Verified Carbon Standard

MICROENERGY CREDITS – MICROFINANCE FOR EFFICIENT LIGHTING PRODUCT LINES - INDIA

Document Prepared by MicroEnergy Credits Corporation

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1 PROJECT DETAILS

1.1 Summary Description of the Project

The purpose of this Grouped Project "Microfinance for Inverter LED lamps in India" is to reduce fossil-fuel based electricity consumption in the rural households across India by introducing more energy efficient inverter LED lamps to replace incandescent lightbulbs ("ICLs"). An inverter LED contains a light bulb coupled with a battery system (typically Li-Ion type) such that the LED bulb will operate on mains power supply during availability and will switch to battery power when main supply is not available (for e.g., in a blackout situation). This makes the inverter LED more versatile and useful than a normal LED bulb.

The inverter LEDs distributed under the grouped project will replace ICL lamps in households, which would have resulted in GHG emissions due to usage of ICL. Thus, the grouped project will lead to mitigation in GHG emissions and a range of other sustainable development benefits in the project region (described in section 1.17 below). The distribution of SLS is not mandated by Indian law and the grouped project is a voluntary initiative.

The grouped project will follow the CDM methodology *AMS-II.C: Demand-side energy efficiency activities for specific technologies*, version15.0.

Over the past few years, household consumption of electricity has grown manyfold. This is mainly due to large-scale electrification, increased penetration of consumer appliances, among other factors. Electricity consumption in Indian homes has tripled since 2000, as the percentage of households with access to electricity has increased from 55% in 2001 to more than 99% in 2019 (MoP 2020).[1] Further, estimated space lighting demand in India for residential and commercial sectors are 30.5 GW and 11 GW respectively[2] with projections of steady growth in the coming years. It is predicted that by 2050, the electric energy consumption in India will increase by more than 8 times for residential buildings[3]. Considering this staggering demand in the coming years, energy efficiency in lighting has the potential to achieve tremendous energy savings in residential space in the country.

The overall penetration of LED in India is still at a nascent stage with rural India favoring conventional power guzzlers over CFLs and LED lightbulbs. Other barriers include reluctance to accept change, uncertainty about performance and lack of trust.

The ordinary incandescent bulb is extremely energy inefficient for lighting when compared to LED. An ICL bulb requires 60 watts of power to emit around 715 lumens whereas Inverter LED bulb

[1] https://shaktifoundation.in/wp-content/uploads/2020/10/Residential-EDM-White-Paper.pdf

[2] http://shaktifoundation.in/wp-content/uploads/2014/02/LED-Demand-Aggregation-Roadmap.pdf

[3] (PDF) Residential buildings in India: Energy use projections and savings potentials (researchgate.net)

can emit 900 lumens in 9W and 1200 lumens in 12W. The project instances (PIs) are located within the boundary of India.

The ownership of the grouped project is with Micro Energy Credits Corporation and is being implemented through Microfinance Institutions (MFIs). These partner organizations have made LED sales in across the country.

Micro Energy Credits Corporation (MEC) works with project partners to develop a successful and diversified clean energy-lending program. The clean energy program addresses typical barriers for low-income clients including education, price, finance, and supply and aftersales service. Micro Energy Credits Corp trains project partners to implement the clean energy lending program, as well as a robust and transparent carbon credit monitoring and tracking system to quantify and record the volume of carbon emission reductions created through the clean energy program. The carbon finance is used to expand and sustain the clean energy program through:

- Client education and marketing
- Internal training and capacity building
- On lending funds to local SMEs producing the clean energy products
- Aftersales service and maintenance
- Lowering the interest or principal cost to the client

Audit Type	Period	Program	VVB Name	Number of years
Validation/ Verification	NA	NA	NA	NA
Total	NA	NA	NA	NA

1.2 Sectoral Scope and Project Type

The applied methodology is a small scale methodology - AMS-II.C.: Demand-side energy efficiency activities for specific technologies; Version: 15.0;

Sectoral scope: 03 Energy Demand

The project has also referred to following documents:

- Methodology: AMS-I. D: Grid connected renewable electricity generation; Version 18.0
- Standard: VCS Standard, v4.4
- Methodological tool 21: Demonstration of additionality of small-scale project activities Version 13.1
- Guideline: General guidelines for SSC CDM methodologies Version 23.1

The project is a Grouped Project that includes several Project Instances of the same project activity into one Project Description and Monitoring Report. New instances can be introduced after the initial start of the project with a PI defined as: Distribution of a inverter LED bulb to rural households in India which is the GP Project Boundary and Project Activity batch is a group of such Project Instances. Each Project Activity batch will comply with small scale methodology requirements.

1.3 Project Eligibility

Grouped Project and Project Activity Instances

The GP falls within the scope of the VCS Program as it is in line with the VCS Standard v4.4 section 2.1.1. The Grouped project includes reduction of Carbon Dioxide emissions which is one of the six Kyoto Protocol greenhouse gases included under the scope of VCS program. And the Grouped Projects is supported by a methodology approved under an approved GHG Program by VCS. The project does not involve use of Ozone Depleting Substances, Jurisdictional or nested REDD+ programs and doesn't use a VCS methodology

The project does not fall under the category of excluded projects in Table 1 of the VCS Standard v4.4 and is therefore eligible under the scope of the VCS Program.

Excluded Activity	Applicability
Activities that reduce hydrofluorocarbon-23 (HFC-23) emissions	N/A: The GP reduces GHG emissions due to energy efficiency measures by replacing ICLs with inverter LED at demand side
Grid-connected electricity generation using hydro-power plants/units	N/A: The GP reduces GHG emissions due to energy efficiency measures by replacing ICLs with inverter LED and does not involve generation of electricity.
Grid-connected electricity generation using wind, geothermal, or solar power plants/units	N/A: The GP reduces GHG emissions due to energy efficiency measures by replacing ICLs with inverter LED and does not involve generation of electricity.
Utilization of recovered waste heat for, *inter alia* combined cycle electricity generation and the provision of heat for residential, commercial or industrial use	N/A: The GP reduces GHG emissions due to energy efficiency measures by replacing ICLs with inverter LED and does not involve generation of heat for producing electricity.
Generation of electricity and/or thermal energy using biomass. This does not include efficiency improvements in thermal applications (e.g, cookstoves)	N/A: The GP reduces GHG emissions due to energy efficiency measures by replacing ICLs with inverter LED and does not involve generation of heat for producing electricity.
Generation of electricity and/or thermal energy using fossil fuels, including activities that involve switching from a higher carbon content fuel to a lower carbon content fuel	N/A: The GP activities do not include the generation of electricity and/or thermal energy using fossil fuels, including activities that involve switching from a higher carbon content fuel to a lower carbon content fuel.
Replacement of electric lighting with more energy efficient electric lighting such as the replacement of incandescent electrical bulbs with CFLs or LEDs	N/A: This exclusion is applicable for large scale project whereas the GP involves small scale project instances.
Installation and/or replacement of electricity transmission lines and/or energy efficient transformers	N/A: The GP activities do not include the installation and/or replacement of electricity transmission lines and/or energy efficient transformers.

1.4 Project Design

☐ The project includes a single location or installation only

☐ The project includes multiple locations or project activity instances, but is not being developed as a grouped project

☒ The project is a grouped project

Eligibility Criteria

Each project lamp i.e., inverter LED is considered as 1 Project activity instance and for the inclusion of new PIs, the project proponent shall ensure that it meets the eligibility criteria set out in section 2.2 of the methodology AMS II.C and clause 3.6.16, 3.6.17 and 3.6.18 of the VCS Standard v4.4 as tabulated below (Table 2).

Table 2: Eligibility criteria for inclusion of PIs

S. No.	Eligibility criteria for the inclusion of new project activity instances	How the new instances will comply	How the PI in a Project Activity batch is complying and Evidences
1	Project Instances (PIs) must meet the applicability conditions set out in the applied methodology.	Only those PIs which will meet the applicability conditions set out in the methodology AMS II.C "Demand-side energy efficiency activities for specific technologies; Version: 15.0" shall be included.	PI is compliant with the applicability conditions set out in the applied methodology AMS II.C as demonstrated in Section 3.2 of this project description. Please see details below
Applicability of methodology AMS-II.C			
1a	This methodology comprises activities that involve the installation of new, energy-efficient equipment (e.g. lamps, ballasts, refrigerators, motors, fans, air conditioners, pumping systems, and chillers) at one or more project sites. Retrofit as well as new construction (Greenfield) projects are included under this	The grouped project involves dissemination of new, energy-efficient equipment (i.e., lamps) in India. The grouped project is a greenfield project and will follow General guidelines for SSC CDM methodologies for determining the baseline scenario.	Project instances under the grouped project entail dissemination of more energy efficient inverter LED lamps to replace incandescent lightbulbs ("ICLs") across India. The grouped project is a greenfield project and will follow General guidelines for SSC CDM methodologies for

	methodology. In the case of new construction projects, a stepwise approach is indicated for determining the baseline under the General guidelines for SSC CDM methodologies.		determining the baseline scenario. **Evidence:** Manufacture's specifications and distribution records.
1b	This methodology is only applicable if the service level (e.g. rated capacity or output) of the installed, project energy-efficient equipment is between 90% and 150% of the service level of the baseline equipment.	Service level for lighting equipment is light output as stated in the applied methodology. The lumen output of the project LEDs would be between 90%- 150% of the lumen output of the baseline lamps thus fulfilling this applicability criteria. However, as per criteria 1g of this table since the total light output of a project lamp should be equal to or more than that of the baseline lamp being replaced, only Service level between 100% and 150% shall be considered.	New LEDs under project activity batch will replace existing incandescent lamp (ICL) eg. 60 W (715 ln) and 70 W (865 ln) with similar output LED lamps eg. 9W LED and the baseline lamp of wattage 75W (940 ln) may be replaced against 12W LED which meets methodology service level requirement. **Evidence:** Manufacturer's specification and Service level configuration tab in ER calculation sheet presented for this Project Activity batch.
1c	Requirements pertaining to the baseline of the retrofit projects and projects involving capacity increase are indicated in paragraphs 20 to 21 in the above cited general guidelines to SSC CDM methodologies.	The project instance is retrofit of LEDs in rural households of India. The project will follow the requirements pertaining to baseline in para 20-21 of the SSC CDM meth v23.1	The project instance is following the methodology specific guidelines for baseline and project emission calculation.

		for all instances included to GP.	**Evidence:** ER calculation sheet
1d	If the energy-efficient equipment contains refrigerants, then the refrigerant used in the project case shall have no ozone depleting potential (ODP).	The project does not involve equipment that contains refrigerants.	The PI does not involve equipment that contains refrigerants. **Evidence:** Manufacturer's specification
1e	This methodology credits emission reductions only due to the reduction in electricity and/or fossil fuel consumption from use of more efficient equipment. However, the calculation of project emissions shall include any incremental emissions, as compared to the baseline, associated with refrigerants used in the project equipment.2	The PIs developed under present GP shall claim emission reductions only due to the reduction in electricity consumption from use of more efficient lighting equipment. As there are no refrigerants involved, incremental emissions associated with refrigerants is not applicable.	The PI is claiming emission reductions only due to the reduction in electricity consumption from replacement of LEDs with ICLs. As there are no refrigerants involved, incremental emissions associated with refrigerants is not applicable. Evidence: Manufacturer's specification and ER calculation sheet.
1f	The aggregate energy savings by a single project may not exceed the equivalent of 60 GWh per year for electrical end-use energy efficiency technologies. For fossil fuel end-use energy efficient technologies, the limit is 180 GWh thermal per year in fuel input.	The SSC capacity limit applies to the methodology used. Therefore, no project activity batch shall exceed the applicable SSC limit which is 15 MW or 45 MW_{th} for Type I projects (not applicable), 60 GWhe/y or 180 GWh_{th}/y for type II projects, and 60,000	The aggregate energy savings by this first project activity batch, i.e. energy savings from energy efficient bulbs distributed in this grouped project, are below 60 GWhe/y of the type II project limits (refer section 3.2 for SSC limit calculation). Further as per VCS standard v 4.3 para 3.5.14 each LED bulb (Project

		t/y for type III projects (not applicable).	activity instance) will have an energy saving of less than 1% of 60 GWh limit (average 0.171 MWh/LED). **Evidence:** Manufacture's specifications, distribution records and Emission reductions spreadsheet.
1g	For both residential and commercial applications, the project shall explain the proposed method of distribution of project lamps and how collection (e.g. exchanged for project lamps) and destruction of baseline lamps will be conducted and documented.	The Project activity batch shall involve distribution of the LED to only those households which exchange old ICLs and will be subsequently destructed. Agreement with collection and distribution agency or any other document/ time stamped video etc. to demonstrate compliance with this applicability criteria	The first Project activity batch involves exchanging ICLs at households itself. The collected ICLs shall be accounted and send for destruction to a contracted agency. A time stamped video of the destruction event will be shared with the verifier. To eliminate double counting of emission reductions due PI, the project proponent will sign a contract with the LED manufacturer, which restricts the claim on carbon credits to the project proponent only. **Evidence:** Contract between project proponent and LED manufacturer and video while destructing the baseline lamps Video conferencing with the VVB while distribution of lamps to sample HHs under the first project

			activity batch has been done.
1h	The total light output of a project lamp should be equal to or more than that of the baseline lamp being replaced; light output of the baseline and the project lamp shall be determined in accordance with relevant national or international standard/s	The LED with equivalent or more light output shall be used to replace baseline lamps. The Wattage and lighting output of ICLs shall be referred from Table 2 of the methodology.	The PI is a 9W inverter LED. The total light output of project lamp is more than that of baseline lamps. The light output of project lamp is as per manufacturer's specification and for baseline lamps values provided in table 2 of the methodology AMS II.C has been used. Also, the project activity batch may replace the baseline lamps of wattages 60 W (715 ln) and 70 W (865 ln) with similar output LED lamps eg. 9W LED and the baseline lamp of wattage 75W (940 ln) may be replaced against 12W LED which meets methodology service level requirement. **Evidence:** Manufacturer's specifications which comply with BEE standard are used for lighting output and Wattage of LED bulbs
1h	The rated average life of each project lamp type shall be known ex ante and reported. Manufacturer specifications shall be used to determine the rated average life. The project shall cite the standard used by the manufacturer.	The rated average lifetime of the project lamp shall be known ex-ante and reported in relevant project documents of each PI. In addition, the standard used by the	The rated average lifetime of the project lamp distributed under Project Activity batch is 25,000 hrs. The standard used by the manufacturer for determining rated average

		manufacturer for determining rated average life shall be mentioned.	life of both types of project lamps is the relevant BIS standard. **Evidence:** Manufacturer's specifications provide evidence of rated average life of project lamps.
1i	The project lamps utilized under the project activity shall, in addition to the standard lamp specifications, be marked for clear unique identification for the project. The method to meet this requirement includes, but is not limited to, the following: (a) Permanent marking of project number and name on each of the project lamps along with other specifications; (b) Marking using special codes, for example each project is permanently marked 'for CDM project, not for sale/resale' followed by project specific marking/labelling; (c) Other forms of identification using communication technologies (e.g. GPS, mobile phone networks) or lease/rental payment	Each recipient of LED will be identified by a specific geographical location, customer name and Serial number of the electricity meter. The project Manager will maintain this database with complete details such as name of the customer, address/ description of location, Adhaar card details and contact telephone number(s). This will help in identifying unambiguously the recipient of new equipment distributed under the project activity. In addition, as required by the applied methodology, each of the LEDs distributed under this GP shall be marked with a logo designed by PP for unique identification.	Each of the LED bulbs that will be distributed under this GP will be marked with the VERRA project ID number, logo and "Not for sale" to avoid double counting. In addition, for every LED distributed, geographical location, name, address, meter serial no. etc will be recorded and maintained in database. **Evidence:** Photo of LED with above specifications and distribution database
1j	The project activity shall be designed to limit undesired secondary market effects	To make sure that the replaced lamps are collected and	All project lamps (PI) replaced under Project activity batch will be

	(e.g. leakage) and free riders by ensuring that replaced lamps are collected and destroyed. Further project participants are required to undertake at least one of the following actions: (a) Directly installing the project lamps; (b) Charging at least a minimal price for efficient lighting equipment; (c) Restricting the number of lamps per household distributed through the project activity to six.	destroyed steps as per 1f of this table will be followed.	collected and destroyed. Moreover, the destruction of baseline lamps will be monitored. Further, the number of lamps distributed per household for the project has been restricted to six. **Evidence:** Agreement with agency responsible for collection, destruction and recycling of baseline lamps.
1k	The households receiving project lamps are connected to a national or regional electricity grid.	The household receiving the project lamps are connected to national grid.	The region where the LEDs are distributed, a report on the grid connectivity in that region will be shared with VVB. Further, LEDs are distributed only to those HHs which have an electricity meter installed. Electricity meter number will be recorded by the project proponent during distribution of the project lamp at each household. **Evidence:** Distribution database.
1l	Whether the project lamps are directly installed or not directly installed, the project shall define actions to be taken to encourage the project lamps being installed in locations within the residences where the utilization hours are relatively	The project proponent will educate the project lamp recipients of the best uses for project lamps to encourage uptake and use of project lamps.	The project proponent is directly installing the lamps at locations within the residences where the utilization hours are relatively high. Also, PP is educating the project lamp recipients of the best uses for project lamps to

	high, for example common areas. For project lamps not directly installed, these actions can include educating the project lamp recipients of the best uses for project lamps.		encourage uptake and use of project lamps. **Evidence:** The sample distribution of lamps was shown to the VVB through video conferencing for best practices followed by PP.
2	Occur within one of the designated geographic areas specified in the project description.	New project activity instances will be located within the geographic boundaries of India. The new Project Instances geographic location will be defined in the monitoring reports.	The Project Instances in first Project Activity batch are located in rural regions across India. **Evidence:** Project database (distribution record) with contact details of HHs
3	Be eligible for crediting from the start date of the instance through to the end of the project crediting period (only).	Each PI within this GP shall be eligible for crediting from its start date through to the end of the project crediting period (only).	The project is eligible for crediting from start date, which is 01-05-2021. **Evidence:** Distribution Database shared with VVB
4	Have evidence of project ownership, in respect of each project activity instance, held by the project proponent from the respective start date of each project activity instance (i.e., the date upon which the project activity instance began reducing or removing GHG emissions).	New PIs will demonstrate ownership by the project proponent, from the start date of the PI.	Project ownership, as described in Section 1.7 of this document, is applicable to all PIs included in this GP. For each PI the end user will sign the title transfer form releasing all rights to GHG emission generated from the PI which is the property of the PP.

