Gold Standard for the Global Goals

TEMPLATE

MONITORING REPORT

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VERSION **v. 1.1**

RELATED SUPPORT **- TEMPLATE GUIDE Monitoring Report v. 1.1**

This document contains the following Sections

KEY PROJECT INFORMATION

Programme of Activity Information

GS ID of Programme	GS11450
Title of Programme	MicroEnergy Credits – Microfinance for Clean Energy Product Lines – India
Version of POA-DD applicable to this monitoring report	2.1
Name and GS ID of fully Validated CPA/VPAs (i.e. non compliance check)	NA

Key Project Information

GS ID (s) of Project (s)	GS11491
Title of the project (s) covered by monitoring report	GS11450 - MicroEnergy Credits – Microfinance for Clean Energy Product Lines – India - MicroEnergy Credits PoA – VPA 31- GS11491
Version number of the PDD/VPA-DD (s) applicable to this monitoring report	VPA31 – 2.0
Version number of the monitoring report	2.0
Completion date of the monitoring report	30-11-2022
Date of project design certification	29-11-2022
Date of Last Annual Report	NA
Monitoring period number	1
Duration of this monitoring period	01/01/2021 to 31/12/2021
Project Representative	Micro Energy Credits Corporation Private Limited
Host Country	India
Activity Requirements applied	☒ Community Services Activities ☐ Renewable Energy Activities ☐ Land Use and Forestry Activities/Risks & Capacities ☐ N/A
Methodology (ies) applied and version number	AMS-I.A "Electricity generation by the user" (Version 14) Technologies and Practices to Displace Decentralized Thermal Energy Consumption (TPDDTEC), version 3.1

Product Requirements applied	☒ GHG Emissions Reduction & Sequestration ☐ Renewable Energy Label ☐ N/A

Table 1 - Sustainable Development Contributions Achieved

Sustainable Development Goals Targeted	SDG Impact	Amount Achieved	Units/ Products
13 Climate Action (mandatory)	Number of VERs	174,018	tCO_2e VERs
1 End poverty in all its forms everywhere	Number of households with clean energy products i.e. ICS	20,300	Number ICS
1 End poverty in all its forms everywhere	Number of households with clean energy products i.e. SLS	350,106	Number SL
3 Good Health and Wellbeing	% Households confirming less smoke with the use of improved cookstove and Solar lighting Systems instead of kerosene lamps	86%	%
5 Gender Equality	% Household reporting time saving on domestic work by women in collecting fuel or cooking on traditional stove	86%	%
7 Affordable and Clean Energy	Number of households having operational improved cookstove (ICS)	17,458	Number
7 Affordable and Clean Energy	Number of households having operational improved cookstove (SLS)	343,189	Number
8 Decent Work and Economic Growth	Quantitative Employment and income generation	60	Number

Table 2 – Product Vintages

		Amount Achieved
Start Dates	**End Dates**	**VERs**
01/01/2021	31/12/2021	174,018

SECTION A. DESCRIPTION OF PROJECT

A.1. General description of project

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The project activity is implemented in India. In the rural areas in India, the predominant means of cooking are traditional cook stoves that use woody biomass as fuel. The smoke and fumes from these traditional inefficient stoves contribute heavily to indoor air pollution, which overall claim approximately 400,000 lives per year in India[1]. In rural areas of India, households are either not connected to the grid or in households even with grid connectivity, there are frequent power outages and low voltage so rural households use kerosene for indoor lighting, which also contributes to indoor air pollution and GHG emissions.

The project activity involves marketing, distributing, and financing improved cookstove and solar lighting systems, for low-income households and microentrepreneurs in India. Future sales of solar lighting systems may happen in any state but within the geographic boundary of the PoA i.e. the country of India.

These products provide clean energy for cooking and renewable energy for lighting. The cookstoves distributed under the VPA replaces traditional cookstoves thereby reducing the amount of fuelwood used for cooking in the baseline by households and thus reducing GHG emissions corresponding to the fuelwood saving by the project activity. The solar lighting systems replace kerosene-based lamps in households, which would have resulted in GHG emissions due to burning of fossil fuel i.e. kerosene.

The program is a voluntary initiative coordinated by Micro Energy Credits Corporation Private Limited (MEC), the CME of the PoA, and implemented by MEC's Partner Organizations (PO). The improved cookstove are implemented by Shri Kshetra Dharmasthala Rural Development Project (SKDRDP)[2] and solar lighting system are implemented by Samasta Microfinance Ltd. (Samasta) and Greenlight Planet India Pvt. Ltd. (GLP).

