled Labour Others
	16	Yearly income of family (INR)?	
	17	Whether the family has representative in any community institution	Yes No
	18	Whether the affiliating community institution is helping in marketing of produce (including customer linkage)?	Yes No
	19	Whether the affiliating community institution is helping in technology linkage?	Yes No
	20	Whether the affiliating community institution is helping in scheme linkage?	Yes No
	21	Whether the affiliating community institution is helping in finance/bank linkage?	Yes No
Drinking Water	22	What is your primary source for Drinking Water?	Tap Water,Borewell/Tubewell, Supplied by Management
	23	Do you have problems/issues with Drinking Water Facilities (Scarcity, Quality, Source)?	Yes (Scarcity issue), Yes (Bad Quality),No
Domestic Lighting & Safety Security	24	Average hours of day-time power cuts/lack of power on a regular day at Household Level?	1-2 hours 2-5 hours 5-10 hours No Power
	25	Average hours of night-time power cuts/lack of power on a regular day at Household Level?	1-2 hours 2-5 hours 5-10 hours No Power

	26	Weekly hours with incidents of interruptions in children's study hours because of night-time power cuts/lack of power (Average Night Study Hours: 3hrs per night)?	Few Minutes 1-2 hours 3-5 hours 5-10 hours >10 hours No Issue
	27	Have you faced issues with service disconnection (due to any reason) in the last 3 years?	Yes No
	28	If Yes, Specify reason	
	29	Is light available everywhere inside/outside the house (including kitchen, courtyard, bathroom)?	Yes No
	30	If no, where is it not available?	
	31	Is the lighting intensity at night adequate for studying at home? (Based on a Std 10X10X10 ft Room)?	Low Intensity (Equivalent 9-10W LED-1 Bulb) Medium Intensity (Equivalent 23-25W LED-1 Bulb) High Intensity (Equivalent 40 W LED- 1 Tube)
	32	Alternative light source in case of power cuts/lack of power?	Kerosene Lantern Candle and Firewood Solar Light Battery Charged Emergency Light
	33	Numbers of other electric equipment you have at home from the list?	Electric Lanterns/Emergency Lamps Mobile Phone Ceiling Fan/Table Fan TV Refrigerator Electric water heater Electric water motor Computer/Laptop Others (Specify):
	34	Level of DRE Tech awareness for Lighting?	Don't Know, Knows Name, Knows Scheme, Knows Financial Scope, Have Access, Is using
	35	If utilizing Solar Lighting-Who's maintaining it if broken down?	
36	If you have access to Solar Lighting and not utilizing-Reason?		
Livelihood enhancement program reach	37	Are you currently enrolled/involved in any livelihood enhancement and/or diversification plan?	Yes No
	38	Who is helping you to make such a plan?	
	39	Do you know about sustainable livelihood practices, which focus on increasing the livelihood while taking care of the environment? (Include Renewable energy in the livelihood value chain)?	Yes No
	40	Are you into sustainable livelihood practices?	Yes No
	41	If yes, what are you practicing?	
	42	Have you received any training/support in existing farm-based Livelihood?	Yes No
	43	If yes, on which topic training have been received?	
	44	If yes, from where training have been received?	
45	On which farm-based value chain (stages of livelihood activities) and associated technologies are you willing to receive training and support?		
Farming-Irrigation	46	Total arable land in Bigha?	
	47	Total land under cultivation in Monsoon in Bigha?	
	48	Total land under cultivation in Winter in Bigha?	
	49	Total land under cultivation in Summer in Bigha?	
	50	Total barren land in Bigha?	