			Evidence: Sample Title transfer forms signed by end user submitted to VVB
5	Have a start date that is the same as or later than the grouped project start date.	Only PIs having a start date that is the same as or later than the GP start date will be included in the GP. The start date of GP is the date of distribution of first unit as per section 1.8 of this document. And subsequent additions will have start date after GP start date only.	The start date of project is 01-05-2021 (start date of distribution of first LED bulb (PI) under the project Activity batch) which is same as the start date of the Grouped Project. **Evidence:** Distribution database
6	Use the technologies or measures specified in the project description.	Only LEDs that confirm with the GP description are to be distributed in the project. Only PIs with service level (e.g. rated capacity or output) between 100% and 150% of the service level of the baseline equipment shall be included.	The manufacturer's technology description. The 60 W (715 In) and 70 W (865 In) ICLs can be replaced with similar output LED lamps eg. 9W LED and the baseline lamp of wattage 75W (940 In) may be replaced against 12W LED. **Evidence:** manufacturer specification
7	Apply the technologies or measures in the same manner as specified in the project description	The LED bulbs distributed will adhere to the GP description and shall replace inefficient ICLs.	a) The manufacturer's technology description describes the applicability of the technology to the PI to

			be distributed under the GP. b) The ICLs are being replaced with equivalent lumen LEDs This information will be stored in the monitoring and data collection database. **Evidence:** manufacturer specification and distribution database
8	Are subject to the baseline scenario determined in the project description for the specified project activity and geographic area.	All new PIs will be implemented only in regions within the geographic borders of India subject to the same baseline scenario determined in Section 3.4 in this report.	a) GPS/location data captured from each end user will demonstrate the location of the project. b) Baseline shall be recorded during distribution of the LEDs This information will be stored in the monitoring and data collection database which shall be used to confirm that the ICLs are replaced with energy efficient LEDs and are distributed within the geographic boundary of India. **Evidence:** Distribution database
9	Have characteristics with respect to additionality that are consistent with the initial	The PIs added to this GP shall comply with all the additionality	The project is additional and is described in section 3.5 of this document.

	instances for the specified project activity and geographic area.	conditions listed in section 3.5 and should be clearly defined in the joint PD&MR or subsequent standalone MRs.	**Evidence:** An investment analysis sheet to prove the additionality of the PI shall be submitted to the VVB.
10	Where a capacity limit applies to a project activity included in the project, no project instance shall exceed such limit. Further, no single cluster of project activity instances shall exceed the capacity limit, determined as follows: • Each project activity instance that exceeds one percent of the capacity limit shall be identified. • Such instances shall be divided into clusters, whereby each cluster is comprised of any system of instances such that each instance is within one kilometer of at least one other instance in the cluster. Instances that are not within one kilometer of any other instance shall not be assigned to clusters. None of the clusters shall exceed the capacity limit and no further project activity instances shall be added to the project that would cause	The SSC capacity limit applies to the methodology AMS II.C used. Therefore, no project instance shall exceed the applicable SSC limit which is 15 MW or 45 MW_{th} for Type I projects, 60 GWhe/y or 180 GWh_{th}/y for type II projects, and 60,000 t/y for type III projects. Further, since the capacity of each bulb (project activity instance) will always be less than 1% of capacity limit there is no need to divide the Project activity instances into clusters.	Each project instance, i.e. energy efficient bulbs distributed in this grouped project have energy savings below 60 GWhe/y of the type II project limits. Further as per VCS standard v 4.3 para 3.5.14 each LED bulb (project activity instance) has an energy saving of less than 1% of 60 GWh limit (i.e 600 MWh). As per section 3.2 of PD the Total Energy savings of each project instance activity batch will be less than 60 GWhe/y. **Evidence:** Manufacture specifications and distribution records

	any of the clusters to exceed the capacity limit.		
11	The PP shall engage with local stakeholders during the project development and implementation processes.	The PP will conduct LSC for a newly identified region before implementation of each Project activity batch i.e. before submission of Monitoring Reports for newly added PIs. The summary of LSC comments shall form part of the MR.	The PP conducted LSC in 21 states across Indian which is the identified geographical region for implementation of first Project activity batch in India. LSC related documents have been submitted to VVB.

1.5 Project Proponent

Organization name	Micro Energy Credits Corporation
Contact person	Sriskandh Subramanian
Title	Technical Director
Address	1201 Alaskan Way Ste 200 WA 98109 Seattle United States of America
Telephone	+91-9999997592
Email	sriskandh@microenergycredits.com

1.6 Other Entities Involved in the Project

Organization name	NA
Role in the project	
Contact person	
Title	

Address	
Telephone	
Email	NA

1.7 Ownership

During the sale of the LED bulbs, the participating households sign an end user agreement which is part of the loan application form or are direct agreements between customer and VPA implementer. The end user agreement has customer information, unique identification number, product details etc. MEC who is project proponent (PP) has a legally binding MoU with VPA implementer which clearly establishes that project ownership is with PP. Both these agreements follow the requirements of para 3.7.1 of the VCS Standard ver4.4 which states the evidence to establish project ownership should be "An enforceable and irrevocable agreement with the holder of the statutory, property or contractual right in the plant, equipment or process that generates GHG emission reductions and/or removals which vests project ownership in the project proponent."

These agreements confirm that the ownership rights of the VERRA project and the carbon assets generated from this project lie with the project proponent. The customer under the End User Agreement "releases all rights to the greenhouse gas reductions and carbon credits produced by the use of the clean energy product in the favour of VPA implementors and agree to not sell or transfer the GHG or carbon credits to any other third party or use these credits for any other purposes". The MoU between VPA implementer and PP also states "VPA implementer has agreed to sell and deliver the carbon credits generated from the sale and use of the product to MEC and the entire legal and beneficial title, all rights to and interests in the carbon credits and the underlying greenhouse gas reductions corresponding to such project transaction will vest with MEC". Sample end user agreement and MoU has been shared with the VVB

1.8 Project Start Date

01-05-2021 (start date of distribution of first LED bulb under the Grouped project and first Project Instance).

1.9 Project Crediting Period

Crediting Period: Renewable

Total number of years: 7 (twice renewable)

Start and End Date: 01/05/2021 to 30/04/2028

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

When completing a draft project description for the purpose of listing on the pipeline as under development, complete the following information; otherwise, delete this text.

The estimated annual GHG emission reductions/removals of the project are:

☐ <20,000 tCO_2e/year

☒ 20,000 – 100,000 tCO_2e/year

☐ 100,001 – 1,000,000 tCO_2e/year

☐ >1,000,000 tCO_2e/year

In all other cases, indicate the scale of the project (project or large project) and the estimated annual GHG emission reductions or removals for the project crediting period.

Project Scale	
Project	Y
Large project	

Year	Estimated GHG emission reductions or removals (tCO_2e)
2021 (01/05/2021-31/12/2021)	11,140
2022	53871
2023	53871
2024	53871
2025	53871
2026	53871
2027	53871
2028 (01/01/2028-30/04/2028)	17,709
Total estimated ERs	352,075

Total number of crediting years	7
Average annual ERs	50,296

1.11 Description of the Project Activity

The Grouped project shall distribute high quality inverter LED bulbs conforming to BIS or BEE standards to rural households across India.

Only Incandescent light bulbs shall be considered for replacement. The wattage of baseline lamps to be replaced as well as decision on the wattage of project lamp to replace a specific wattage of baseline lamp is at the sole discretion of the project Proponent (PP) as long as it is in compliance with applicability criteria set out in the methodology namely the service level (which for lighting projects is light output) of the project equipment being between 90 to 150 per cent of the service level of baseline equipment and the total light output of a project lamp should be equal to or more than that of the baseline lamp being replaced. This ensures a Service level between 100% and 150% shall be considered. It is envisaged that 70W ICL will be replaced with 9W LED. However, at the time of implementation, replacements could differ. Following are the stipulated specifications/features of the LED lamps.

The grouped project will distribute the 9W SunKing™ Inverter Bulb and 12W D.light inverter bulb which is 2 in1 lighting solution designed to provide uninterrupted access to light even during power cuts. The 9W SunKing™ Inverter Bulb LED shines bright at 900 lumens, and the cool white light at a temperature of 6000K evenly lights up the space. The Sun King™ Inverter Bulb is powered by a 2200mAh powerful Lithium-Ion battery and provides one of the best-in-class backup. The bulb provides light with backup of 4 hours during power cuts. On mains power supply, the bulb lights at 900 lumens and the brightness reduces by upto 50% on emergency backup. Designed to operate as a smart bulb, it comes with an inbuilt BMS (Battery Management System) to protect the battery from overcharging. With an auto-charge feature, the inbuilt battery charges automatically while the LED bulb is in use on mains power supply.Technical specifications of the Sun King™ Inverter Bulb are given in the table below:

Technical specification	Value (9W)	Value(12W)
Rated Wattage	9 W	12W
Input Voltage	220-230V, 50 Hz	220-230V, 50 Hz
Battery	2200mAh lithium ion	-
Cycle Lifetime	500+	500
Output Voltage Range	100-300V AC	-
Surge Protection	>=3.5kVA	<=4kVA
Charging Time	8-10 Hours	5-6 hours
Backup time	Upto 4 hours	Upto 4 hours

Holder	B22	-
Colour temperature	6500 K	-
Initial lumen	900 Ln[4]	1200
Baseline lamp rated wattage and lumens	60 W,70W	70W,75W
Service level as compared to baseline lamp	126%, 104%	139%,128%
CRI	>=80	>=80
Power factor	>0.90	>0.90
Rated Life	25,000 hours	25,000 hours

Table 1: Technical specification of project lamps and comparison with baseline lamps

Figure 1 - The project bulb

[4] On AC, backup light output - lumen reduces upto 50%

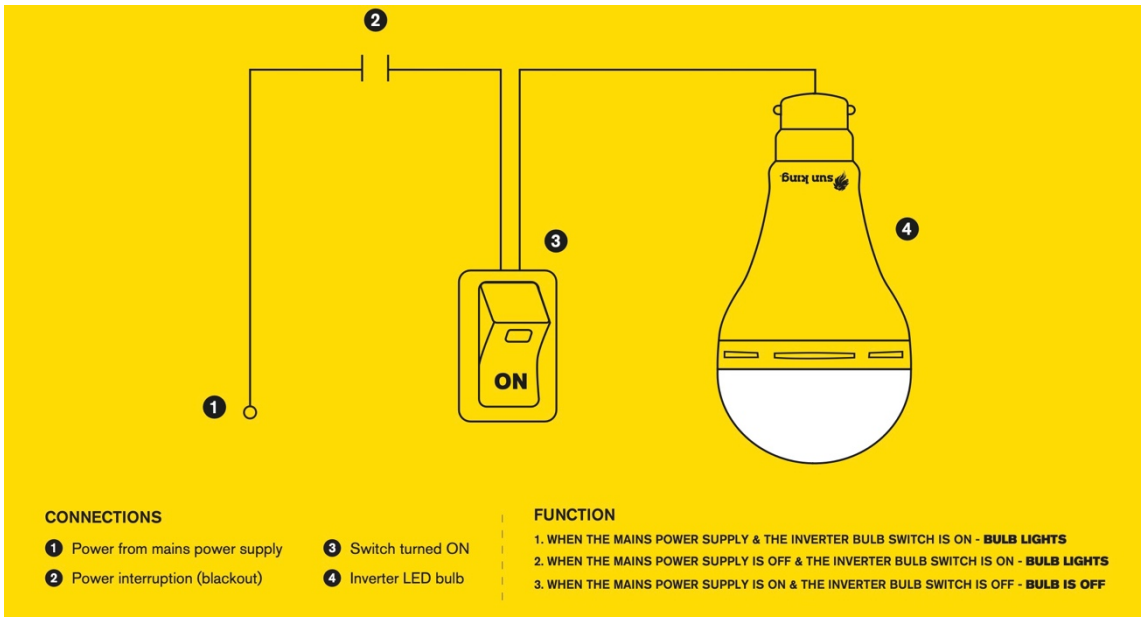


Figure 2 - The project bulb schematic

The project proponent however is free to choose LEDs of any other make with similar specifications for Project Instances added to GP in future and comply with the eligibility criteria for PIs inclusion in section 1.4.

1.12 Project Location

The PIs will be implemented in rural areas of India (mentioned in section 1.11 above). The geographic coordinates of India are 21° 7' 32.452" N and 82° 47' 41.992" E.

Figure 3 - Geographical location of the grouped project - India

1.13 Conditions Prior to Project Initiation

Prior to the project activity these rural households are using inefficient Incandescent lamps (ICLs) which is same as the baseline scenario. The baseline scenario has been described in detail in section 3.4

Figure 4 - Image of an incandescent lamp

The GP involves replacement of power guzzling ICLs (existing prior to project initiation) with energy-efficient LED lamps in the rural households of India, resulting in GHG emissions mitigation due to reduction in fossil-fuel based electricity consumption. Thus, the GP has not been implemented to generate GHG emissions for the purpose of their subsequent reduction, removal or destruction.

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

There are no mandatory policies and/or regulations in India that mandates distribution and/or installation of LED lighting equipment in households. Further, after the destruction of the ICLs all the components shall be recycled and no waste will be generated. Therefore, the grouped project complies with the Solid Waste Management Rules 2016[5] by recycling the metal, glass components of the ICLs.

Thus, there are no rules or regulations in the host country India for implementation of the PIs.

1.15 Participation under Other GHG Programs

1.15.1 Projects Registered (or seeking registration) under Other GHG Program(s)

The Grouped project has neither been registered, nor is seeking registration under any other GHG programs.

[5] https://cpcb.nic.in/uploads/MSW/SWM_2016.pdf

1.15.2 Projects Rejected by Other GHG Programs

The Grouped project has not been rejected by any other GHG programs.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

The grouped project is not included in an emissions trading program or any other mechanism that includes GHG allowance trading.

1.16.2 Other Forms of Environmental Credit

The Grouped project has not sought, nor received another form of GHG-related environmental credit.

1.16.3 Supply Chain (Scope 3) Emissions

A supply chain is a network of organizations (e.g., manufacturers, wholesalers, distributors, and retailers) involved in producing, delivering, and selling a product or service to the consumer. Scope 3 inventory emissions are all indirect upstream and downstream GHG emissions in an organization's supply chain. Carbon project activities may impact the emissions of goods and services in a supply chain and, therefore, Scope 3 emissions. If a project affects emissions associated with a good or service, demonstrate that a public statement(s) by the owner(s) or retailer(s) of the impacted goods or services or project proponent (as applicable) has been made throughout the project crediting period. Where applicable, also demonstrate that the impacted good or service's producer(s) or retailer(s) have been notified of the project and the potential risk of Scope 3 emissions double claiming via email. Evidence of the public statement(s) and email(s) must be provided in this report or attached as an appendix.

1.17 Sustainable Development Contributions

1.17.1 Sustainable Development Contributions Activity Description

The grouped project contributes to social, environmental, economic and technological benefits which is aligned with India's sustainable development priorities and the UN's Sustainable Development Goals. A summary of the grouped project's sustainable development contributions is provided below:

Environmental Sustainability

- Total power generation from Thermal power plants accounted for 85% gross generation of electricity in the country in 2020-21[6]. Introduction of energy efficient LED technology will reduce the GHGs released in the atmosphere by the thermal power plants in course of electricity generation.
- Unlike fluorescent tubes, LEDs do not contain toxic mercury.
- Reduction in waste generation as LEDs have longest life span when compared to any other alternative.

Social Sustainability

- India faced a peak time power deficit of 1.2%[7] in 2021-22. Over the years while demand has increased, the supply has remained constrained resulting in a number of consumers not having access to sufficient power supply. The electricity saved by replacing ICLs with LED will be available for other consumers thereby improving their quality of life
- The project will generate direct and indirect employment.
- Penetration of LED technology within the very important part of our society i.e. rural households.

Economic Sustainability

- The project will generate business opportunities for technology suppliers as well as other parties who will be employed for baseline survey, distribution of LED bulbs and monitoring survey
- The LEDs will consume less electricity as compared to incandescent light bulbs (ICLs) thus resulting in reduced utility bill for the end user.

Technological Sustainability

- Light-emitting diode (LED) is the most energy-efficient and rapidly developing lighting technologies today. Quality LED light bulbs last longer, are more durable, and offer comparable or better light quality than other types of lighting. However, the high upfront cost of the LEDs acts as a deterrent for its acceptance.
- Through this program LED bulbs will be made available to the consumers free of cost allowing diffusion of the LED technology to even those who cannot pay for it and so are denied its advantages.

1.17.2 Sustainable Development Contributions Activity Monitoring

[6] Power Sector at a Glance ALL INDIA | Government of India | Ministry of Power (powermin.gov.in)

[7] Power Sector at a Glance ALL INDIA | Government of India | Ministry of Power (powermin.gov.in)

Table 2: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
1)	13.0	Quantity of emission reductions achieved from the project activity	Emission reductions	The project activity involves distribution of inverter LEDs across India. The LEDs replace incandescent lightbulbs ("ICLs") which will result in reduction in greenhouse gas emissions released in the atmosphere by the thermal power plants in course of electricity generation. The GHG emission reduction for a project activity batch 1 is 41,647 and 1,684 tCO_2e for project activity batch 2.	The average annual GHG emission is 43,331 tCO_2e for the grouped project activity over the current monitoring period.
2)	7.1	7.1 – By 2030, ensure universal access to affordable, reliable and modern energy services	7.1.2 – Proportion of population with primary reliance on clean fuels and technology	Number of LEDs operational under both the project activity batch is 590,203. PP will ensure that the LEDs are operational, and all the end users have access to clean energy.	Number of LEDs operational under the project activity batches is 590,203. PP will ensure that the LEDs are operational, and all the LED owners have the access to clean energy.

3)	8.5	8.5.2 – Quality of employment; and Quantitative employment and income generation	• Number of training programmes provided to the employees and the maintenance & service staff. • Number of employees for maintenance and service.	• Provided training for improving employability thereby improving quality of employment. • Training per year; minimum 10 employments	A total of 20 trainings in project lifetime and maintaining minimum 10 employments throughout lifetime of the project activity.

1.18 Additional Information Relevant to the Project

Leakage Management

Not Applicable.

Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of the project description

Further Information

There are no additional relevant legislative, technical, economic, sectoral, social, environmental, geographic, site-specific and/or temporal information that may have a bearing on the eligibility of the project, the net GHG emission reductions or removals, or the quantification of the project's net GHG emission reductions or removals.

2 SAFEGUARDS

2.1 No Net Harm

There are no potential negative environmental and socio-economic impacts.

2.2 Local Stakeholder Consultation

MicroEnergy Credits here after referring as MEC conducted a local stakeholder consultation on 11/02/2022 at 2p.m. for the project "MicroEnergy Credits – Microfinance for Energy Efficient Product Lines - India".

The physical as well as virtual meeting were conducted in 21 states of India.