Under this VPA, 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. MEC 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

[1] http://www.pciaonline.org/sierra-club
[2] skdrdpindia.org

energy program. The carbon finance is used to expand and sustain the clean energy program through:

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

The goal of the VPA is to use carbon finance to enable installations of solar lanterns, and improved cook stoves in India.

A.2. Location of project

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VPA31- GS11491

a. Host Party (ies) - India

b. Region/State/Province – Karnataka (KA) state for improved cookstoves and several regions within the State. For solar lighting systems, several states, Andhra Pradesh (AP), Assam (AS), Bihar (BH), Gujarat (GJ), Rajasthan (RJ), Haryana (HR), Maharashtra (MH), Goa, West Bengal (WB), Chhattisgarh (CG), Jharkhand (JK), Karnataka (KA), Madhya Pradesh (MP), Odisha (OD), Tami Nadu (TN), Uttarakhand (UK), Uttar Pradesh (UP) and many regions within those states are included.

c. City/Town/Community – Several Cities/Towns are included

d. Physical/Geographic location – The exact location (address) of each CEP is captured in the Credit Tracker Platform and can be verified.

The location of each clean energy installation as per a GPS location or verified address will be recorded in Micro Energy Credit's Credit Tracker Platform, which has been designed specifically for accelerating microfinance access to clean and efficient energy. These locations will define the more precise boundary of the project activities.

The Credit Tracker Platform is used to collect and store the information related to the unique identification number, location, installation date, and usage status of each clean energy product in the VPAs, making it easy to identify, locate and verify any or all of the installations that pertain to the VPAs. The MEC Credit Tracker Platform is a hosted internet service, limiting the risk of loss of data.

Figure 1: Map of India

A.3. Reference of applied methodology

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Solar Lighting System: AMS-I.A "Electricity generation by the user, version 14"[3]

Improved Cookstove: Technologies and Practices to Displace Decentralized Thermal Energy Consumption (TPDDTEC), version 3.1[4]

CDM tool 30: Calculation of the fraction of non-renewable biomass v3.0

A.4. Crediting period of project

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VPA Reference Number	Crediting Start Date	Crediting End Date (CP-1)	Crediting Start Date (CP-2)	GS4GG Crediting End Date	GS4GG Eligible Crediting End Date[5]
GS11491	21/12/2019	20/12/2024	-	20/12/2024	30/04/2034

SECTION B. IMPLEMENTATION OF PROJECT

B.1. Description of implemented project

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a. Purpose of the VPA(s) and the measures taken for GHG emission reductions or net anthropogenic GHG removals–

Purpose: Under the VPA, Micro Energy Credits works with PO – Shri Kshetra Dharmasthala Rural Development Project (SKDRDP), Samasta Microfinance Ltd. (Samasta) and Greenlight Planet India Pvt. Ltd. (GLP) 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 MicroEnergy Credits trains the PO's 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.

[3] AMS I.A version 14.0

[4] TPDDTEC version 3.1

[5] As these are CDM Transitioned projects, GS4GG allows a total crediting period of 15-years from the CDM crediting start date.

Measures taken: The VPA involves marketing, distributing, and financing solar lighting systems for low income households and microentrepreneurs in Andhra Pradesh (AP), Assam (AS), Bihar (BH), Gujarat (GJ), Rajasthan (RJ), Haryana (HR), Maharashtra (MH), Goa, West Bengal (WB), Chhattisgarh (CG), Jharkhand (JK), Karnataka (KA), Madhya Pradesh (MP), Odisha (OD), Tamil Nadu (TN), Uttarakhand (UK) and Uttar Pradesh (UP). These products provide renewable energy for lighting and efficient energy for cooking. The total number of units implemented under this VPA till date is:

Improved cookstoves – 20,300
Solar Lighting Systems – 350,106

Year	ICS	SLS
2017	-	85,830
2018	-	176,567
2019	20,300	87,709
Total	**20,300**	**350,106**

Description of the installed technology, technical processes and equipment for the VPA –

Improved Cookstove:

The technical specification of the stove is as follows –
Grameen Jumbo Stove (GJS) –
Stove Body Size – 12.4" x 10.6" x 11.6"
Net weight: 5 kg
Average Life span under standard use conditions: 5 years
The rated thermal efficiency is 31.17%