	51	Existing Primary Source of Irrigation?	Rain water Borewell/Tubewell DG Pumps+GW Electric Pumps+GW DG pumps+Stream Water Electric Pumps + Stream Water
	52	Existing annual hiring cost towards Irrigation? (INR Per Person/Pump Basis)?	
	53	Existing annual fuel cost towards Irrigation (Per Bigha Basis)?	
	54	Existing annual maintenance cost towards Irrigation (Per Bigha Basis)?	
	55	Average productivity of Tea (Per Bigha Basis)?	
	56	Average productivity of Spices (Kgs Per Bigha Basis)?	
	57	Average productivity of Horticulture (Kgs Per Bigha Basis)?	
	58	Average productivity of Food Crop (Kgs Per Bigha Basis)?	
	59	If utilizing Solar Pumps/Sprinklers-Who's maintaining if broken down?	
	60	If have access to Solar Pumps/Sprinklers and not utilizing-Reason?	
Farming-Sprayer	61	If utilizing Solar Sprayers-Who's maintaining if broken down?	
	62	If you have access to Solar Sprayer and not utilizing-Reason?	
Farming-Leaf Cutter/Plucker	63	What is the daily average incentive of tea garden workers in peak season? (INR Per Person)	
Smoke Free Cooking/Lighting	64	What is your primary cooking fuel?	Firewood/Charcoal LPG Kerosene Cow-Dung Cake Coal
	65	Cost incurred for Cooking Fuel Per Month (INR)	
	66	If utilizing Solar Cookstove-Who's maintaining if broken down	
	67	If you have access to Solar Cookstove and not utilizing-Reason	
Health	68	Has anyone in your family suffered from any waterborne diseases in the last 1 year?	Yes No
	69	If Yes, Incidence and prevalence of Waterborne diseases among the Working age population?	
	70	If Yes, Incidence and prevalence of Waterborne diseases among Children?	
	71	If Yes, Incidence and prevalence of Waterborne diseases among Senior Citizens in last 1 year	
Non-farm Livelihood Augmentation	72	Mention existing alternative non-farm Livelihood?	Eco-Tourism Small scale Business Apiculture (Honey and Wax) Traditional Crafting Skill based Jobs
	73	Have you received any training/support in existing alternative non-farm Livelihood?	Yes/No
	74	On which value chain training have been received?	No Training Received Eco-Tourism Small scale Business Apiculture (Honey and Wax)Traditional Crafting Skill based Jobs Others
	75	From where training have been received?	
	76	On which non-farm value chain and associated technologies are you willing to receive training and support?	
	77	Do you perceive any barrier or risk in existing non-farm livelihood practice?	Yes No
	78	If Yes, Specify reason	

into monthly salary based Green Jobs	79	Are you aware of employment opportunities related to renewable energy and green jobs?	Yes No
	80	Are you involved in any renewable energy and green jobs?	Yes No
	81	Have you considered pursuing employment opportunities in green jobs?	Yes No
	82	If yes, what are the barriers/challenges you perceive?	
	83	If no, why not considering?	
	84	General knowledge source of Small Tea Growers on DRE technologies	Friends or Other Colleagues Awareness campaigns Workshops Training sessions TV Radio Social media NGO Activities Others
	85	If Others, Specify	
	86	Overall Observations and Feedback?	

2. FGD INTERVIEW SCHEDULE

FGD INTERVIEW SCHEDULE- TEA GARDEN PROJECT

Research Query	SL. No.	Probe Question
Basic Information	1	Total No. of Participants
	2	Profile of the Participants
	3	No. of Male participants
	4	No. of Female participants
	5	Hamlet -Village - Panchayat - Block
	6	Name of the District
Drinking Water	7	Seasonal Source, Quality, Cost (if Any), and Scarcity of Drinking Water at Household level
	8	For getting clean water, do you use any kind of filters? if it requires energy how is it met? A cheaper energy source can make better filtration?
	9	Seasonal Quality and Scarcity of Drinking Water at PHC level
	10	Seasonal Quality and Scarcity of Drinking Water at School Level
	11	If utilizing Solar powered drinking water source, who's maintaining if broken down?
	12	If you have access to solar power drinking water source and not utilizing Reason
Domestic Lighting & Safety-Security	13	What are the average hours of power cuts/lack of power on a regular day at Household Level and is there any seasonal variation in power cuts in your locality?
	14	Weekly days with incidents of interruptions in children's study hours because of night-time power cuts/lack of power
	15	If utilizing Solar Domestic Lighting, who's maintaining if broken down
	16	If have access to Solar Domestic Lighting and not utilizing-Reason
	17	Do you have Lighting in your locality at night
	18	How many incidents of human-animal conflict in dark areas (Anything from Snake to Elephant) in last year?
	19	How many incidents of attack on human dignity/crime (e.g. Molestation of women/children, Snatching of belongings etc.) in dark areas last year?
	20	Do you face additional challenges to meet energy requirements (for domestic/ livelihood related) during monsoons due to storms or heavy rain?