Zones	States
North Zone	Haryana, Chandigarh, Punjab
West Zone	Maharashtra, Gujarat, Rajasthan
East Zone	Sikkim, West Bengal, Assam, Tripura, Bihar, Odisha, Jharkhand
South Zone	Tamil Nadu, Karnataka, Kerala & Goa
Central Zone	Uttar Pradesh, Madhya Pradesh, Uttarakhand, Chhattisgarh

A list of invitees was made prior to the stakeholder's consultation meeting. The invitees were then contacted through calls, public notices at important places like dak ghar, panchayat offices etc. and follow-ups via word of mouth to ensure maximum participation. Detailed contact information such as phone number and email address of the representative of the project implementer were also made available in the Notices, invitation letters, for the stakeholders who could not physically attend the local stakeholder consultation. Due to some unavoidable situation, online participation on a shared link was also encouraged. The stakeholder meeting was well attended, and the participants were actively involved.

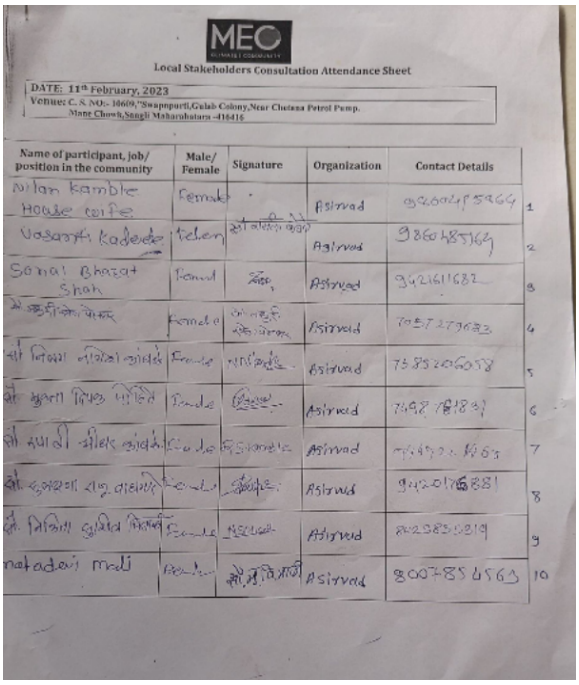
The stakeholder consultation was conducted at the grouped project activity level as the technology and its impact will be similar for all the project activities implemented in this grouped project activity.

A comprehensive stakeholder mapping and analysis was done and the relevant stakeholders were identified:

1. Local people, farmers
2. Local policymakers- Gram Panchayat representatives
3. Local non-governmental organizations (NGOs)
4. Women Groups
5. local self-help groups,
6. field assistants working in the project
7. Partners: Ashrivad, GLP, Samasta, Sarala, Satin, Midland

Attendance List

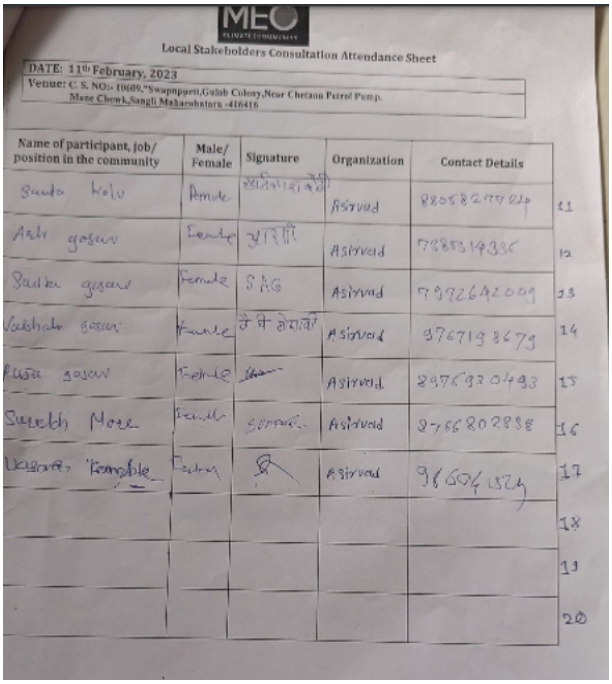
1) **West Zone:** Maharashtra, Gujarat, Rajasthan



MEC
Local Stakeholders Consultation Attendance Sheet

DATE: 11th February, 2023
Venue: C. S. NO:- 10609,"Swappnpurti,Gulab Colony,Near Chetana Petrol Pump. Mane Chowk,Sangli Maharashtara -416416

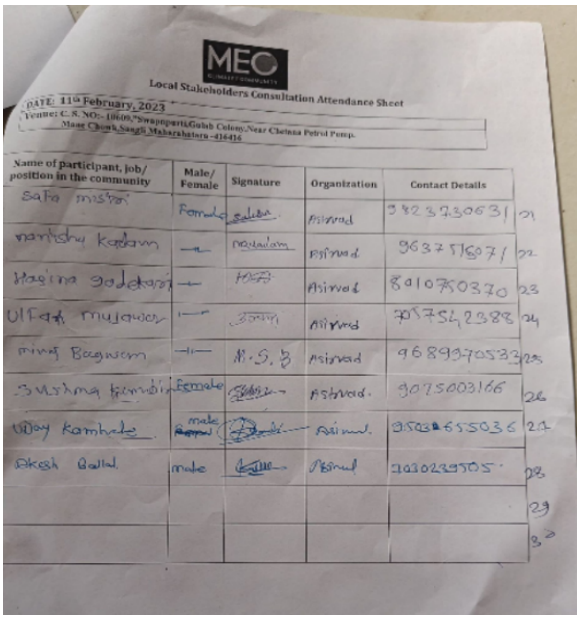
Name of participant, job/ position in the community	Male/ Female	Signature	Organization	Contact Details	
Nilam kamble House wife	Female		Asirvad	9545695464	1
Vasanti kadeke	Female		Asirvad	9860485164	2
Sonal Bharat Shah	Female		Asirvad	9421611682	3
[illegible]	Female		Asirvad	7057279633	4
[illegible]	Female		Asirvad	7588206058	5
[illegible]	Female		Asirvad	7498 [illegible]84	6
[illegible]	Female		Asirvad	[illegible]	7
[illegible]	Female		Asirvad	9420[illegible]881	8
[illegible]	Female		Asirvad	8423830819	9
mahadevi mali	Female		Asirvad	8007856563	10



MEC
Local Stakeholders Consultation Attendance Sheet

DATE: 11th February, 2023
Venue: C. S. NO:- 10609,"Swappnpurti,Gulab Colony,Near Chetana Petrol Pump. Mane Chowk,Sangli Maharashtara -416416

Name of participant, job/ position in the community	Male/ Female	Signature	Organization	Contact Details	
Sunita kolu	Female		Asirvad	8805827702	11
Archi gosavi	Female		Asirvad	7588314935	12
Savita gosavi	Female	SAG	Asirvad	7972642009	13
Vaishali gosavi	Female	[illegible]	Asirvad	8767193679	14
Pooja gosavi	Female		Asirvad	8975930493	15
Suvekh More	Female		Asirvad	9766202888	16
[illegible] Kamble	Female		Asirvad	9860615824	17
					18
					19
					20



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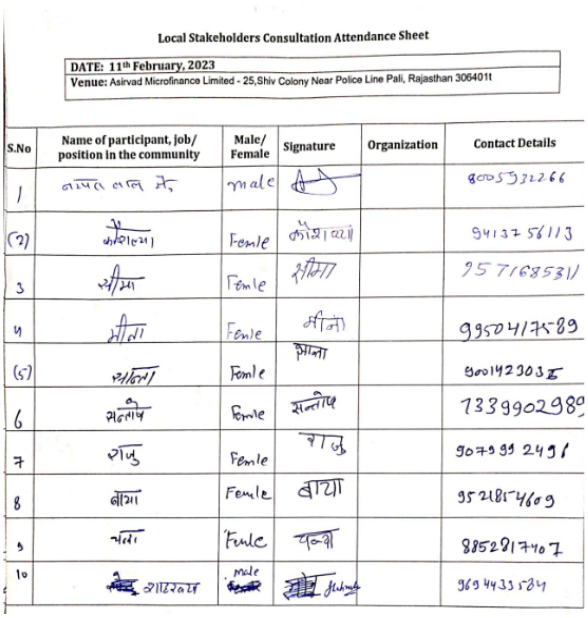
Local Stakeholders Consultation Attendance Sheet

DATE: 11th February, 2023
Venue: C. S. NO:- 10609,"Swappnpurti,Gulab Colony,Near Chetana Petrol Pump. Mane Chowk,Sangli Maharashtara -416416

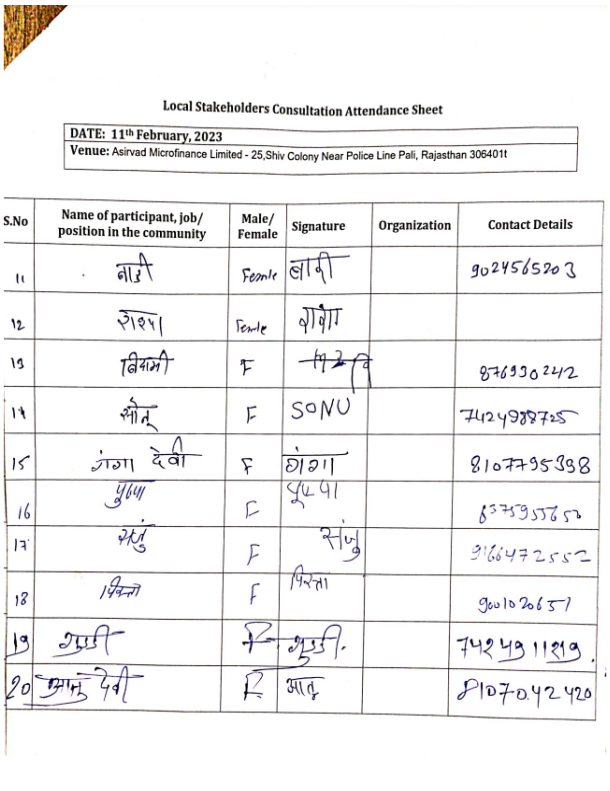
Name of participant, job/ position in the community	Male/ Female	Signature	Organization	Contact Details	
Safa mistri	Female		Asirvad	382330631	21
Ankita Kadam	—		Asirvad	9637516071	22
Hasina Sodekar	—		Asirvad	8010750370	23
Ulfat mujawar	—		Asirvad	7057542388	24
Rinaj Begwan	—		Asirvad	9689970533	25
Sushma Kambli	Female		Asirvad	9075003166	26
Vijay Kamble	Male		Asirvad	3503655035	27
Akash Ballal	male		Asirvad	2030299505	28
					29
					30



Local Stakeholders Consultation Attendance Sheet

DATE: 11th February, 2023
Venue: Asirvad Microfinance Limited - 25,Shiv Colony Near Police Line Pali, Rajasthan 306401

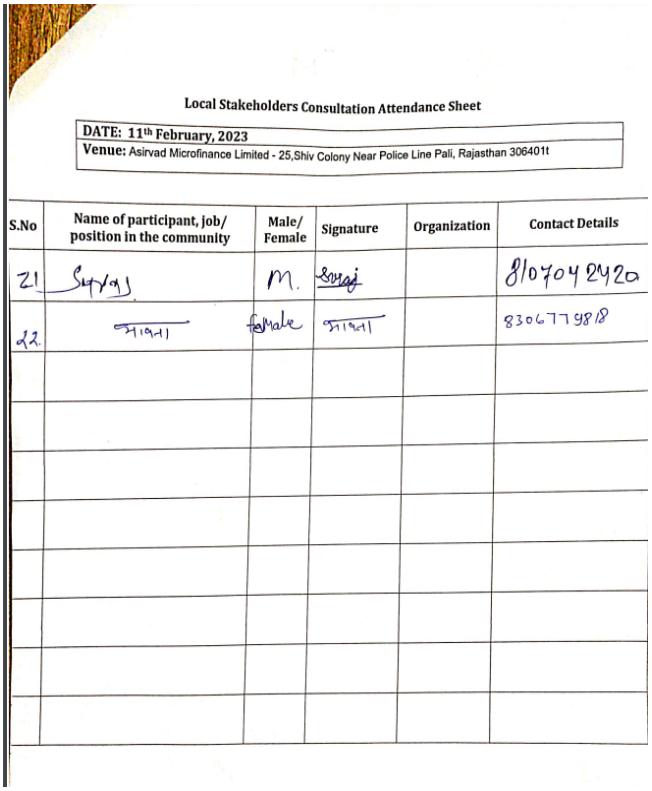
S.No	Name of participant, job/ position in the community	Male/ Female	Signature	Organization	Contact Details
1	[illegible]	male			8005332266
(2)	[illegible]	Female			9413758113
3	[illegible]	Female			9571685311
4	[illegible]	Female			9950417589
(5)	[illegible]	Female			9001423035
6	[illegible]	Female			7339902989
7	[illegible]	Female			9079992491
8	[illegible]	Female			9521854609
9	[illegible]	Female			8852817407
10	[illegible]	male			9694435584



Local Stakeholders Consultation Attendance Sheet

DATE: 11th February, 2023
Venue: Asirvad Microfinance Limited - 25,Shiv Colony Near Police Line Pali, Rajasthan 306401t

S.No	Name of participant, job/ position in the community	Male/ Female	Signature	Organization	Contact Details
11	नीरी	Female	नीरी		9024565203
12	रोशनी	Female	रोशनी		
13	खिलाणी	F	[illegible]		8769930242
14	सोनू	F	SONU		7412988725
15	अंजना देवी	F	अंजना		8107795398
16	पूजा	F	पूजा		8375955850
17	रेखु	F	रेखु		9166472557
18	प्रियंका	F	प्रियंका		9001026571
19	अर्पित	F	अर्पित		7429911819
20	आशु देवी	F	आशु		8107042420

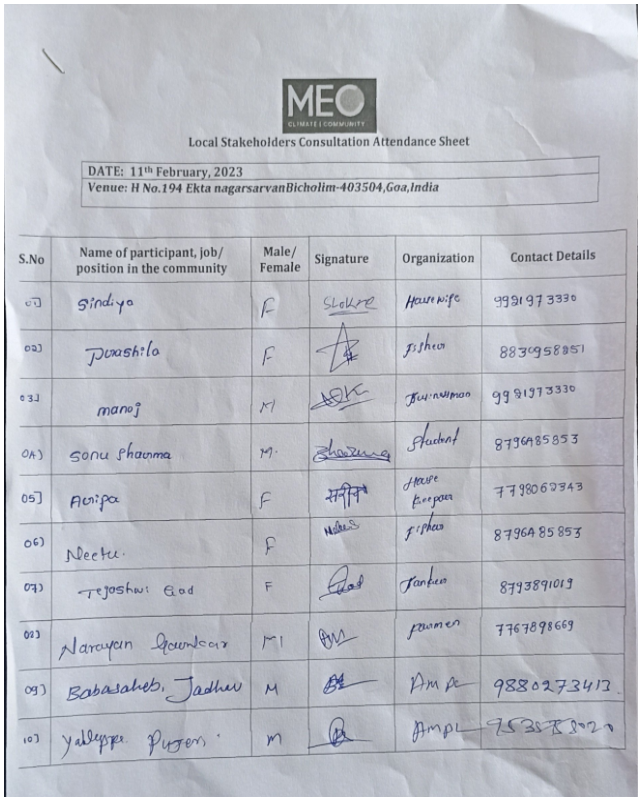


Local Stakeholders Consultation Attendance Sheet

DATE: 11th February, 2023
Venue: Asirvad Microfinance Limited - 25,Shiv Colony Near Police Line Pali, Rajasthan 306401t

S.No	Name of participant, job/ position in the community	Male/ Female	Signature	Organization	Contact Details
21	Suraj	M.	Suraj		8107042420
22	रामदा	female	रामदा		8306779818

2) **South Zone:** Tamil Nadu, Karnataka, Goa, Kerala

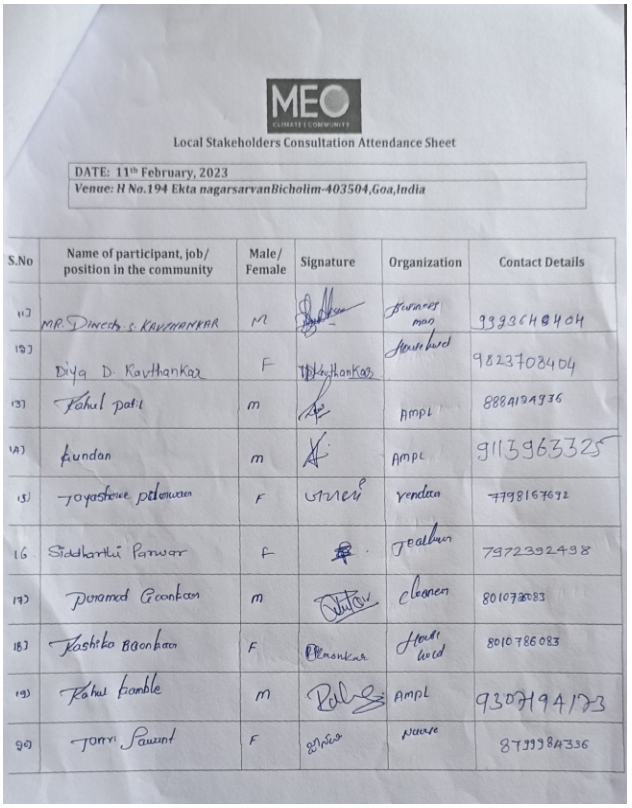


MEO CLIMATE | COMMUNITY

Local Stakeholders Consultation Attendance Sheet

DATE: 11th February, 2023
Venue: H No.194 Ekta nagarsarvanBicholim-403504,Goa,India

S.No	Name of participant, job/ position in the community	Male/ Female	Signature	Organization	Contact Details
01	Sindiya	F	SLokar	Housewife	9991973330
02	Purashila	F	[illegible]	fisher	8830958851
03	manoj	M	[illegible]	Farmer	9991973330
04	Sonu Sharma	M	[illegible]	Student	8796485853
05	Arpita	F	[illegible]	House keeper	7798062343
06	Neetu	F	[illegible]	fisher	8796485853
07	Tejashri God	F	[illegible]	Farmer	8793891013
08	Narayan Gaonkar	M	[illegible]	farmer	7767898669
09	Babasaheb Jadhav	M	[illegible]	Ampl	9880273413
10	Yallappa Pujeri	M	[illegible]	Ampl	7538[illegible]



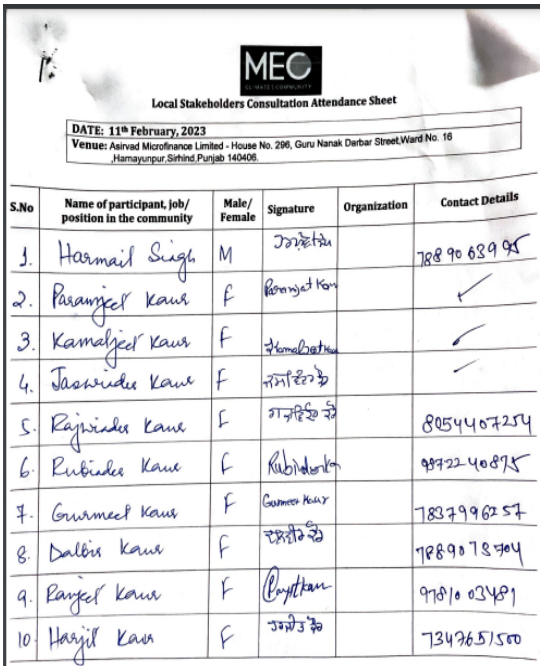
MEO CLIMATE | COMMUNITY

Local Stakeholders Consultation Attendance Sheet

DATE: 11th February, 2023
Venue: H No.194 Ekta nagarsarvanBicholim-403504,Goa,India