Solar lighting system:

The solar lighting system models implemented under this VPA including their technical specifications is as follows –

1. d.light S550
Luminosity – 240 lumen
Lighting Wattage – 3 Watt
Average Lifetime of product (in years)
Module – 15 years

Battery – 5 years
Electronics – 5 years

2. d.light D333
Luminosity – 520 lumen
Lighting Wattage – 6.6 Watt
Average Lifetime of product (in years)
Module – 15 years
Battery – 5 years
Electronics – 5 years

3. ACE 2.1
Luminosity – 200 lumen
Lighting Wattage – 3.3 Watt
Average Lifetime of product (in years)
Module – 15 years
Battery – 8 years
Electronics – 5 years

4. Greenlight Planet Boom (Sunking Boom)
Luminosity – 160 lumen
Lighting Wattage – 3 Watt
Average Lifetime of product (in years)
Module – 15 years
Battery – 8 years
Electronics – 5 years

5. Greenlight Planet Home Lighting System (Sunking HLS)
Luminosity – 400 lumen
Lighting Wattage – 2.64 Watt
Average Lifetime of product (in years)
Module – 15 years
Battery – 8 years
Electronics – 5 years

6. Greenlight Planet Pro-400 (Sunking Pro400)

Luminosity – 400 lumen
Lighting Wattage – 5.5 Watt
Average Lifetime of product (in years)
Module – 15 years
Battery – 8 years
Electronics – 5 years

7. Greenlight Planet Grihajyoti (Sunking HLS120+Sunking Boom)
Luminosity – 750 lumen
Lighting Wattage – 8.28 Watt
Average Lifetime of product (in years)
Module – 15 years
Battery – 8 years
Electronics – 5 years

8. Greenlight Planet Pro 200 (Sunking Pro 200)
Luminosity – 200 lumen
Lighting Wattage – 1.25 Watt
Average Lifetime of product (in years)
Module – 10 years
Battery – 5 years
Electronics – 5 years

9. Greenlight Planet Pro X (Sunking Pro X)
Luminosity – 175 lumen
Lighting Wattage – 1.093 Watt
Average Lifetime of product (in years)
Module – 15 years
Battery – 8 years
Electronics – 5 years

c. Relevant dates for the VPA –

1. Construction/Implementation date – The solar lighting systems are implemented from 28/02/2017 to 20/07/2019. The improved cookstoves are implemented from 28/02/2019 to 11/09/2019

2. Commissioning – 20,300 cookstoves being implemented till the end of monitoring period of this report. 350,106 solar lighting systems are distributed till date under this VPA. The exact commissioning/installation dates for all the CEP's are mentioned in the Emission Reduction Calculation sheet for this VPA.
3. Continued operation periods – All of the functional products were continuously operational during the course of this monitoring period. Non-functional products are discounted in emission reduction calculation.

d. Total GHG emission reductions achieved in this monitoring period for the VPA, including information on how double counting is avoided –

The total GHG emission reductions achieved in this monitoring period for the VPA is 174,018 tCO_2e.

e. Avoiding double counting –
Each Clean Energy Product sold under each VPA has 2 unique identifier numbers - one that is attached to each household and one that is attached to each installation within that VPA to ensure no double-counting within the PoA.

The 2 unique identification numbers for CEPs sold by each product are as follows –

Partner	**Unique Identification number for the households**	**Unique identification number for the CEP**
SKDRDP	Group Identification number-Member ID	Branch ID-Loan account number
GLP India	User Identification number	Transaction identification number
Samasta	Customer identification number	Transaction identification number

Unique identification number for the households is defined as "User Account identification number" and Unique identification number for the CEPs is defined as "Loan Account number" in the emission reduction sheets.

Unique identification numbers match with the information displayed on each VPA Credit Tracker Platform, with a copy retained by the customer, thus identifying that each CEP with its unique identification number has been distributed under a PoA managed by the CME of this PoA.

At the time of including a new VPA, Micro Energy Credits ensured that the project activity is not part of CDM/GS project activity or another PoA by the following means:

- MEC signs contracts with each microfinance institution documenting that the emissions reductions in a specific project activity are included in that project and that project alone.

- The partner PO explains the concept of carbon credits to the end user. The PO signs a contract with each end user recognizing the end user's title to the emissions reductions and transferring it to the PO, which then transfers it to Micro Energy Credits via the contract signed between the PO and MEC.