Livelihood enhancement program reach	21	Are you currently enrolled/involved in any livelihood enhancement and/or diversification plan?
	22	Who is helping you to make such plan?
	23	Are you aware of livelihood practises which are environment friendly? (sustainable livelihood practices)? (Include Renewable energy in livelihood value chain)
	24	The livelihood you practise is environment friendly or will it cause any harm to soil, air, water or cause any adverse impact on human or animal life in near future?
	25	If yes,what are you practicing?
	26	Have you received any training/support in existing farm-based Livelihood?
	27	On which value chain training have been received?
	28	From where training have been received?
	29	On which farm-based value chain and associated technologies are you willing to receive training and support?
Farming-Irrigation	30	If utilizing Solar Pump set, Who's maintaining if broken down
	31	If have access to Solar Pump set and not utilizing-Reason
Farming-Sprayer	32	If have access to Solar Sprayer and not utilizing-Reason
	33	Whether community managed renting service of Solar powered Leaf Cutter/Plucker is possible
	34	What are the tea industry related standard working hours for tea garden workers and small tea growers in peak season?
	35	What is the daily average income/incentive of tea garden workers in peak season?
Smoke Free Cooking/Lighting	36	Type, Amount, Source and Cost of Cooking Fuel Per Month?
	37	If have access to Solar Cook Stove and not utilizing-Reason
Non-farm Livelihood Augmentation	38	Barriers and risks involved in propagating existing non-farm livelihood (Scheme, Finance, Market, Political Scenario, Gender Scenario)
	39	Public Demand for DRE Tech. (What are the priority DRE Solutions you prefer to adapt or consider?)
Scope of Rooftop Solar	40	What is the potential scope for implementing rooftop solar? (Both large scale in estate and small scale in Small tea growers' houses)
	41	How are tea estate/managements looking at viability and cost-effectiveness (break-even point) of rooftop solar
	42	What is the potential scope for implementing on-grid rooftop solar? (Efficiency and applicability for BLF)
	43	How are BLF looking at viability and cost-effectiveness (break-even point) of rooftop solar
Others	44	What are the alternative sources of income if any; electrical energy is required for any process involved for these livelihoods- if yes, what is the source (grid, fossil fuel-kerosene, diesel etc, or any others); these alternate cheaper sources can bring enhanced productivity?
	45	For the tea garden sector, what are the energy requirements for different stages (plantation to value-added products), and how it is met? whether a cheaper and low-maintenance energy source can ease the process and bring more profit?



Broad Area	Topic	Probe Questions
Renewable Energy Based equipment- Solar Powered Drinking Water source, Solar Domestic Lighting, Solar Pumps for Irrigation, Solar Sprayer, Solar Insect Traps, Solar powered Leaf Cutter/Plucker, Solar Cook Stove, etc.	Awareness about technology	Level of awareness on the renewable energy-based technology solutions ((Solar panels, biogas systems, micro-hydro systems, etc.) (Renewable Energy Based equipment) aimed at improving living conditions and livelihoods within your community?
		If yes, from where have you learned or been aware about the Renewable Energy technologies and their benefits?
	Access to DRE technology	Access to Renewable Energy Solution (Renewable Energy Based equipment) technology?
		If No, what are the reasons?
	Awareness about scheme	Level of awareness on the schemes for Renewable Energy Solution (Renewable Energy Based equipment)?
		What are the Schemes for Renewable Energy Solution (Renewable Energy Based equipment)?
	Access to scheme	Access to Renewable Energy Solution (Renewable Energy Based equipment) schemes?
	Awareness about Credit	Level of awareness on the available credit for Renewable Energy Solution (Renewable Energy Based equipment)?
		Who are the Credit Institutions (Banks or finance Institutions)
	Access to credit	Do you have access to credit for Renewable Energy Solution (Renewable Energy Based equipment)?
	Adoption/Utilization of DRE	Have you personally used any Renewable Energy Solution (Renewable Energy Based equipment)?
		If yes, under which schemes are you using this Renewable Energy technology?
	Reason for non-utilization	If No, what are the reason for not used any renewable energy technologies?
	Community Institutions and Resource linkages	Who help to initiate resource linkages (Schemes, finance and technology)
		If Others, Specify
	Can you identify any existing community institutions or organizations that are currently involved in initiating resource linkages within your community?	
Scope	Are you interested in adopting Renewable Energy Solution (Renewable Energy Based equipment)?	
Risk	What is the risk associated with the adaptation of Renewable Energy Solution (Renewable Energy Based equipment)?	







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