S.No	Name of participant, job/ position in the community	Male/ Female	Signature	Organization	Contact Details
11	MR. Dinesh S. KAVTHANKAR	M	[illegible]	farmer mao	9923624404
12	Diya D. Kavthankar	F	[illegible]	Housewife	9823703404
13	Rahul patil	m	[illegible]	AMPL	8881124736
14	Kundan	m	[illegible]	AMPL	9113963325
15	Jayashree pednekar	F	[illegible]	Vendor	7798167672
16	Siddharth Parwar	F	[illegible]	Teacher	7972392498
17	Dinanath Gaonkar	m	[illegible]	cleaner	8010786083
18	Kashika Gaonkar	F	[illegible]	House wife	8010786083
19	Rahul Gamble	m	[illegible]	AMPL	9307194173
20	Tanvi Sawant	F	[illegible]	Nurse	8799984336

3) North Zone : Punjab, Haryana, Chandigarh



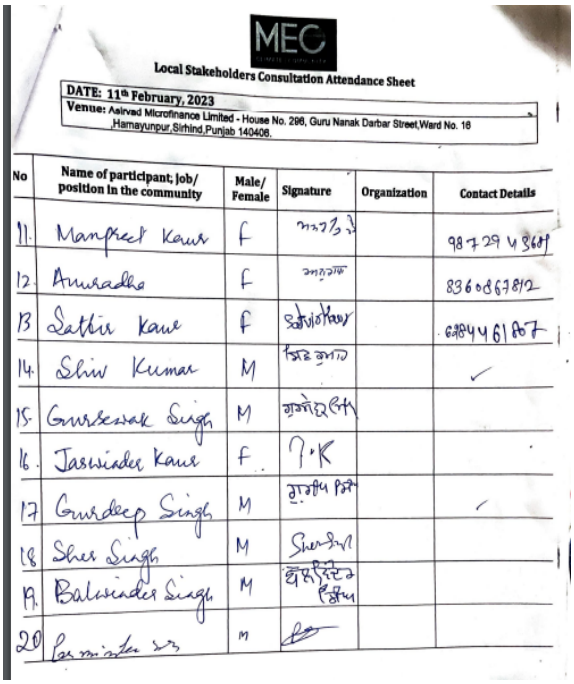
MEC

Local Stakeholders Consultation Attendance Sheet

DATE: 11th February, 2023

Venue: Asirvad Microfinance Limited - House No. 296, Guru Nanak Darbar Street,Ward No. 16 ,Hamayunpur,Sirhind,Punjab 140406.

S.No	Name of participant, job/ position in the community	Male/ Female	Signature	Organization	Contact Details
1.	Harmail Singh	M			78890 83995
2.	Paramjeet Kaur	F			✓
3.	Kamaljeet Kaur	F			✓
4.	Jaswinder Kaur	F			✓
5.	Rajwinder Kaur	F			8054407254
6.	Rubinder Kaur	F			98722 40895
7.	Gurmeet Kaur	F			7837996257
8.	Dalbir Kaur	F			78890 78704
9.	Ranjeet Kaur	F			97810 03491
10.	Harjit Kaur	F			7347651580



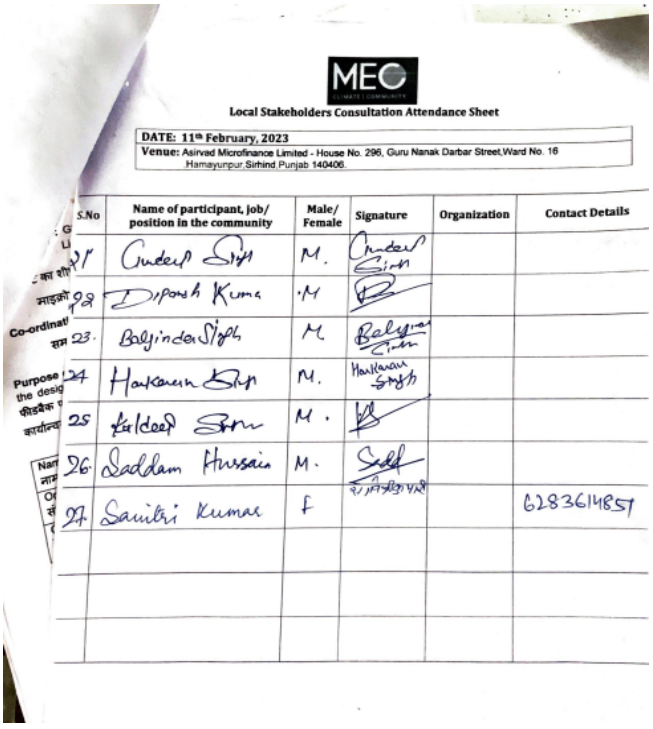
MEC

Local Stakeholders Consultation Attendance Sheet

DATE: 11th February, 2023

Venue: Asirvad Microfinance Limited - House No. 296, Guru Nanak Darbar Street,Ward No. 16 ,Hamayunpur,Sirhind,Punjab 140406.

No	Name of participant, job/ position in the community	Male/ Female	Signature	Organization	Contact Details
11.	Manpreet Kaur	F			98729 43691
12.	Anuradha	F			8360867812
13	Satbir Kaur	F			6284461867
14.	Shiv Kumar	M			✓
15.	Gursevak Singh	M			
16.	Jaswinder Kaur	F			
17	Gurdeep Singh	M			✓
18	Sher Singh	M			
19.	Balwinder Singh	M			
20	[illegible]	M			



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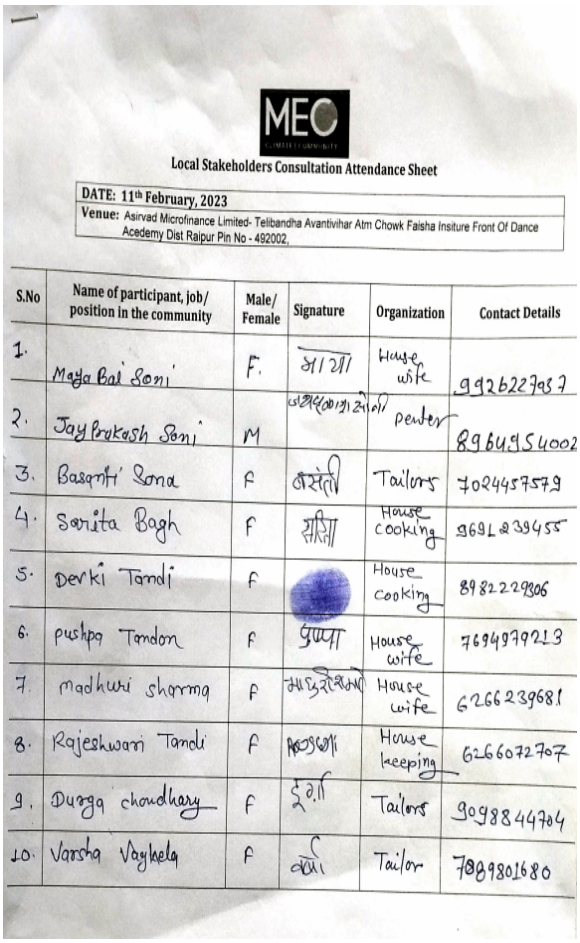
Venue: Asirvad Microfinance Limited - House No. 296, Guru Nanak Darbar Street,Ward No. 16 ,Hamayunpur,Sirhind,Punjab 140406.

S.No	Name of participant, job/ position in the community	Male/ Female	Signature	Organization	Contact Details
22	Gudeep Singh	M.			
23	Dipesh Kumar	M			
23.	Balwinder Singh	M.			
24	Harkaran Singh	M.			
25	Kuldeep Singh	M.			
26.	Saddam Hussain	M.			
27.	Savitri Kumar	F			6283614857

4) Central Zone: Uttar Pradesh, Madhya Pradesh, Uttarakhand, Chhattisgarh



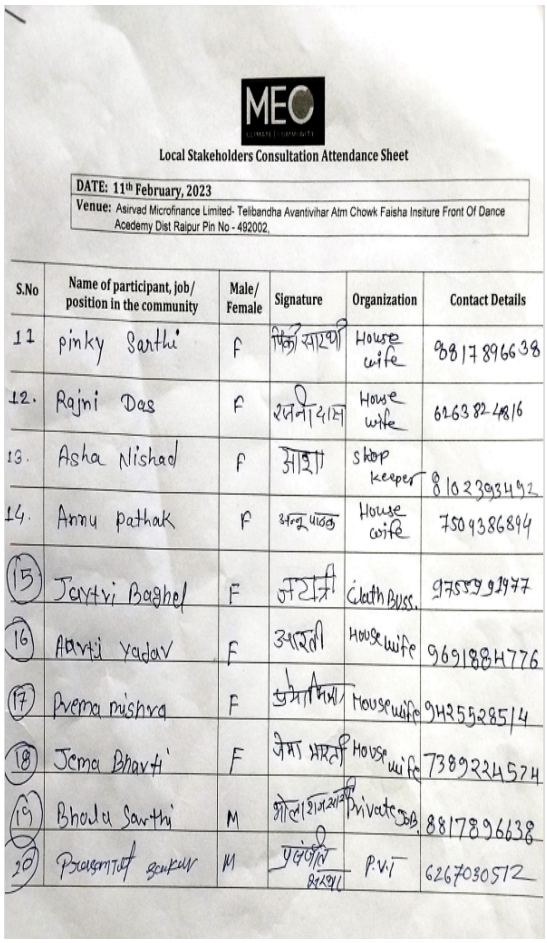
MEC

Local Stakeholders Consultation Attendance Sheet

DATE: 11th February, 2023

Venue: Asirvad Microfinance Limited- Telibandha Avantivihar Atm Chowk Faisha Insiture Front Of Dance Acedemy Dist Raipur Pin No - 492002.

S.No	Name of participant, job/ position in the community	Male/ Female	Signature	Organization	Contact Details
1.	Maya Bai Soni	F.		House wife	9926227937
2.	Jay Prakash Soni	M		peinter	8964954002
3.	Basanti Sona	f		Tailors	7024457579
4.	Sarita Bagh	f		House cooking	9691239455
5.	Derki Tandi	f		House cooking	8982229306
6.	pushpa Tandon	f		House wife	7694979213
7.	madhuri sharma	f		House wife	6266239681
8.	Rajeshwari Tandi	f		House keeping	6266072707
9.	Durga choudhary	f		Tailors	9098844704
10.	Varsha Vaykela	f		Tailor	7889801680



MEC

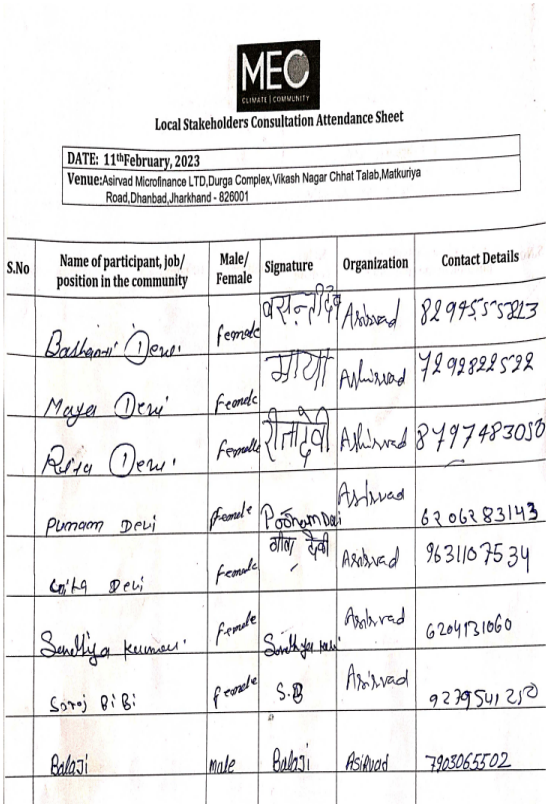
Local Stakeholders Consultation Attendance Sheet

DATE: 11th February, 2023

Venue: Asirvad Microfinance Limited- Telibandha Avantivihar Atm Chowk Faisha Insiture Front Of Dance Acedemy Dist Raipur Pin No - 492002.

S.No	Name of participant, job/ position in the community	Male/ Female	Signature	Organization	Contact Details
11	pinky Sarthi	f		House wife	8817896638
12.	Rajni Das	f		House wife	6263824816
13.	Asha Nishad	f		shop keeper	8102393492
14.	Annu pathak	f		House wife	7509386894
15	Jarivi Baghel	F		Cloth Buss.	9755991977
16	Aarti yadav	F		House wife	9691884776
17	Prema mishra	F		House wife	9425528514
18	Jema Bharti	F		House wife	7389224574
19	Bhodu Sarthi	M		Private Job	8817896638
20	Prashant gurjar	M		P.V.T	6267030572

5. East Zone: Sikkim, West Bengal, Assam, Tripura, Bihar, Odisha, Jharkhand

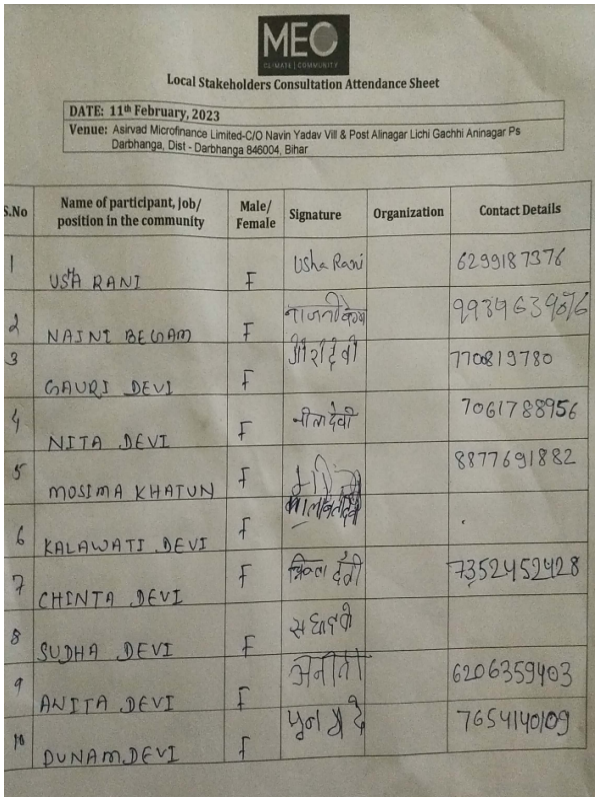


MEC
CLIMATE | COMMUNITY

Local Stakeholders Consultation Attendance Sheet

DATE: 11th February, 2023
Venue: Asirvad Microfinance LTD,Durga Complex,Vikash Nagar Chhat Talab,Matkuriya Road,Dhanbad,Jharkhand - 826001

S.No	Name of participant, job/ position in the community	Male/ Female	Signature	Organization	Contact Details
	Badkani Devi	Female		Asirvad	8299555823
	Maya Devi	Female		Asirvad	7292822532
	Rita Devi	Female		Asirvad	8797483050
	Punam Devi	female	Poonam Devi	Asirvad	6206283143
	Gita Devi	female		Asirvad	9631107534
	Sanjiya kumari	female		Asirvad	6204131060
	Saroj Bibi	female	S.B	Asirvad	9279541258
	Balaji	male	Balaji	Asirvad	7903065502



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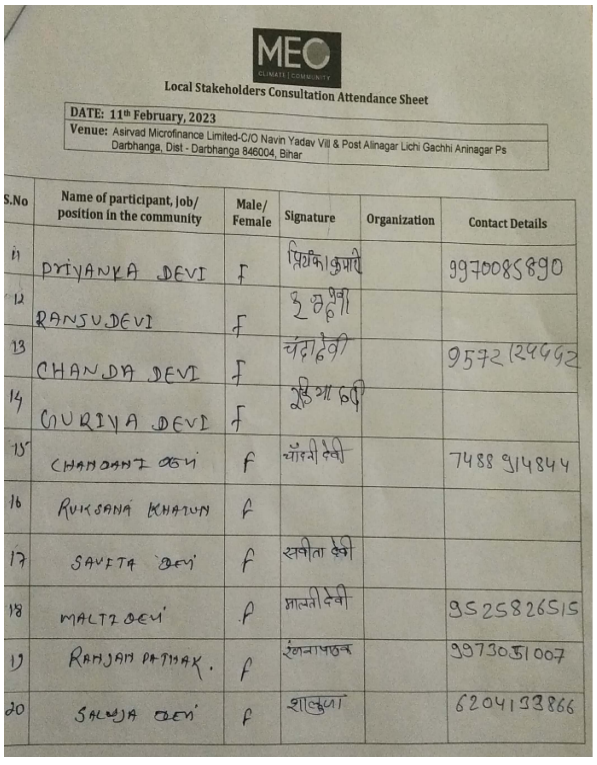
Local Stakeholders Consultation Attendance Sheet

DATE: 11th February, 2023
Venue: Asirvad Microfinance Limited-C/O Navin Yadav Vill & Post Alinagar Lichi Gachhi Aninagar Ps Darbhanga, Dist - Darbhanga 846004, Bihar

S.No	Name of participant, job/ position in the community	Male/ Female	Signature	Organization	Contact Details
1	USHA RANI	F			6299187376
2	NAINI BEGAM	F			9934639676
3	GAURI DEVI	F			7708819780
4	NITA DEVI	F			7061788956
5	MOSIMA KHATUN	F			8877691882
6	KALAWATI DEVI	F			
7	CHINTA DEVI	F			7352452428
8	SUDHA DEVI	F			
9	ANITA DEVI	F			6206359403
10	PUNAM DEVI	F			7654140109