- Micro Energy Credits and partner PO consult with participating clean energy product suppliers to clarify that credits are not included in other projects and are included only in this PoA.

The MEC Credit Tracker Platform maintains data on all installations, including each CEP unique identifier number, the date of installation and the VPA/PoA with which they are associated. The platform's use of locations for each installation will ensure that each clean energy product is only included in a single VPA under a single PoA. The credit tracker platform also allocates a system generated number call "sysnum" to each installation under the PoA. No two CEP installations can have the same "sysnum".

B.1.1 Forward Action Requests

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NA

B.2. Post-Design Certification changes

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B.2.1. Temporary deviations from the approved Monitoring & Reporting Plan, methodology or standardized baseline

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NA

B.2.2. Corrections

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NA

B.2.3. Changes to start date of crediting period

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NA

B.2.4. Permanent changes from the Design Certified monitoring plan, applied methodology or applied standardized baseline

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NA

B.2.5. Changes to project design of approved project

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NA

SECTION C. DESCRIPTION OF MONITORING SYSTEM APPLIED BY THE PROJECT

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Micro Energy Credit's Credit Tracker Platform is used to maintain records for each VPA. The MEC Credit Tracker Platform has been designed specifically for accelerating microfinance access to clean and efficient energy. The Credit Tracker Platform is used to collect and store the information related to the unique identification number, location, installation date, and usage status of each clean energy product (CEP) in each VPA, making it easy to identify, locate and verify all of the installations that pertain to a given VPA. The MEC Credit Tracker Platform is a hosted internet service, limiting the risk of loss of data.

Monitoring system and monitoring plan of VPAs – The Credit Tracker Platform enables Micro Energy Credits to maintain consistent data on all VPAs and product installations. The process for entering data into the Credit Tracker Platform will be consistent across all VPAs. At the time of installation, the PO creates a Booking Record (in paper or electronic format) that captures detailed data on the installation:

- Household name
- Location of household (address and/or GPS location)
- Product type installed
- Product model installed
- Date of installation
- Unique identifier number for CEP
- Respective VPA number

The Credit Tracker Platform includes a VPA Dashboard that provides a summary on the status of each VPA, and includes the fields:

- Name and unique identifier of each VPA
- List of CEPs included in each VPA
- Name of PO implementing each VPA
- Number of CEPs installed
- Aggregate emissions reductions per year for each VPA

The VPA Monitoring Record maintains monitoring and auditing data on each installation in a VPA:

- Unique identifier number for CEP

- Date of monitoring
- Usage status at time of monitoring

The monitoring activity provides a framework for project preparation and monitoring processes that has been undertaken at the VPA level for each VPA. This schedule takes into account the key parameters that are needed during the crediting periods of the project. All required monitoring and documentation have been implemented, reported, consolidated and managed by the CME. Monitored data has been stored in a suite of monitoring databases.

Summary:

1. Each PO keeps a record of all the CEPs it installs in the MEC Credit Tracker Platform. The record includes the name, date of installation, model of CEP and location of the product. All records are screened by the CME and cross-checked with the PO records to confirm the installation record is authentic and no double counting occurs.

2. The values of the emission reduction parameters required for ex-post ER calculation - project fuel consumption ($p_{p,y}$) or efficiency of ICS , number of ICS still operating ($U_{p,y}$), number of not operational SLS ($LFR_{i,v}$), average operating hours (h), average number of operational days of lamps ($d_{i,a,v}$) are found from sampling of CEP installations.

3. The records kept in the MEC Credit Tracker Platform relate to paper copies of title transfer agreements received from individual households.

Quality assurance

To increase the precision of the estimates during the survey, it is necessary to establish sampling mechanisms for avoiding non-sampling errors (bias) include good questionnaire design, well-tested questionnaires, possibly pilot testing the data collection. To remedy the incomplete questionnaires, additional households or schools will be drawn randomly until the required number is met at per the sample size determined. Then, well-trained personnel will scrutinize all the questionnaires. This will be a procedure to find outliers, and then outliers may be excluded and/or replaced. If the outliers are found according to the above analysis it will be examined further to correct for possible transcription and data entry errors, but it will be omitted from the analysis if no such administrative errors exist. All monitored data such as name, date and contact information of the end-user will be archived in the electronic database tool. Hard copies of all documents will be kept at the office of CME or an alternative place nominated by CME. All the data will be used to calculate the sample size for parameters and emission reductions. All data stored to be kept for at least two years after the crediting period or the last issuance of CERs for the project activity.