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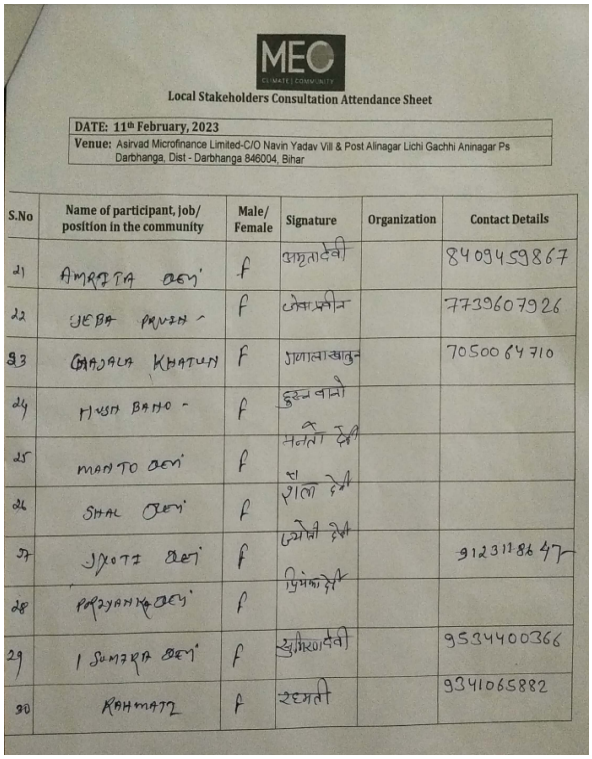
S.No	Name of participant, job/ position in the community	Male/ Female	Signature	Organization	Contact Details
11	PRIYANKA DEVI	F			9970085890
12	RANJU DEVI	F			
13	CHANDA DEVI	F			9572124462
14	GURIYA DEVI	F			
15	CHANDANI DEVI	F			7488914844
16	RUKSANA KHATUN	F			
17	SAVITA DEVI	F			
18	MALTI DEVI	F			9525826515
19	RANJAN PATHAK.	F			9973051007
20	SANJYA DEVI	F			6204133866



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S.No	Name of participant, job/ position in the community	Male/ Female	Signature	Organization	Contact Details
21	AMRITA DEVI	f			8409459867
22	JEBA PARVIN	f			7739607926
23	GHAJALA KHATUN	f			7050064710
24	MUSH BANO	f			
25	MANTO DEVI	f			
26	SHAL DEVI	f			
27	JYOTI DEVI	f			9123186847
28	PRIYANKA DEVI	f			
29	I SUMITRA DEVI	f			9534400366
30	RAHMATI	f			9341065882

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Local Stakeholders Consultation Attendance Sheet

DATE: 11th February, 2023

Venue: Asirvad Microfinance Limited-Belaguntha Road ,Jamapali Square , Bhanjanagar,Ganjam ,Odisha .Pin-761126

S.No	Name of participant, job/ position in the community	Male/ Female	Signature	Organization	Contact Details
1	Babi Bisoyi	Female			Rayakunda
2	Rina Jena	Female	Rina Jena		Kandhanupatna
3	Swapnini Das	Female			Kandhanupatna
4	Namita Jena	Female			Kandhanupatna
5	Kuni Gouda	Female			Kandhanipatna
6	Pinki Swain	Female			Rayakunda
7	Ahalya Nayak	Female			Rayakunda
8	Babi Pradhan				Ambapua
9	Rina Swain				Ambapua
10	Pabitra Kumari Padhi		Pabitra Kumari Padhi		Ambapua

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Venue: Asirvad Microfinance Limited-Belaguntha Road ,Jamapali Square , Bhanjanagar,Ganjam ,Odisha .Pin-761126

S.No	Name of participant, job/ position in the community	Male/ Female	Signature	Organization	Contact Details
1	Jagadeshi Behera	Female			Kalleny
2	Thuru Gouda	Female			Kalleny
3	Babi Behera	Female			Kalleny
4	Tarani Gouda	Female			Kalleny
5	Ahalya Nayak	Female			Rayakunda
6	Laxmi Swain	Female			Rayakunda
7	Lya Swain	Female			Rayakunda
8	Namita Jena	Female			Kandhanupatna
9	Sanju Naik	Female			Ambapua
10	Sunita Pradhan	Female	Sunita Pradhan		Akhiripat

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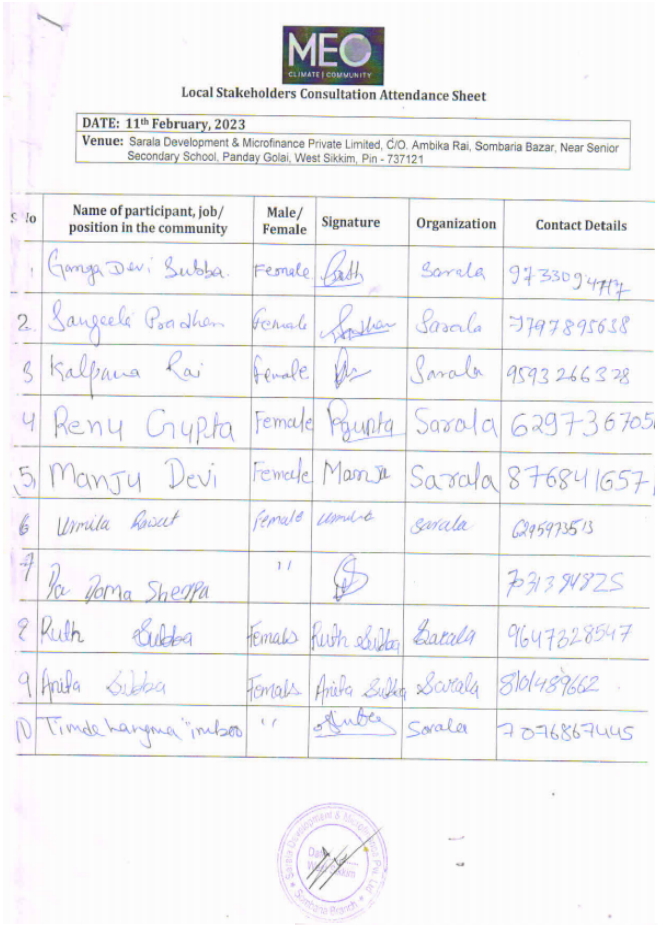
Venue: Asirvad Microfinance Limited-Belaguntha Road ,Jamapali Square , Bhanjanagar,Ganjam ,Odisha .Pin-761126

S.No	Name of participant, job/ position in the community	Male/ Female	Signature	Organization	Contact Details
1	Sisula Bisikal	Female			Shadabhumi
2	Basanti Bisoyi	Female			Gurabadi
3	Kanak Bisikal	Female			Shadabhumi
4	Manjula Bisoyi	Female			Gadisapali
5	Rasparali Das	Female	Rasparali Das		Tanirada
6	Pratima Bisoyi	Female			Gadisapali
7	Monali Das	Female			Tanirada
8	Ahalya Barik	Female			Basudevpur
9	Santoshini Gouda	Female			Basudevpur
10	Rita Gouda	Female			Basudevpur



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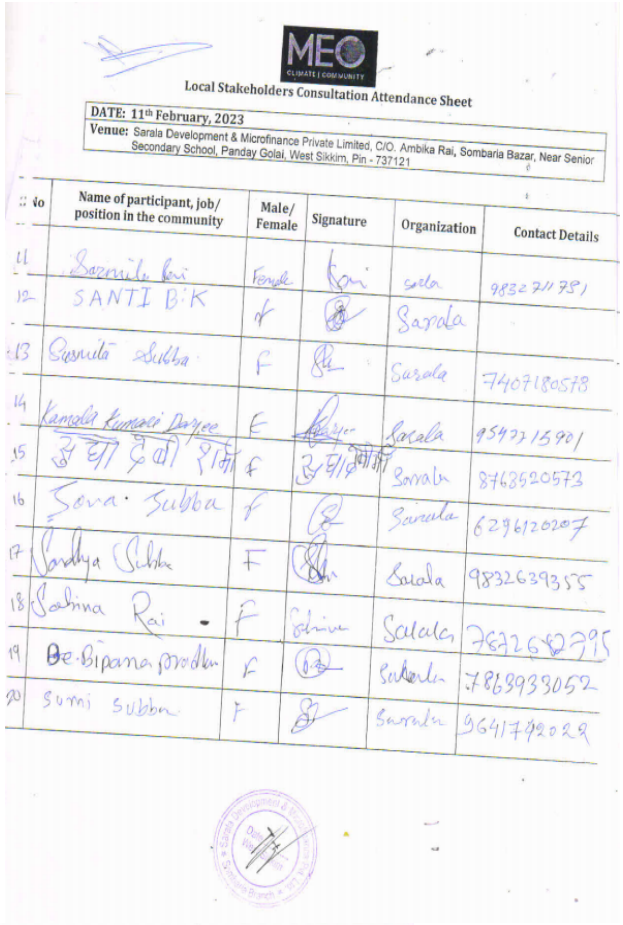
Local Stakeholders Consultation Attendance Sheet

DATE: 11th February, 2023

Venue: Sarala Development & Microfinance Private Limited, C/O. Ambika Rai, Sombaria Bazar, Near Senior Secondary School, Panday Golai, West Sikkim, Pin - 737121

Sl No	Name of participant, job/ position in the community	Male/ Female	Signature	Organization	Contact Details
1.	Ganga Devi Subba	Female		Sarala	9733094717
2.	Sangeeta Pradhan	Female		Sarala	7797895638
3	Kalpana Rai	Female		Sarala	9593266378
4	Reny Gupta	Female		Sarala	6297367051
5	Manju Devi	Female		Sarala	8768416571
6	Urmila Basnet	Female		sarala	09593735 13
7	Dr Soma Sherpa	"			7031391825
8	Ruth Subba	Female		Sarala	9647328547
9	Anita Subba	Female		Sarala	8101489662
10	Timdelhangma Limboo	"		Sarala	7076867445



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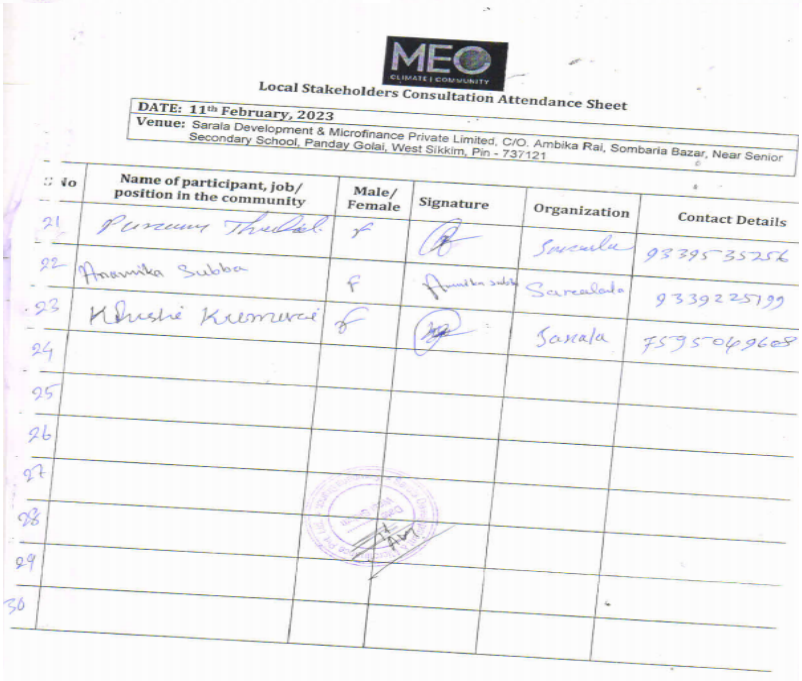
Local Stakeholders Consultation Attendance Sheet

DATE: 11th February, 2023

Venue: Sarala Development & Microfinance Private Limited, C/O. Ambika Rai, Sombaria Bazar, Near Senior Secondary School, Panday Golai, West Sikkim, Pin - 737121

Sl No	Name of participant, job/ position in the community	Male/ Female	Signature	Organization	Contact Details
11	Saraswati Rai	Female		sarala	9832711751
12	SANTI BK	F		Sarala	
13	Susmita Subba	F		Sarala	7407180578
14	Kamala Kumari Dargee	F		Sarala	9547715901
15	[illegible]	F		Sarala	8768520573
16	Sova Subba	F		Sarala	6296120207
17	Sandhya Subba	F		Sarala	9832693555
18	Sabina Rai	F		Sarala	7872650795
19	Dr. Bipana pradhan	F		Sarala	7863933052
20	Sumi Subba	F		Sarala	9641792029



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Sl No	Name of participant, job/ position in the community	Male/ Female	Signature	Organization	Contact Details
21	Purnima Thakuri	F		Sarala	9339535256
22	Anamika Subba	F		Sarala	9339225799
23	K Shushi Kumari	F		Sarala	7595069608
24					
25					
26					
27					
28					
29					
30					

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Local Stakeholders Consultation Attendance Sheet

DATE: 11th February, 2023
Venue:Anandi Bhawan, Guwahati - Baihata Rd, Silbharal, Changsari, Assam - 781101

.No	Name of participant, job/ position in the community	Male/ Female	Signature	Organization	Contact Details
	Gitima Boro	M/F	Gitima Boro	SATIN	9387287990
	Manju Nath	M/F	manath	SATIN	7635893240
	Sheowali Boro	M	Sheowali	SATIN	9706964395
	Rukia Bibi	F		SATIN	9126823425

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Local Stakeholders Consultation Attendance Sheet

DATE: 11th February, 2023
Venue:Anandi Bhawan, Guwahati - Baihata Rd, Silbharal, Changsari, Assam - 781101

S.No	Name of participant, job/ position in the community	Male/ Female	Signature	Organization	Contact Details
	Sri Manju Deka.	f.	Manju.	satin.	6001704572
	Sri Sarapna mali	F	Sarapna	SatiN	7399187025
	Sri. Rojita Pathak	F	Rojita	Satin	9707352783
	SIR KANAK LATA DEKA	F	KD	SATIN	8486654738
	SIR. PRANITA DEKA	F	P.D	Satin	9101546224

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Local Stakeholders Consultation Attendance Sheet

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S.No	Name of participant, job/ position in the community	Male/ Female	Signature	Organization	Contact Details
	Pinkumoni Dutta Deka	Female	Pinkumoni Dutta	Satin.	99575-43738
	Nayanmoni Borah	Female	Nayanmoni Borah	satin	6003385659
	Jonti Lankar	Female	Jonti L.	Satin	9854226401
	Sumi Nath	Female	Sumi Nath	Satin	9387716327
	Najima Begum	F	Najima	Satin	9957945816

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Venue:Anandi Bhawan, Guwahati - Baihata Rd, Silbharal, Changsari, Assam - 781101

S.No	Name of participant, job/ position in the community	Male/ Female	Signature	Organization	Contact Details
1/	Sri Rita Das	F	Rita Das	Satin	6003231200
2/	Sri Nomita Das	F	Nomita Das	Satin	8011364427
3/	Sri Kiran Das	F	Kiran	Satin	9957156844
4/	Sri Anjali Das	F	Anjali	Satin	8822072402
5/	Najnin Akhtara Saikia	F		Satin	9864633106

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Venue:Anandi Bhawan, Guwahati - Baihata Rd, Silbharal, Changsari, Assam - 781101

S.No	Name of participant, job/ position in the community	Male/ Female	Signature	Organization	Contact Details
1	Shahidur Rahman	M		SATIN	9101515046
2	Mahesh Vishwakarma	M	Mahesh	SATIN	9205591083
3	Ritu Kunjan Rajkhowa	M		MEC	9854094097

Minutes of the Meeting

Introduction to the Grouped Project activity and Project Developers

MEC opened the meeting by thanking all the participants for taking out time from their busy schedules for this meeting, especially thanking the women for their participation. Following that, MEC representative presented a quick overview of the LED Distribution initiative and how it will address the issue of climate change.

MEC briefed the stakeholders on design of the project:

a. The purpose of the Grouped project "Replacement of ICLs with LED lamps in India" was discussed which is to reduce fossil-fuel based electricity consumption in the Rural households of India by introducing more energy efficient LED lamps. The LEDs will basically replace incandescent lightbulbs majorly used in the rural households. And the Grouped project will have various Project Instances under it as per the capacity limit of each Project Activity batch.
b. As a result, MEC will distribute the first project instance under the Grouped project in the 21 states.
c. MEC explained about the project cycle of VERRA validation, registration and issuance was and it was highlighted that there will be regular audits of the project.
d. One of the most crucial parts of the meeting was to explain the carbon title transfer process. During the meeting, the carbon title transfer process was explained to the stakeholder which talks about releasing the rights from the reduction of greenhouse gas reductions to the partner organization and through them to MEC. It was explained to the participants that a carbon waiver form will have to be signed by the households who will be involved in the programme to make this a success.
e. In terms of energy savings related with replacement and their contribution to reducing the effects of climate change, it was described how households will gain. The distribution of free light bulbs and the Project Developer's financial management of the project using the proceeds from the sale of carbon credits were also explained to the stakeholders


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On
"MicroEnergy Credits - Microfinance for Efficient Lighting Product Lines - India"
Date: 11th February 2023, 2 PM
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Continuous Input and Grievance Mechanism

The stakeholders were informed that the project has designed a continuous input and grievance mechanism to ensure all grievances are recorded and responded. It was decided during the meeting that the contact details and Location maintaining a log book to record the *query/complaints of the stakeholders was also shared.*

Questions and Answers

S. No.	Question	Answer
1	**When will the distribution of LED lamps start?**	The distribution of LED lamps has already started in phases and will reach all of the states mentioned
2	**What wattage LED lamps shall be distributed and replaced with?**	A 9 W LED lamp shall be replaced with a 60/70 W ICL and a 12 W LED shall replace a 75 W ICL
3	**How will this project be beneficial to villagers?**	The project will help in Energy savings to the households. For ex- a 9W LED will generate equivalent lumens as generated by a 60-70 W ICL
4	**What is the expected life of the LED lamps?**	The expected life of an LED lamp is 25,000 hours i.e. if you are using a lamp for 5 hours in a day your lamp will be operational for an average of 13 years
5	**Why is the no. of lamps to be replaced by LEDs restricted to 6?**	As per the methodology used for the project the no. of lamps distribution is restricted to 6
6	**How and where would the LEDs lamps be distributed**	The LED lamps shall be distributed at every household in exchange of equivalent number of old working ICLs

The stakeholders were happy about the project and satisfied with the responses. There weren't any comments raised by the stakeholders which may have any significant impact on the Design or implementation of the project.

2.3 Environmental Impact

The PIs distributed under this Grouped project does not fall in the list of projects or activities requiring environmental impact assessment.

2.4 Public Comments

This section will be filled after the public comment period is completed.

2.5 AFOLU-Specific Safeguards

Since this is a non AFOLU project, this section is not required to be filled.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Applied Methodology is small scale methodology - AMS-II.C.: Demand-side energy efficiency activities for specific technologies; Version: 15.0[8];

Sectoral scope: 03 Energy Demand

The project has also referred to following documents:

- Methodology: AMS-I. D: Grid connected renewable electricity generation; Version 18.0[9]
- Standard: VCS Standard, v4.4[10]
- Methodological tool 21: Demonstration of additionality of small-scale project activities Version 13.1 [11]
- Guideline: General guidelines for SSC CDM methodologies Version 23.1[12]
- Guidelines for sampling and surveys for CDM project activities and programmes of activities, version 04.0
- Methodological tool 07: Tool to calculate the emission factor for an electricity system, version 7.0[13]

3.2 Applicability of Methodology

S. No.	Applicability requirement as per methodology AMS II.C	How the Project instance comply	Evidence
1	This methodology comprises activities that involve the installation of	The grouped project involves dissemination of new, energy-efficient	Manufacture's specifications and distribution records

[8] CDM: Demand-side energy efficiency activities for specific technologies --- Version 15.0 (unfccc.int)

[9] CDM: Grid connected renewable electricity generation --- Version 18.0 (unfccc.int)

[10] https://verra.org/documents/vcs-standard-v4-4/

[11] CDM: Demonstration of additionality of small-scale project activities (unfccc.int)

[12] MethSSC_Guid25ver23.1 (unfccc.int)

[13] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf

	new, energy-efficient equipment (e.g. lamps, ballasts, refrigerators, motors, fans, air conditioners, pumping systems, and chillers) at one or more project sites. Retrofit as well as new construction (Greenfield) projects are included under this methodology. In the case of new construction projects, a stepwise approach is indicated for determining the baseline under the General guidelines for SSC CDM methodologies.	equipment (i.e., lamps) in India. The grouped project is a greenfield project and will follow General guidelines for SSC CDM methodologies for determining the baseline scenario.	
2	This methodology is only applicable if the service level (e.g. rated capacity or output) of the installed, project energy-efficient equipment is between 90% and 150% of the service level of the baseline equipment.	Service level for lighting equipment is light output as stated in the applied methodology. The lumen output of the project LEDs would be between 90%-150% of the lumen output of the baseline lamps thus fulfilling this applicability criteria. However, as per criteria 8 of this table since the total light output of a project lamp should be equal to or more than that of the baseline lamp being replaced, only Service level between 100% and 150% shall be considered. Therefore, the baseline lamps of wattage 70W	Manufacturer's specification and Service level configuration tab in ER calculation sheet presented for the PIs.

		(865 ln) may also be replaced against 9W LED	
3	Requirements pertaining to the baseline of the retrofit projects and projects involving capacity increase are indicated in paragraphs 20 to 21 in the above cited general guidelines to SSC CDM methodologies.	The project instance is retrofit of LEDs in rural households of India. The project will follow the requirements pertaining to baseline in para 20-21 of the SSC CDM meth v23.1 for all instances included to GP.	ER calculation sheet
4	If the energy-efficient equipment contains refrigerants, then the refrigerant used in the project case shall have no ozone depleting potential (ODP).	The project does not involve equipment that contains refrigerants.	Manufacturer's specifications
5	This methodology credits emission reductions only due to the reduction in electricity and/or fossil fuel consumption from use of more efficient equipment. However, the calculation of project emissions shall include any incremental emissions, as compared to the baseline, associated with refrigerants used in the project equipment.	The PIs developed under present GP shall claim emission reductions only due to the reduction in electricity consumption from use of more efficient lighting equipment. As there are no refrigerants involved, incremental emissions associated with refrigerants is not applicable.	Manufacturer's specification and ER calculation sheet
6	The aggregate energy savings by a single project may not exceed the equivalent of 60 GWh per year for electrical end-use energy efficiency technologies. For fossil fuel end-use energy efficient	The SSC capacity limit applies to the methodology used. Therefore, no project activity batch shall exceed the applicable SSC limit which is 15 MW or 45 MW_{th} for Type I projects (not applicable), 60	Manufacture's specifications and distribution records and ER calculation sheet.

	technologies, the limit is 180 GWh thermal per year in fuel input.	GWhe/y or 180 GWh_{th}/y for type II projects, and 60,000 t/y for type III projects (not applicable).	
7	For both residential and commercial applications, the project shall explain the proposed method of distribution of project lamps and how collection (e.g. exchanged for project lamps) and destruction of baseline lamps will be conducted and documented.	The Project activity batch shall involve distribution of the LED to only those households which exchange old ICLs and will be subsequently destructed. Agreement with collection and distribution agency or any other document/ time stamped video etc. to demonstrate compliance with this applicability criteria	Video conferencing with the VVB while distribution of lamps to sample HHs under the project activity Contract between project proponent and LED manufacturer. A time stamped video of the destruction event, from the agency hired for collection, destruction, and recycling.
8	The total light output of a project lamp should be equal to or more than that of the baseline lamp being replaced; light output of the baseline and the project lamp shall be determined in accordance with relevant national or international standard/s	The LED with equivalent or more light output shall be used to replace baseline lamps. The Wattage and lighting output of ICLs shall be referred from Table 2 of the methodology.	Manufacturer's specifications which comply with BIS/BEE standard are used for lighting output and Wattage of LED bulbs.
9	The rated average life of each project lamp type shall be known ex ante and reported. Manufacturer specifications shall be used to determine the rated average life. The project shall cite the standard used by the manufacturer.	The rated average lifetime of the project lamp shall be known ex-ante and reported in relevant project documents of each PI. In addition, the standard used by the manufacturer for determining rated average life shall be mentioned.	Manufacturer's specifications provide evidence of rated average life of project lamps.

10	The project lamps utilized under the project activity shall, in addition to the standard lamp specifications, be marked for clear unique identification for the project. The method to meet this requirement includes, but is not limited to, the following: (a) Permanent marking of project number and name on each of the project lamps along with other specifications; (b) Marking using special codes, for example each project is permanently marked 'for CDM project, not for sale/resale' followed by project specific marking/labelling; (c) Other forms of identification using communication technologies (e.g. GPS, mobile phone networks) or lease/rental payment.	Each recipient of LED will be identified by a specific geographical location, customer name and Serial number of the electricity meter. The project Manager will maintain this database with complete details such as name of the customer, address/ description of location, Adhaar card details and contact telephone number(s). This will help in identifying unambiguously the recipient of new equipment distributed under the project activity. In addition, as required by the applied methodology, each of the LEDs distributed under this GP shall be marked with a logo designed by PP for unique identification.	Photo of LED with above specifications and distribution database
11	The project activity shall be designed to limit undesired secondary market effects (e.g. leakage) and free riders by ensuring that replaced lamps are collected and destroyed. Further project participants are required to undertake at least one of the following actions: (a) Directly installing the project lamps; (b) Charging at least a	To make sure that the replaced lamps are collected and destroyed steps as per criteria 8 of this table will be followed.	Agreement with agency responsible for collection, destruction and recycling of baseline lamps.

	minimal price for efficient lighting equipment; (c) Restricting the number of lamps per household distributed through the project activity to six.		
12	The households receiving project lamps are connected to a national or regional electricity grid.	The household receiving the project lamps are connected to national grid.	Distribution database

Each PI as well as each project activity batch meets the small-scale limit i.e., energy efficient bulbs distributed in this Project is below 60 GWhe/y of the type II project limits.

The estimated no. of LED bulbs to be distributed in a project activity batch is 464006. This estimated number assumes 5.5 operating hours per day. In case of change of operating hours based on 90-day campaign this number may change so that it does not cross the capacity limit of 60GWhe.

Parameter		**Value**
Wattage of bulb (W)		70
Number	=	*464006*
Wattage in kW	=	0.07
Operating hours	=	2007.5
Annual Technical grid Losses	=	10%
Total Energy Consumption (in MWh)	=	68,673

Parameter		**Value**
Wattage of bulb (W)		9
Number	=	*464006*
Wattage in kW	=	0.009
Operating hours	=	2007.5
Annual Technical grid Losses	=	10%
Total Energy Consumption (in MWh)	=	8,816

Total Energy Savings = Energy consumption by ICLs- Energy consumption by LEDs
= (68,673 – 8,816)/10^3 MWh
= **59.86 GWhe**

The total Energy savings from project activity batch is 59.86 GWhe/yr which is less than the SSC limit of 60 GWhe/y. Therefore, this Project activity batch complies with the methodology applicability criteria of meeting the SSC limit.

Similarly, the Project Instances to be added under this GP shall comply with this requirement and the total number of LEDs to be distributed under subsequent project activity batches should be such that total capacity of each batch under this Grouped Project does not exceed the SSC limit.

3.3 Project Boundary

As per methodology, the project boundary is the physical, geographical location of all equipment and systems affected by the project activity. Further, in the project boundary, the electricity grid of India is also included. As the activity involves replacement of ICLs with LEDs, the project boundary is the physical, geographical location of each LED that replaces the ICL. The following sources and greenhouse gases have been included in the project boundary.

Source*		Gas	Included?	Justification/Explanation
Baseline	Thermal power plants serving the grid	CO_2	Yes	Major source of emissions
		CH_4	No	Minor source. Excluded and is conservative
		N_2O	No	Minor source. Excluded and is conservative
		Other	No	Not Applicable
Project	Thermal power plants serving the grid	CO_2	Yes	Major source of emissions
		CH_4	No	Minor source. Excluded and is conservative
		N_2O	No	Minor source. Excluded and is conservative
		Other	No	Not Applicable

*The source of GHG emissions is electricity use in baseline and grouped project. And since the technology uses grid electricity therefore thermal power plants are considered source of emissions

The various LEDs shall be distributed in the project boundary of India. The map of project boundary is shown in section 1.12.

Figure 5: Map of India

3.4 Baseline Scenario

As the PIs under the Grouped Project do not involve new construction projects, application of 'General guidelines for SSC CDM methodologies' for determining baseline as indicated in the applied methodology AMS II.C.; version 15.0 is not obligatory. In India relevant authority for regulations concerning energy savings is the Bureau of Energy Efficiency (BEE). This was set up under the Energy Conservation Act, 2001 to promote energy efficiency. There are various mandatory and voluntary provisions of the Act that have been implemented by BEE in the form of projects and schemes such as the announcement of National Mission on Enhanced Energy Efficiency (NMEEE) in 2009. However, there is currently no legislation mandating the installation or usage of LED lighting technology. Hence there are no regulatory constraints.

The most plausible baseline scenario thus is continued use of inefficient ICLs and/or fluorescent lamps in the low-income households, small commercial spaces as well as SMEs. Even though ICLs consume a lot of electricity, they find huge acceptance amongst lower income groups owing to their low price. While a 60-watt incandescent bulb costs between INR 10-15, a 9-watt LED (comparable lumen output) costs anywhere between INR 100-150[14] in retail outlets. This high upfront cost of the LEDs acts as a deterrent for their use in low-income households.

Further, a survey was conducted by selecting 100 samples from each state. Following states where PP is targeting to distribute the LED under the Grouped project: Assam, Bihar, Chandigarh,

[14] https://www.amazon.in/Philips-9-watt-Energy-Filament-Crystal/dp/B09YXQK1LS/ref=sr_1_10?adgrpid=1207264258218576&hvadid=75454147162505&hvbmt=bp&hvdev=c&hvlocphy=156701&hvnetw=o&hvqmt=p&hvtargid=kwd-75454377600363%3Aloc-90&keywords=bulb+15w+led&qid=1669814887&qu=eyJxc2MiOiIwLjAwIiwicXNhIjoiMC4wMCIsInFzcCI6IjAuMDAifQ%3D%3D&sr=8-10

Chhattisgarh, Goa, Gujarat, Haryana, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Uttarakhand, Uttar Pradesh and West Bengal.

The survey was done for approx. 2100 Households from across 21 states. Since the households targeted are in rural and peri urban areas with similar socio-economic conditions it represents a homogenous population and therefore random sampling approach was adopted. The sample size was determined using the Guidelines for Sampling and Surveys for CDM Project activities and Programme of Activities Ver. 4.0 (EB67, A06). The guideline for annual surveys required the level of precision of 10% and a confidence level of 90%. For the project, 'p' value of 80% was considered based on a pilot study. Therefore, using following equation sample size was calculated:

$$n \geq \frac{1.645^2 N \times p(1-p)}{(N-1) \times 0.1^2 \times p^2 + 1.645^2 p(1-p)}$$

The survey results show the most plausible baseline scenario in rural and peri urban households of 21 states of India are use of ICLs. The result of the survey has been submitted to the VVB.

This is also in line with paragraph 51 of applied methodology, according to which the "assumed baseline scenario is that lighting by the project lamps would have been provided by the lamps collected and replaced by the project activity". The lamps collected and replaced in different project activity batches shall only be Incandescent bulbs.

As per para 17, section 5.3 of the methodology, Procedure for estimating the end of the remaining lifetime of existing equipment, to estimate the end of useful life of the baseline equipment "Tool to determine the remaining lifetime of equipment" shall be used. As per the tool, Project participants may use one of the following options to determine the remaining lifetime of the equipment:

a) Use manufacturer's information on the technical lifetime of equipment and compare to the date of first commissioning;

b) Obtain an expert evaluation;

c) Use default values.

Using option (a) the life of the baseline lamps i.e. Incandescent lamps is approx. 1000 hours[15] (which is equivalent to 6 months considering a lamp operates for an average 5.5 hours a day) for established brands supplying ICLs, whereas the ones used in the targeted rural regions of the project are locally manufactured without any warranty. These ICLs are available at a very low price

[15] https://www.sciencedirect.com/topics/engineering/incandescent-lamp

of 10-15INR[16][17] whereas inverter LEDs are available at INR 500 for a 9W LED[18]. Moreover, when people buy LED bulbs in retail, they only get 1 year warranty so it is too risky for them to invest so much money. Since a LED is available at a high cost against an equivalent lumen of ICL, this acts as a barrier as end users are not willing to spend high upfront cost. Thus, in baseline scenario end users would prefer to replace ICL with a new cheap ICL only.

Additionally, the energy efficient lamps made available by Govt. schemes like Bureau of Energy Efficiency's (BEE) '*Bachat Lamp Yojana*' which was replacement of ICLs with CFLs at a discounted price, was registered under CDM[19] to offset the costs incurred from the program with the sale of Certified emission reductions. Another scheme, '*UJALA Yojana*' was launched in India in May 2015 where LEDs were provided to residential customer at 40% of the market price, but the program had very low turnout from rural areas (less than 2%)[20] because, even at a subsidised price of ₹50 a bulb, rural households could not afford it. Therefore, another scheme "*Gram Ujala*" was launched in 2021 by Convergence Energy Services Ltd (CESL) a wholly owned subsidiary of Govt. of India Undertaking, Energy Efficiency Services Limited, targeting rural households where the LEDs will be provided at an affordable price of INR 10 but to cover the program costs this scheme was also registered under CDM[21][22] and the CPAs have now been transitioned to voluntary GHG program-VERRA[23].

As per para 10 of the methodology, AMS II.C. Project participants shall apply the general guidelines for the small-scale (SSC) Clean Development Mechanism (CDM) methodologies. Further, according to SSC general Guidelines, version 23.1 para 15 section 4.5.2, for consideration of national policies and circumstances in baseline scenarios, project participants shall refer to the applicable provisions for the establishment and description of baseline scenario for all project types in the project standard. So, as per CDM Project Standard for project activities,

[16] As reported by the baseline users during audit as well

[17] https://www.indiamart.com/proddetail/100-watt-incandescent-light-bulb-20914238733.html - The price mentioned is for bulk purchase whereas in retail it is available at 10-15 INR as confirmed to the DOE during the baseline survey audit

[18] https://www.flipkart.com/sun-king-9w-led-light-inverter-bulb-rechargeable-2200-mah-b-22-base-4-hours-power-backup-cool-white-color-hrs-emergency/p/itm4704ec3b74843

https://www.indiamart.com/proddetail/ssk-srl-15w-mg-syska-led-bulb-22575030497.html

[19] https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/CZ59J1XMR8K4ELUS6WY3BA0IVTGQ2F/view

[20] https://www.thehindubusinessline.com/companies/eesl-brings-in-carbon-finance-for-led-bulb-distribution-in-rural-areas/article62177914.ece

[21] https://sarkariyojana.com/gram-ujala-scheme/#:~:text=%E0%A4%97%E0%A5%8D%E0%A4%B0%E0%A4%BE%E0%A4%AE%20%E0%A4%89%E0%A4%9C%E0%A4%BE%E0%A4%B2%E0%A4%BE%20%E0%A4%AF%E0%A5%8B%E0%A4%9C%E0%A4%A8%E0%A4%BE%20%E0%A4%85%E0%A4%A5%E0%A4%B5%E0%A4%BE%20Gram,%E0%A4%AA%E0%A4%B0%20%E0%A4%95%E0%A4%BE%E0%A4%AE%20%E0%A4%95%E0%A4%B0%20%E0%A4%B0%E0%A4%B9%E0%A5%80%20%E0%A4%B9%E0%A5%88%E0%A5%A4

[22] https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/MN26BFZ0CHPIR47GQ1L3YES9XVKTUD/view

[23] https://registry.verra.org/app/projectDetail/VCS/3850

version 3.0, paragraph 64 when establishing the baseline scenario, the project participants shall take into account the following two types of national and/or sectoral policies or regulations:

(a) National and/or sectoral policies or regulations that give comparative advantages to more emissions-intensive technologies or fuels over less emissions-intensive technologies or fuels;

(b) National and/or sectoral policies or regulations that give comparative advantages to less emissions-intensive technologies over more emissions-intensive technologies (e.g. public subsidies to promote the diffusion of renewable energy or to finance energy efficiency programmes).

The schemes like Bachat Lamp Yojana, Ujala Yojana, Gram Ujala are National and/or sectoral policies or regulations as described in paragraph (b) above. As these have been implemented since the adoption by the COP of the CDM M&Ps (decision 17/CP.7, 11 November 2001), these need not be taken into account in establishing the baseline scenario as per paragraph 65 (b) of CDM Project Standard.

Therefore, considering the subsidies provided under Bachat Lamp Yojana, Ujala Yojana, Gram Ujala schemes is after 2001, they cannot be considered plausible baseline scenarios.

From the above explanation it is found that the LED bulb is too expensive for rural communities especially when they have to replace 4-5 lamps in their households. Rural communities are more comfortable in buying and replacing the cheap incandescent lamp (ICL) which costs around 10-15 INR (USD 15 cents). This justifies that project activity is not a baseline scenario and households continue to replace fused ICL with a new ICLs at the end of its life.

3.5 Additionality

As per the methodology “If the project lamps sold or distributed by the project coordinator to households are self-ballasted LED lamps, the project activity is deemed automatically additional. The provision is valid for three years from 28 November 2014; the Board may reassess the validity of the provision and extend or update it if needed. Any update does not affect the project activities that request registration as a CDM project activity or a programme of activities by 27 November 2017”. However, there has been no update from the EB whether the provision has been extended or withdrawn.

Therefore, the project is following Methodological Tool 21: Demonstration of additionality of small-scale project activities version 13.1 to prove project’s additionality using Investment barrier.

The proposed Grouped Project is a voluntary activity initiated by the project proponent. The initiative is solely based on expected emission reduction revenue and is completely financed by MFIs. There are no mandatory policies and/or regulations in India that mandates the installation of LED lighting equipment in households.