Generalities

The CME along with the PO coordinated all ex-post monitoring activities. The CME is ultimately responsible for implementing the monitoring plan, ensuring the quality of data obtained and the use of this data for emissions reduction calculations. However, the actual field measurements to be conducted during monitoring (e.g. project KPT) has been performed by enumerators trained by CME and PO field staff. Sampled households were visited for 4 days to collect the data on the fuel consumption for cooking. Fuelwood was not supplied separately but a small bundle from household stock was separated and provided to households to be used for the KPT. Each day enumerator or field staff would visit the household between 6-7 a.m. before the first meal is cooked. All enumerators would carry weighing scale and moisture meter to take the measurements. The data would be collected directly in the Microsoft excel.

CME has defined the project technology "use" versus "non-use" to determine who should be considered eligible for crediting. The criteria for defining the same has been listed below:

1. User is defined as someone who uses the stove daily. The same shall be captured in the survey questionnaire.
2. To define the use and non-use of project technology, CME has included questions in the survey questionnaire such as when was the stove last used, frequency of use, how many meals are prepared in a day.
3. Physical verification of the stove is conducted to check if the combustion chamber is intact and grate is available or not. Surveyor shall also observe physically that the stove feels warm and presence of ash in the stove.
4. Users will be asked questions on use of the baseline stove, how many meals prepared, presence or absence of the baseline stove.
5. CME shall refer to usage and project survey and Kitchen Performance Tests (KPTs) to determine if the stove was in use or not.

During sampling there may be non-response from the target population. Over-sampling by 20% have been used to avoid non-response, however, sampling may be cease once required confidence/precision is met.

Implementation - The survey for collecting the details of monitoring parameters was conducted annually at the end of the monitoring. The overall monitoring and the implementation of the sampling has been coordinated by the CME and the management staff. CME has ensured successful monitoring of the emission reductions of the proposed project during its crediting period. Furthermore, the survey of the representative sample for the parameters has been carried out by the distributor together with the CME. The survey method that used by CME include: (a) Online questionnaire (b) Face to face interview (c) Telephone Interview (cross check). Primary data was stored by the implementing entities/operators.
All efforts of sampling will be conducted by qualified personnel who have undergone training as part of the programme.

SECTION D. DATA AND PARAMETERS

D.1. Data and parameters fixed ex ante or at renewal of crediting period

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SDG 13

Improved Cookstoves:

Data/parameter	$P_{b,y}$
Unit	kg/household-day
Description	Quantity of fuel that is consumed in baseline scenario b during year y
Source of data	Baseline FT or default baseline fuelwood consumption
Value(s) applied	**VPA Number** / **State** / **Values**: VPA 31 / Karnataka / 7.11
Choice of data or Measurement methods and procedures	Baseline Study in section B.4 of the VPA-DD.
Purpose of data	For baseline emission calculations
Additional comment	-

Data/parameter	$EF_{b,i,CO2}$
Unit	tCO_2/t_{fuel}
Description	CO_2 emission factor arising from use of fuel type *i* in baseline scenario
Source of data	Wood: Methodology default
Value(s) applied	Fuelwood / wood chips: 112 tCO2/TJ
Choice of data or Measurement methods and procedures	Default IPCC values have been applied
Purpose of data	For baseline emission calculations
Additional comment	-

Data/parameter	$EF_{b,i,nonCO2}$
Unit	tCO_2/tfuel
Description	Non-CO_2 emission factor arising from use of fuel type i in baseline scenario
Source of data	IPCC default value as per 2006 IPCC Guidelines for National Greenhouse Gas Inventories volume 2, chapter 2 (Table 2.9)

Value(s) applied	Wood: 37.25 tCO2e/TJ
Choice of data or Measurement methods and procedures	Methodology defaults have been applied for wood

Parameter	Value	Average	Units	Source
EF_wood_CH4	258 – 2190	1224	kgCO2/TJ	
EF_wood_N2O	4 – 18.5	11.25	KgCO2/TJ	
GWP CH4	28		tCO2/TJ	AR5
GWP N2O	265		tCO2/TJ	AR5
$EF_{b,fuel\ non\text{-}CO2}$		**37.25**	**tCO2/TJ**	