Implementation of LED projects pose considerable investment barrier owing to high upfront cost of quality LEDs. LED bulbs are provided to customer on loan which is paid by the end user on weekly basis. Under the assumption that a particular project aims to replace 70W ICLs with 9W, the cost of LEDs is quite substantial as compared to the ICLs since the LED costs high in retail outlets. Even under Ujala scheme which is highly subsidized, a 9W LED bulb is sold for INR 65-70[24], while a single ICL costs only around INR 10- 15/- per piece. This makes the procurement and distribution cost of LEDs way much higher, while there is no source of revenue from it. The benefit in terms of energy saving is passed on directly to the consumer and the investor can expect returns only from sale of Emission Reductions. Thus, for each PI implemented under the Grouped Project, there exists an investment barrier which has been established according to Tool 21- "Demonstration of additionality of small -scale project activities"; Version 13.1. In addition, Guidelines stated under paragraph 4.3 of 'Tool for the demonstration and assessment of additionality'; version 07.0, are also followed for demonstrating that the PIs will not be economically or financially feasible, without the revenue from the sale of Emission Reductions.

Since the investment analysis has confidential component like the cost of each LED, the investment analysis sheet has been provided to the validator with all the cost details. The investment analysis sheet clearly shows that the first Project activity batch has negative NPV without considering revenue from sale of emission reductions from the project.

3.6 Methodology Deviations

The project did not apply any methodology deviations.

4 IMPLEMENTATION STATUS

4.1 Implementation Status of the Project Activity

Total number of LEDs implemented are 590,203 across 21 states of India. The state-wise break-up of distributed LEDs is provided below:

S.no	States	2021	2022
1	Assam	0	44
2	Bihar	38997	43613
3	Chandigarh	0	4
4	Chhattisgarh	2	8956
5	Goa	3	24
6	Gujarat	7144	20165
7	Haryana	9444	9318
8	Himachal Pradesh	859	1881

[24] Ujala Gujarat Yojana - LED Bulbs, Tubelights, Fans Distribution Scheme (sarkariyojana.com)

9	Jharkhand	11580	11041
10	Karnataka	5982	7700
11	Kerala	577	1517
12	Madhya Pradesh	2471	43479
13	Maharashtra	1	2971
14	Odisha	0	5111
15	Punjab	21734	12811
16	Rajasthan	22966	51465
17	Sikkim	0	34
18	Tamil Nadu	1	43900
19	Uttarakhand	638	1053
20	Uttar Pradesh	19664	166828
21	West Bengal	1123	15340
	Total	142948	447255

Each project activity batch will have maximum of 464,006 LED lamps and will comply with methodological requirements of a small-scale project.

The grouped project has been in normal operation for its operational lifetime of 21 years, and there have been no events that may impact the GHG emission reductions. Emission reductions have been calculated based on the number of stoves operational in each particular month of the crediting period.

5 ESTIMATED GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

According to paragraphs 20 and 21 of the applied methodology, Option 1 i.e., 'Constant Load Equipment's' is applicable for the present project. Baseline emission is calculated using the following equations:

$BE_y = E_{BL,y} \times EF_{CO2,ELEC,y} + Q_{ref,BL} \times GWP_{ref,BL}$ Equation 1

As the project entails replacement of LED in place of ICLs hence no refrigerant is involved. The above equation is then modified as:

$BE_y = E_{BL,y} \times EF_{CO2,ELEC,y}$ Equation 2

Energy consumption for baseline in year y is calculated as:

$E_{BL,y} = \sum_i (n_i \times \rho_i \times o_i/(1 - l_y)$ x 0.95 Equation 3

Where:

BE_y	=	Baseline emissions in year y (tCO_2e)
$E_{BL,y}$	=	Energy consumption for the baseline in year y (kWh)
$EF_{CO2,ELEC,y}$	=	Electricity emissions factor. If electricity displaced is grid, the emission factor in year y shall be calculated in accordance with the provisions in AMS-I.D (tCO_2/MWh). If electricity displaced is captive electricity, the emission factor in year y shall be calculated in accordance with the "Tool to calculate baseline, project and/or leakage emission from electricity consumption"
$\sum_i$	=	Sum over the group of i baseline equipment (e.g. 40W incandescent lamps, 5 hp motors) replaced or that would have been replaced. The devices in group i must be closely related by type (e.g. motor), size (e.g. 5 hp), service (e.g. conveyor belt, office building chilled water pump), and any other relevant factors that determine energy consumption of the equipment
n_i	=	Number of pieces of equipment of the group of i baseline equipment replaced or that would have been replaced
ρ_i	=	Electrical power demand (kW) of the group of i baseline equipment (e.g., 40W incandescent lamps, 5 hp motors).
o_i	=	Average annual operating hours of the group of i baseline equipment. The operating hours of the baseline equipment in year y can be determined using surveys by continuous measurement of usage hours of baseline equipment for a minimum of 90 days. For a large population of baseline equipment: (a) Use a representative sample (sampling determined by a minimum 90% confidence interval and 10% maximum error margin); (b) Apply correction for seasonal variation, if any; and (c) Ensure that sampling is statistically robust and relevant, i.e. the selection of the equipment to be analysed for operating hours has a random distribution and is representative of target population (size, location).
l_y	=	Average annual technical grid losses (transmission and distribution) during year y for the grid serving the locations where the devices are installed, expressed as a fraction. This value shall not include non-technical losses such as commercial losses (e.g. theft). The average annual technical grid losses shall be determined using recent, accurate and reliable data available for the host country. This value can be determined from recent data published either by a national utility or an official governmental body. The reliability of the data used (e.g. appropriateness, accuracy/uncertainty, especially exclusion of non-technical grid losses) shall be established and documented by the project participant. A default value of 0.1 shall be used for average annual technical grid losses, if no recent data are available or the data cannot be regarded accurate and reliable
$Q_{ref,BL}$	=	Average annual quantity of refrigerant used in the baseline to replace the refrigerant that has leaked (tonnes/year). Only applies to projects that replace equipment containing ODP refrigerants. Values from Chapter 7: Emissions of Fluorinated Substitutes for Ozone Depleting Substances, Volume 3, Industrial Processes and Product Use, 2006 IPCC Guidelines for National Greenhouse Gas Inventories may be used

$GWP_{ref,BL}$	=	Global Warming Potential of the baseline refrigerant (tCO_2e/t refrigerant)
0.95	=	Default value of net-to-gross adjustment factor

5.2 Project Emissions

Project emissions consist of electricity used in the project equipment, determined as follows.

$$PE_y = EP_{PJ,y} \times EF_{CO2,y} + PE_{ref,y}$$ Equation 4

Where:

PE_y = Project emissions in year *y* (tCO2e)

$EP_{PJ,y}$ = Energy consumption in project activity in year y. This shall be determined ex post based on monitored values

$EF_{CO2,y}$ = Emission factor for electricity or thermal baseline energy. The emissions associated with grid electricity consumption should be calculated in accordance with the procedures of AMS-I.D. For fossil fuel displaced reliable local or national data for the emission factor shall be used; IPCC default values should be used only when country or project-specific data are not available or difficult to obtain

$PE_{ref,y}$ = Project emissions from physical leakage of refrigerant from the project equipment in year *y* (tCO_2e/y)

Since the project does not involve use of refrigerant Equation 4 becomes

$$PE_y = EP_{PJ,y} \times EF_{CO2,y}$$ Equation 5

The project energy consumption in the case of project activities that displace grid electricity is determined as follows using the data of the project equipment or system:

$$EP_{PJ,y} = \sum_t \sum_i (n_i \times \rho_i \times o_i) / (1 - l_y) \text{ X } 0.95$$ Equation 6

Where:

n_i	=	Number of group *i* project devices operating in time interval *t* year *y*
ρ_i	=	Electrical power demand (kW) of the group i project devices measured during the time interval *t* in year y

o_i	=	Operating hours of group of i project devices in the time interval *t* in year *y* Note that ρ_i and o_i may be determined separately or in combination, i.e. as energy consumption. For efficient lighting project activities, default values for the hours of utilization of lamps provided in the methodology may be used.
l_y		Average annual technical grid losses (transmission and distribution) during year y for the grid serving the locations where the devices are installed, expressed as a fraction. This value shall not include non-technical losses such as commercial losses (e.g. theft).
0.95	=	Default value of net-to-gross adjustment factor

5.3 Leakage

According to the applied methodology, leakage emissions have to be considered if the energy efficiency technology involves equipment transferred from another activity. In the Grouped Project, LEDs that will be distributed to the households are not transferred from another activity; hence leakage emissions are not applicable. Therefore,

$LE_y = 0$

5.4 Estimated Net GHG Emission Reductions and Removals

The emission reduction will be calculated in accordance with equation 10, of the small-scale methodology AMS II.C., Version 15.0.

$ER_y = (BE_y - PE_y) - LE_y$ Equation 7

Where:

ER_y = Emission reductions in year *y* (tCO_2e)

BE_y = Baseline emissions in year y (t tCO_2e)

PE_y = Project emissions in year y (tCO_2e)

LE_y = Leakage emissions in year *y* (tCO_2e)

Year	Estimated GHG emission reductions or removals (tCO_2e)
2021 (01/05/2021-31/12/2021)	11,140
2022	53871
2023	53871
2024	53871

2025	53871
2026	53871
2027	53871
2028 (01/01/2028-30/04/2028)	17,709
Total estimated ERs	352,075
Total number of crediting years	7
Average annual ERs	50,296

6 MONITORING

6.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{CO2,ELEC,y}$
Data unit	tCO_2/MWh
Description	Combined margin emission factor for Indian grid calculated according to equation 16 of methodological tool 07- 'Tool to calculate the emission factor for an electricity system'; version 07)
Source of data	CO2 Baseline Database for the Indian Power Sector, User Guide; Version17.0 (October 2021)[25]
Value applied	0.90
Justification of choice of data or description of measurement methods and procedures applied	The PIs shall apply the latest grid emission factor database available on the CEA website and fix the value ex-ante.
Purpose of Data	Calculation of baseline and project emissions
Comments	-

Data / Parameter	l_i

[25] CDM - CO2 Baseline Database - Central Electricity Authority (cea.nic.in)

Data unit	Hours
Description	Rated average operating hours for LED type *i*
Source of data	Manufacturer's specification
Value applied	25,000
Justification of choice of data or description of measurement methods and procedures applied	Determined from independent life-tests of the LEDs as per national / international standard or any other industry admissible test. The value is fixed ex-ante. The value is provided for 9W and 15W LED bulbs, however ex-post for PIs included later to the GP the wattage of LED lamps installed may be different.
Purpose of Data	-
Comments	The manufacturer has specified rated life of 25,000 hrs. The independent life test of the bulb as per national/international standard shall be provided.

Data / Parameter	$\rho_{i,\,b\,(XW)}$
Data unit	Watts
Description	Rated power of baseline lamps replaced
Source of data	Actual lamp collection record database
Value applied	60W, 70W, 75W
Justification of choice of data or description of measurement methods and procedures applied	At the time of the exchange of baseline lamp, nameplate data of wattage will be recorded for each replaced lamp. The data will be recorded through a handheld device that will relay it in real time to a central DMS. Industry standard software, databases, infrastructure and backup procedures will be followed ensuring full auditability and long-term data integrity and security so that data is not misreported, overwritten or lost.
Purpose of Data	Calculation of baseline emissions
Comments	The project may replace the baseline lamps of wattage 60W (715 ln) against 9W LED which meets methodology service level requirement. Similar Service level requirement (between 100% and 150%) shall be checked for different wattage of PIs introduced in future

Data / Parameter	$\rho_{i,\,p\,(YW)}$
Data unit	Watts
Description	Rated power of project lamps
Source of data	Manufacturer's specification
Value applied	9W, 12W
Justification of choice of data or description of measurement methods and procedures applied	The value has been provided by manufacturer.
Purpose of Data	Calculation of project emissions
Comments	For PIs added in the Grouped project later on, will comply with section 1.4 and service level configuration 100%-150% of the baseline lamp identified.

Data / Parameter	l_y
Data unit	-
Description	Average annual technical grid losses
Source of data	Default AMS-II.C option
Value applied	0.10
Justification of choice of data or description of measurement methods and procedures applied	As per the host country reports published by government sources the transmission and Distribution losses including unaccounted losses are approx. 20.46%[26] whereas as per the methodology, only technical grid losses without considering commercial losses need to be considered. Therefore, in absence of accurate data on technical losses from grid, the conservative emission reduction estimations using the default value of 0.10 has been done for average annual technical grid losses.
Purpose of Data	Calculation of baseline and project emissions
Comments	Fixed for crediting period

[26] file:///C:/Users/nehag/Downloads/General_Review_2021.pdf

6.2 Data and Parameters Monitored

Data / Parameter	$n_{i, b (XW)}$
Data unit	-
Description	Number of baseline lamps of X wattage replaced.
Source of data	Distribution database
Description of measurement methods and procedures to be applied	At the time of the exchange of baseline lamps a record will be kept of the number of replaced lamps. The data will be recorded through a handheld device that will relay it in real time to a central DMS. Industry standard software, databases, infrastructure and backup procedures will be followed ensuring full auditability and long-term data integrity and security so that data is not misreported, overwritten or lost. Data will be recorded for each category (X=50, 100 etc.) of lamps
Frequency of monitoring/recording	Annual or at the time of monitoring
Value applied	590,203
Monitoring equipment	Data will be collected via smart phone or tablet app module connected to data cloud. This allows data validation checks to be enforced at the point of collection, hence minimizing errors.
QA/QC procedures to be applied	Data will be stored in the project database for at least two years after the crediting period or the last issuance
Purpose of data	Calculation of baseline emissions
Calculation method	-
Comments	-

Data / Parameter	$n_{i \text{ baseline scrapped (XW)}}$
Data unit	-
Description	Number of baseline lamps of X wattage destroyed

Source of data	Database records on baseline lamps of (XW) wattage handed over to third party for scrapping
Description of measurement methods and procedures to be applied	The Project involves one to one replacement of baseline lamp with project lamp. At the time of the exchange of baseline lamp a record will be kept of the number of replaced equipment. The collected baseline lamps will be stored in boxes at a central facility. Each box will have suitable labels with information about the type, number and VERRA Project ID of baseline lamps stored in it. At the time of destruction of baseline lamps, the contracted entity will ensure a recording is done for independent monitoring of scrapped baseline lamps. This will ensure the leakage effect of the use of the replaced equipment in another activity is neglected, because the replaced equipment is scrapped. The recording will be available at the time of Verification.
Frequency of monitoring/recording	Annual
Value applied	For the first 2 years, ICLs replaced at actual is considered i.e. 590,203. For each project activity batch inserted will have a maximum of 464,006 ICLs replaced. Actual value will depend on ex-post monitoring.
Monitoring equipment	Number of baseline lamps that are destroyed will be cross checked with $n_{i,b(XW)}$
QA/QC procedures to be applied	Proper documentation in place to record all the collected lamps from households are actually destroyed. The destruction is documented via time stamped video records.
Purpose of data	Calculation of leakage emissions
Calculation method	Monitored
Comments	-

Data / Parameter	O_i
Data unit	Hours
Description	Average annual operating hours of XW baseline lamp
Source of data	Survey records

Description of measurement methods and procedures to be applied	The operating hours will be measured continuously for a period of 90 days with the help of run time meters installed on a sample of lighting points. The data thus measured will be used for calculating average daily operating hours. The value obtained will be multiplied with 365 days to give average annual operating hours of baseline/project lamps. Sample size will be determined in accordance to guidelines for Sampling and surveys for CDM project activities and programme of activities, version 04. For ex-ante calculation it is assumed that the average operating hours per ICL per day is 5.5 hours. The value shall be updated once the PP receives the data from the run time meters that will be installed in randomly selected sample HHs. The installation of the run time meters is expected by end of April'23 so that the data shall be monitored over 90 days period from Apr-June'2023. PP shall be taking into account the seasonal variations by applying correction factor (equivalent to difference in daytime length of season to be monitored and representative season of the campaign). Therefore, PP shall (a) Use a representative sample (sampling determined by a minimum 90% confidence interval and 10% maximum error margin); (b) Apply correction for seasonal variation; and (c) Ensure that sampling is statistically robust and relevant, i.e. the run time meters have random distribution, and is representative of target population (rural areas of Gujarat).
Frequency of monitoring/recording	Once during the crediting period
Value applied	2007.5 (5.5 * 365)
Monitoring equipment	Run time meters
QA/QC procedures to be applied	-
Purpose of data	Calculation of baseline and project emissions
Calculation method	-
Comments	Data will be stored in the project database for at least two years after the crediting period or the last issuance

Data / Parameter	$N_{i,\ project,\ operational\ (YW)}$

Data unit	-
Description	Total number of project lamps of Y wattage that are operational during time interval t
Source of data	Sample to be calculated from actual distribution records as stored in database; (option 1; paragraph 53 of applied methodology).
Description of measurement methods and procedures to be applied	Physical observation and recording response in questionnaires of sample of project lamps. The no. of lamps shall be categorized depending on the wattage (Y=9,15 etc.) Sample size will be determined in accordance with guidelines for Sampling and surveys for CDM project activities and programme of activities, version 04.
Frequency of monitoring/recording	Annual
Value applied	For the first 2 years, LED's distributed at actual is considered i.e. 590,203. For each project activity batch inserted will have a maximum of 464,006 LED's replaced.
Monitoring equipment	-
QA/QC procedures to be applied	Internal audits will be conducted on sampled data.
Purpose of data	Calculation of baseline and project emissions
Calculation method	-
Comments	Data will be stored in the project database for at least two years after the crediting period or the last issuance

6.3 Monitoring Plan

Description of the monitoring plan

The following are the monitoring requirements as defined in methodology AMS II.C.; Version 15.0.

I. For both residential and commercial applications, the PI needs to explain the following -

A. Proposed method of distribution of project lamps

- It is envisaged that the distribution of LEDs will be taken up in batches by the project proponent, by direct installation at each premise; and/or ICL collection and LED distribution through dedicated distribution points as advertised by the Project Proponent in the local

media e.g. retail outlets, resident association offices, schools etc. These batches will be registered under a Project activity batch as new Project Instances (PI).

- Where direct installation is not done, project implementer shall educate the recipient to install the LED in area where lighting needs are more, such as outdoors, shared areas, living room area and kitchen. The project Implementer shall conduct awareness campaigns to educate consumers about the importance of installing LEDs in areas with maximum lighting needs to maximize energy conservation and subsequent cost saving in terms of reduced utility bills.
- The replaced ICLs will be destroyed to ensure that these are not used elsewhere.
- Since as per methodology the consumer household should be connected to electricity grid it will be mandatory for consumers to present their latest utility bill/electricity meter serial no. to participate in the project. This database of each beneficiary who receives the LEDs shall be maintained by the implementer in electronic format.
- The participating consumers will be required to sign a Title transfer form with the project proponent declaring that LEDs are the property of PP.
- For the installed LED light points in the premises: Number, Wattage, date of supply is to be recorded.
- The compiled information will be electronically submitted to the project proponent at the end of the LED distribution campaign / monitoring survey in the target area.
- For both direct installation and distribution of LEDs through distribution points, LED installation would be the date of distribution to consumer. It is expected that the consumer would install the LED at the point where the ICL was in use. Normally, this would be done, before night-fall of the same day on which the LED is distributed.
- The records of distribution with start date and completion date would be maintained by distributor and declared to project proponent.
- Any discrepancies observed by the PP would be reported to the distributor for correction, and database will be accepted once the corrections are made. Where necessary this may also imply a change in the declared date.
- The total number of LEDs that are eligible for calculating emission reductions for the monitoring interval *y* should be less than or equal to the number of ICLs replaced inthe Grouped project.. To be conservative for emission reduction calculation the number of ICLs collected shall be used for baseline emission calculation.