Purpose of data	For baseline emission calculations
Additional comment	-

Data/parameter	$EF_{p,i,CO2}$
Unit	tCO_2/t_{fuel}
Description	CO_2 emission factor arising from use of fuel type *i* in project scenario
Source of data	Wood: Methodology default
Value(s) applied	Fuelwood / wood chips: 112 tCO2/TJ
Choice of data or Measurement methods and procedures	Default IPCC values have been applied
Purpose of data	For project emission calculations
Additional comment	-

Data/parameter	$EF_{p,i,nonCO2}$
Unit	tCO_2/TJ
Description	Non-CO_2 emission factor arising from use of fuel type *i* used in project scenario
Source of data	IPCC default value as per 2006 IPCC Guidelines for National Greenhouse Gas Inventories volume 2, chapter 2 (Table 2.9)
Value(s) applied	37.25 tCO2e/TJ (AR5 GWP)
Choice of data or Measurement methods and procedures	Default methodology values have been applied for wood

Parameter	Value	Average	Units	Source
EF_wood_CH4	258 – 2190	1224	kgCO2/TJ	
EF_wood_N2O	4 – 18.5	11.25	KgCO2/TJ	
GWP CH4	28		tCO2/TJ	AR5

	GWP N2O	265		tCO2/TJ	AR5
	$EF_{b,fuel\ non\text{-}CO2}$		**37.25**	**tCO2/TJ**	
Purpose of data	For project emission calculations				
Additional comment	-				

Data/parameter	$NCV_{b,i}$
Unit	TJ/tonne
Description	Net calorific value of the fuel type *i* used in the baseline
Source of data	Methodology default: Wood
Value(s) applied	Fuelwood / wood chips:0.0156 TJ/tonnes
Choice of data or Measurement methods and procedures	Default IPCC values have been applied
Purpose of data	For baseline emission calculations
Additional comment	-

Data/parameter	$NCV_{p,i}$
Unit	TJ/tonne
Description	Net calorific value of the fuel type *i* used in the project scenario
Source of data	Wood: Methodology default
Value(s) applied	Fuelwood / wood chips: 0.0156 TJ/tonnes
Choice of data or Measurement methods and procedures	Default IPCC values for wood / wood waste are applied.
Purpose of data	For project emission calculations
Additional comment	-

Data/parameter	$f_{NRB,b,i,y}$
Unit	Fractional non-renewability
Description	Non-renewability status of woody biomass fuel type *i* that can be established as non-renewable during year y
Source of data	Calculation as per CDM methodology Tool 30 version 3.0
Value(s) applied	**VPA Number**: VPA 31; **State**: Karnataka; **Value**: 0.86

Choice of data or Measurement methods and procedures	N.A.
Purpose of data	For emission reduction calculations
Additional comment	-

Solar Lighting System

Data/parameter	LE_{ker}
Unit	Lumen/W
Description	The specific luminous efficiency of kerosene when burnt in a kerosene lantern
Source of data	Jean-Paul Louineau, Modibo Dicko, Peter Fraenkel, Roy Barlow and Varis Bokalders; Rural Lighting: A Guide for Development Workers, Intermediate Technology (IT) Publications in association with The Stockholm Environment Institute 1994
Value(s) applied	0.13
Choice of data or Measurement methods and procedures	Louineau et al (1994) state an efficiency range of 0.05 to 0.21 lumens/W for hurricane kerosene lanterns. Another study by the World Bank states an efficiency of 0.1 lumen/W for hurricane lanterns. Values for the widely used homemade wick lamps are scarcely available as designs vary. Anyway, these lamps have much lower efficiencies than hurricane lanterns. It is assumed that the kerosene lamp model in the baseline is a hurricane lamp. This is conservative since the vast majority of households use self-made kerosene lanterns without a glass cover, which are less efficient due to wind disturbance and very basic design. The average efficiency value of 0.13 lumen/watt for hurricane lamps from Louineau et al (1994) is chosen, being conservative with respect to the lower value of 0.1 lumen/W provided by the World Bank.
Purpose of data	Calculation of baseline emissions
Additional comment	The parameter is fixed for the entire crediting period.

Data/parameter	EF_{ker}
Unit	tCO_2/GJ
Description	The specific CO_2 emissions of kerosene
Source of data	2006 IPCC guidelines for National Greenhouse Gas inventories

Value(s) applied	0.0719
Choice of data or Measurement methods and procedures	The default value of other kerosene in 2006 IPCC guidelines for National Greenhouse Gas Inventories is 71.900 tCO2/TJ.
Purpose of data	Calculation of baseline emissions
Additional comment	The parameter is fixed for the entire crediting period.