B. **Process of collection and destruction of baseline lamps and its documentation.**

Collection and Storage

Replaced baseline lamps would be collected from the consumer or from dedicated LED distribution points (defined above) whichever is applicable, by the project proponent or an independent entity appointed by PP. Distribution of project lamps and collection of baseline lamps will be a simultaneous activity. Data related to collection of each baseline lamp that will be replaced by project lamp will be gathered using a hand-held device (smartphone/ tablet). The data so collected will be relayed real - time to a central server. Total number of baseline lamps segregated based on their wattage will be recorded in an unambiguous manner. Pre-determined number of baseline lamps of a specific wattage will then be packed in labelled boxes and stored

at a central facility until further processing. Either this system or any other system which ensures accurate and transparent collection of baseline lamps and their storage shall be employed by the PP.

Recording

Records of all replaced baseline lamps will be maintained by the PP in such a way that it can be verified any time during project crediting period. Records so maintained, in addition to other details, shall mention the following

1. Number of pieces of project lamps distributed under the project activity batches, identified by the wattage of lamp and the date of supply;

2. Number and wattage of the baseline lamps;

3. Data to unambiguously identify the recipient of the new lamp distributed under the project activity batch;

Destruction

The PP will arrange for destruction of collected baseline lamps in accordance with paragraph 43 and footnote 10 of applied methodology. To enhance process credibility, a time stamped video shall also be made.

C. Procedure for eliminating double counting of emission reductions.

Against each LED distributed to the beneficiaries, the PP shall reference the customer's name, his geographic location, electricity meter serial no. and other identification details. The PP will maintain this database with complete details.

LEDs replaced by this PI shall, in addition to the standard lamp specifications, be marked for clear unique identification. This is important to avoid double counting within the project (the same device belonging to two different Project activities of the same project).

The logo will be used on each of the LEDs that will be distributed under this Project and will include following information:

- Input Voltage, Rated wattage, Lumens, power factor of LED
- VERRA ID
- "Not for Sale"
- Manufacturing date"

In addition, the number of LEDs per household will be restricted to six

To ensure that no more than six LEDs are distributed to each consumer, the following procedures are in place:

- Training of persons involved in the distribution to emphasize that a maximum of 6 LEDs to be distributed to participating consumers;
- The electronic database allowing maximum entry of 6 LEDs for each consumer to be maintained at the time of distribution of LEDs. this database will not allow data entry beyond 6 LEDs.

D. Project Instance Database

According to methodology the following data are to be recorded at the time of Grouped Project implementation:

1. Number of pieces of new lamps distributed under the project activity, identified by the type of lamp and the date of supply;
2. The number and power of the replaced bulbs;
3. Data to unambiguously identify the recipient of the new equipment distributed under the project activity batch;

Advanced data collection system will be employed making use of hand-held digital devices (smart phones and/or tablets) that, soon after collection, will load the captured data to a central data server for storage. The data transmission will happen in real-time, so that data issues could be resolved while the field team is still at the location. The GPS module will link the collected data to the geographical location enabling easy identification of households. As required by paragraph 55 of the applied methodology, the following information will be stored in the DMS

- Address along with GPS coordinates (where applicable)
- Number of pieces of new bulbs distributed under the grouped project, identified by the type of bulb, wattage and the date of supply
- The number and power of the replaced bulbs
- Electricity meter serial number

In addition to above, the following data will be recorded during annual surveys

- A list of consumers who participated in the survey (name, address, and area).
- Information on the date on which the consumer was surveyed.
- Information on any changes made to the LED (exchange, repair etc).

E. Ex-post monitoring Survey

For the proposed Grouped Project, sample of consumers will be randomly selected from the database.The sampling is as per following criteria:

Sampling Criteria

1. The survey should cover the PI area,
2. Random sample group to be determined using statistical tools as representing the consumers falling under the proposed PI area. Survey sample size shall be determined to have at-least 90% confidence level with 10 % maximum margin of error[17].

Monitoring survey will be carried out either through computer assisted personal interview (CAPI) where data is collected via smart phone or tablet app module connected to data cloud allowing data validation checks to be enforced at the point of collection, hence minimizing errors or through questionnaires and physical observations where respondents are requested to fill pre-compiled questionnaire. The data will be collected and collated centrally by the PP. The sampling plan has been tabulated below for ex-ante as well as ex-post sampling of parameters.

SAMPLING PLAN

S. No	Information head	Coverage
1	**Sampling Objectives**	Sampling Objective is to obtain a reliable estimate of the keyvariables used in the estimation of GHG reductions viz.: *a.* Operating hours of replaced ICL lamps using run time meters. *b.* Number of operational project lamps in time interval 't'- Annual monitoring
2	**Target Population**	The proposed project activities employ a homogenous technology with similar operating characteristics i.e. LED; but are dispersed amongst a large number of consumers. The target population is the end user representative of the projectscenario using the LED technology. A list of end users with contact details will be maintained in the Project Database.
3.	**Sampling Frame.**	The sampling frame is representative of the population and shall consist of all households where incandescent bulbs will be replaced by LEDs under the Project activity batch of the GP. For the Project activity batches, the sample frame is the project database which includes the households targeted for project implementation. The units in the sampling frame shall meet the following criteria: *a.* All units will have a unique identification no.- Electricity meter serial no. *b.* All units can be easily traced –contact information, geographical location or other relevant information of beneficiary is present *c.* Every element of the population is present only once in theframe *d.* No elements from outside the population of interest are present in the frame Where information miss-match is observed, conservative assumptions would be applied.
4	**Sample Method.**	Considering the homogenous nature of target population, 'Simple Random Sampling' will be used in which unbiased random selection of individual households is carried out to ensure that from the many samples which are drawn, the average sample would accurately represent the target population.

5	**Desired Precision / Expected Variance and Sample Size.**	AMS-II.C. Version 15.0 requires a minimum 90% confidenceinterval and 10% maximum error margin. To estimate the number of premises to be surveyed with a 10% margin of error at desired confidence level of 90%, the optimal sample size n is given by: 1. For proportional parameters $n \geq \frac{1.645^2 \, N \times p(1-p)}{(N-1) \times 0.1^2 \times p^2 + 1.645^2 \, p(1-p)}$ Here, n = Sample size N = Total number of LEDs distributed p = Our expected proportion 1.645 = Represents the 90% confidence required 0.1 = Represents the 10% relative precision (0.1x0.5 = 0.05 =5% points either side of p) The above equation has two unknowns- n and p. However, using information from a pilot study, a possible value of p, can be used for estimating n. Requirements of Guidelines for Sampling and surveys for CDM project activities and programme of activities, version 4.0 shall be followed.
6	**Minimum Sample Size**	If the sample size calculation returns a value of less than 30 samples, a minimum sample size of 30 shall be chosen when the parameter of interest is a proportion. If the parameter of interest is a numeric mean value (i.e. not a proportion or percentage) the Student's t distribution shall be used if the resulting sample size is less than 30.

F. Personnel Training

The personnel involved in collecting field data should be trained before every field visit whether it is prior to project implementation or ex-post. And evidence (attendance sheet, power point presentations) in support of the training should be documented.

G. Roles and Responsibilities of Project Proponent

- Development of VCS project Description using latest template.
- Registration of the project with VERRA.
- Inclusion of PIs to the Grouped Project upon fulfilling the eligibility criteria as per section 1.4
- PP itself or through a hired consultant shall officially communicate with VERRA for project registration

- Providing LEDs with equivalent or higher lumen output for free in exchange for Incandescent Lamps that are currently being used in the premises.
- Getting the project validated/verified by a Designated Operational Entity
- Carrying out annual surveys and monitoring
- Maintaining the project database and other documentation required by VERRA
- Preparing the Monitoring Reports for the new Project activity batches

H. Organizational Structure

Person	Role
PP database administrator	The database administrator is responsible for updating and maintaining all electronic databases. Required competencies include experience with data management systems (e.g. Excel, STATA, or SPSS), minimum 2 years working experience in a similar field, and at minimum a Bachelor's degree from an institution of higher education.
Monitoring team	The monitoring team will be assigned by the PP to conduct the user interviews and check the operational status of LEDs in Households during the periodic sampling and reports the results to the database administrator. The skills and experience required for the data collection activities include: • Experience conducting surveys/tests • Experience conducting door-to-door surveys • Local language skills (especially important for input to questionnaire design and interviewing of end users) • English language skills • Cultural awareness • Numerical proficiency • Data entry skills

7 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

7.1 Data and Parameters Monitored

Data / Parameter	$n_{i,\,b\,(XW)}$
Data unit	-

Description	Number of baseline lamps of X wattage replaced.
Value applied	For the first 2 years, ICLs distributed at actual is considered i.e. 590,203. For each project activity batch inserted will have a maximum of 464,006 ICLs replaced. Ex-post actual ICL collected value shall be used
Comments	-

Data / Parameter	$n_{i\ baseline\ scrapped\ (XW)}$
Data unit	-
Description	Number of baseline lamps of X wattage destroyed
Value applied	For the first 2 years, ICLs replaced at actual is considered i.e. 590203. For each project activity batch inserted will have a maximum of 464006 ICLs replaced.
Comments	-

Data / Parameter	O_i
Data unit	Hours
Description	Average annual operating hours of XW baseline lamp
Value applied	2007.5 (5.5 * 365)
Comments	Data will be stored in the project database for at least two years after the crediting period or the last issuance

Data / Parameter	$N_{i,\ project,\ operational\ (YW)}$
Data unit	-
Description	Total number of project lamps of Y wattage that are operational during time interval t
Value applied	For the first 2 years, LEDs distributed at actual is considered i.e. 590,203. For each project activity batch inserted will have a maximum of 464,006 LED's replaced.

Comments	Data will be stored in the project database for at least two years after the crediting period or the last issuance

7.2 Baseline Emissions

According to paragraphs 20 and 21 of the applied methodology, Option 1 i.e., 'Constant Load Equipment's' is applicable for the present project. Baseline emission is calculated using the following equations:

$BE_y = E_{BL,y} \times EF_{CO2,ELEC,y} + Q_{ref,BL} \times GWP_{ref,BL}$ Equation 1

As the project entails replacement of LED in place of ICLs hence no refrigerant is involved. The above equation is then modified as:

$BE_y = E_{BL,y} \times EF_{CO2,ELEC,y}$ Equation 2

Energy consumption for baseline in year y is calculated as:

$E_{BL,y} = \sum_i (n_i \times \rho_i \times o_i/(1 - l_y)$ x 0.95 Equation 3

Where:

BE_y	=	Baseline emissions in year y (tCO_2e)
$E_{BL,y}$	=	Energy consumption for the baseline in year y (kWh)
$EF_{CO2,ELEC,y}$	=	Electricity emissions factor. If electricity displaced is grid, the emission factor in year y shall be calculated in accordance with the provisions in AMS-I.D (tCO_2/MWh). If electricity displaced is captive electricity, the emission factor in year y shall be calculated in accordance with the "Tool to calculate baseline, project and/or leakage emission from electricity consumption"
$\sum_i$	=	Sum over the group of i baseline equipment (e.g. 40W incandescent lamps, 5 hp motors) replaced or that would have been replaced. The devices in group i must be closely related by type (e.g. motor), size (e.g. 5 hp), service (e.g. conveyor belt, office building chilled water pump), and any other relevant factors that determine energy consumption of the equipment
n_i	=	Number of pieces of equipment of the group of i baseline equipment replaced or that would have been replaced
ρ_i	=	Electrical power demand (kW) of the group of i baseline equipment (e.g., 40W incandescent lamps, 5 hp motors).

o_i	=	Average annual operating hours of the group of i baseline equipment. The operating hours of the baseline equipment in year y can be determined using surveys by continuous measurement of usage hours of baseline equipment for a minimum of 90 days. For a large population of baseline equipment: (a) Use a representative sample (sampling determined by a minimum 90% confidence interval and 10% maximum error margin); (b) Apply correction for seasonal variation, if any; and (c) Ensure that sampling is statistically robust and relevant, i.e. the selection of the equipment to be analysed for operating hours has a random distribution and is representative of target population (size, location).
l_y	=	Average annual technical grid losses (transmission and distribution) during year y for the grid serving the locations where the devices are installed, expressed as a fraction. This value shall not include non-technical losses such as commercial losses (e.g. theft). The average annual technical grid losses shall be determined using recent, accurate and reliable data available for the host country. This value can be determined from recent data published either by a national utility or an official governmental body. The reliability of the data used (e.g. appropriateness, accuracy/uncertainty, especially exclusion of non-technical grid losses) shall be established and documented by the project participant. A default value of 0.1 shall be used for average annual technical grid losses, if no recent data are available or the data cannot be regarded accurate and reliable
$Q_{ref,BL}$	=	Average annual quantity of refrigerant used in the baseline to replace the refrigerant that has leaked (tonnes/year). Only applies to projects that replace equipment containing ODP refrigerants. Values from Chapter 7: Emissions of Fluorinated Substitutes for Ozone Depleting Substances, Volume 3, Industrial Processes and Product Use, 2006 IPCC Guidelines for National Greenhouse Gas Inventories may be used
$GWP_{ref,BL}$	=	Global Warming Potential of the baseline refrigerant (tCO_2e/t refrigerant)
0.95	=	Default value of net-to-gross adjustment factor

So,

Parameter	Description	Value (70 W)
BE_y	Baseline emissions in year *y*	0.133
$E_{BL,y}$	Energy consumption for the baseline (ICLs) in year *y*	148
$EF_{CO2,ELEC,Y}$	CM emissions factor	0.9
n_i	Number of equipments of baseline replaced	1
ρi,baseline(KW)	Rated power of baseline lamps replaced	0.07

o_i	Average annual operating hrs	2007.5
l_y	Average annual technical grid losses	0.10
0.95	Net to gross adjustment factor	0.95

Thus, the baseline emissions are calculated to be:

$BE_y = E_{BL,y} \times EF_{CO2,ELEC,y}$

For Project Activity Batch 1,

$BE_y = 0.133*142,948$

$=19,040\ tCO_2e$

7.3 Project Emissions

Project emissions consist of electricity used in the project equipment, determined as follows.

$$PE_y = EP_{PJ,y} \times EF_{CO2,y} + PE_{ref,y}$$ Equation 4

Where:

PE_y = Project emissions in year *y* (tCO_2e)

$EP_{PJ,y}$ = Energy consumption in project activity in year y. This shall be determined ex post based on monitored values

$EF_{CO2,y}$ = Emission factor for electricity or thermal baseline energy. The emissions associated with grid electricity consumption should be calculated in accordance with the procedures of AMS-I.D. For fossil fuel displaced reliable local or national data for the emission factor shall be used; IPCC default values should be used only when country or project-specific data are not available or difficult to obtain

$PE_{ref,y}$ = Project emissions from physical leakage of refrigerant from the project equipment in year *y* (tCO_2e/y)

Since the project does not involve use of refrigerant Equation 4 becomes

$$PE_y = EP_{PJ,y} \times EF_{CO2,y}$$ Equation 5

The project energy consumption in the case of project activities that displace grid electricity is determined as follows using the data of the project equipment or system:

$$EP_{PJ,y} = \sum_t \sum_i (n_i \times \rho_i \times o_i) / (1 - l_y) \text{ X } 0.95$$ Equation 6

Where:

η_i	=	Number of group *i* project devices operating in time interval *t* year *y*
ρ_i	=	Electrical power demand (kW) of the group i project devices measured during the time interval *t* in year y
o_i	=	Operating hours of group of i project devices in the time interval *t* in year *y* Note that ρ_i and o_i may be determined separately or in combination, i.e. as energy consumption. For efficient lighting project activities, default values for the hours of utilization of lamps provided in the methodology may be used.
l_y		Average annual technical grid losses (transmission and distribution) during year y for the grid serving the locations where the devices are installed, expressed as a fraction. This value shall not include non-technical losses such as commercial losses (e.g. theft).
0.95	=	Default value of net-to-gross adjustment factor

So,

$EP_{j,y}$

Parameter	Description	Value (9 W)
PE_y	Project emissions in year *y*	0.0171
$EPPJ_{,y}$	Energy consumption in project activity in year y.	19
$EF_{CO2,y}$	Emission factor for electricity or thermal baseline energy.	0.9
ηi, project,operational	Total number of project lamps of Y wattage that are operational during time interval t	1
ρi,p	Rated power of project lamps	0.009
oi	Average annual operating hours	2007.5
l_y	Average annual technical grid losses	0.10
0.95	Net to gross adjustment factor	0.95

For Project Activity Batch 1,

The project emissions are calculated to be:

$BE_y = EP_{j,y} \times EF_{CO2,y}$

= 0.0171*142948

=2444 tCO_2e

7.4 Leakage

According to the applied methodology, leakage emissions have to be considered if the energy efficiency technology involves equipment transferred from another activity. In the Grouped Project, LEDs that will be distributed to the households are not transferred from another activity; hence leakage emissions are not applicable. Therefore,

$LE_y = 0$

7.5 Net GHG Emission Reductions and Removals

The table below provides the year wise distribution and total values of the baseline, project and leakage emissions along with the new GHG emissions reductions for the current monitoring period.

Project Activity Batch 1:

Year	Estimated baseline emissions or removals (tCO_2e)	Estimated project emissions or removals (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated net GHG emission reductions or removals (tCO_2e)
2021 (01/05/2021-31/12/2021)	4,956	636	0	4,320
2022 (01/01/2022-31/12/2022)	42,825	5,498	0	37,327
Total				**41,647**

Project Activity Batch 2:

Year	Estimated baseline emissions or removals (tCO_2e)	Estimated project emissions or removals (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated net GHG emission reductions or removals (tCO_2e)

2022 (12/10/2022-31/12/2022)	1934	250	0	1,684
Total				1,684

The table below provides the estimated ex-ante GHG emission reductions and the achieved emission reductions for this monitoring period. The percentage difference and justification on the difference between the two values has also been reported below.

Ex-ante emissions reductions /removals	Achieved emissions reductions /removals	Percent difference	Justification for the difference
62,907	43,331	31%	In ex-post calculations, the actual number of days the light were in used was considered while in ex-ante the entire year was considered.