Data/parameter	z
Unit	n/a
Description	Standard normal for a confidence interval of 90%
Source of data	Köhler, Schachtel, Voleske, 2002; Biostatistik, Springer Verlag Berlin Heidelberg; Tafel 2, p. 279
Value(s) applied	1.290, 1.645; 1.96
Choice of data or Measurement methods and procedures	The statistical standard value for standard normal for a confidence level of 90% for one-sided test which is 1.290 as the parametric values are appropriate for a one-sided test.
Purpose of data	Calculation of baseline emissions
Additional comment	-

D.2 Data and parameters monitored

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Improved Cookstoves

Data / Parameter	$P_{p,y}$
Unit	kg/household-day
Description	Quantity of fuel that is consumed in project scenario p during year y
Source of data	Project KPT
Value(s) applied	**VPA** / **Model/State** / **Values**: VPA31 / Jumbo/KA / 3.05
Measurement methods and procedures	Project KPT has been conducted
Monitoring frequency	Updated every two years
QA/QC procedures	CME has provided guidance and training to enumerators/experts for conducting KPTs to meet specific requirement of the methodology. The equipment used for

	testing is externally calibrated or newly purchased at the time of use so measurements are done with the necessary guarantees. Calibration of the equipment is done annually. Type – Digital Moisture Meter Accuracy Class - +/- 1% Serial number – TM157341, TM157285, TM28591, TM240016, TM28657, TM240017, TM28618, TM239929, TM157277 Calibration frequency – Annual Date of calibration – 19/02/2021 Validity – Until 18/02/2022 Type - Weighing Scale Accuracy Class - +/- 0.5 grams Serial number – WS00120, WS00123, WS12012, WS00132, WS00156, WS00151, WS00153, WS00436, WS00136, Calibration frequency – Annual Date of calibration – 15/02/2021 Validity – Until 14/02/2022
Purpose of data	To calculate baseline emissions
Additional comment	Project fuel consumption using KPT has been conducted twice – wet season (July-Aug 2021) and dry season (Jan-Feb 2022) to take into account seasonal variation in wood consumption. The higher value (wet season) has been used for calculation of emission reduction as a measure of conservativeness.

Data / Parameter	$U_{p,y}$
Unit	Fraction (or %)
Description	Usage rate in project scenario p during year y
Source of data	Annual usage survey (KS)
Value(s) applied	**VPA** | **Model/State** | **Values** VPA31 | Jumbo/KA | 86%
Measurement methods and procedures	Sampling surveys (physical) has been conducted to record the continued operation of project devices.

	The usage rate has been calculated for each age (simple random sampling has been applied as applicable)
Monitoring frequency	Annual
QA/QC procedures	CME has provided guidance and training to enumerators for conducting surveys to meet specific requirement of the methodology, if any. The value obtained has been tested to determine if the desired precision was met. The "Cookstove Usage Rate Guidelines" has been followed and CME has ensured that the value applied for this parameter is in line with the guidance provided for the Level applied. Out of the three levels to the Usage Monitoring Requirements, CME has ensured "Mandatory" and "Good Practice" level are complied with.
Purpose of data	To calculate baseline emissions
Additional comment	A single usage parameter is weighted to be representative of the quantity of project technologies of each age being credited in a given project scenario.

Data / Parameter	Policy for encouraging discontinuation of baseline stove
Unit	--
Description	Measures adopted to encourage use of project technology / discontinue baseline technology
Source of data	Internal records
Value(s) applied	-
Measurement methods and procedures	The end user training events were monitored to demonstrate that the users have been informed about use of project stoves and phase out of baseline stove. POs conduct regular training events for the end users and the information is captured in reports submitted to CME as part of contract between PO and CME.
Monitoring frequency	Updated every two years
QA/QC procedures	Transparent data analysis and reporting.
Purpose of data	To calculate baseline emissions
Additional comment	-

Data / Parameter	$N_{p,y}$
Unit	Project technologies credited (Number)
Description	Technologies in the project Database for project scenario p through year y

Source of data	Total sales record
Value(s) applied	**VPA** / **Model/State** / **Values**: VPA31 / Jumbo/KA / 20,300
Measurement methods and procedures	Number of stoves listed in the Monitoring Database
Monitoring frequency	Continuous
QA/QC procedures	Values can be cross checked by sales records.
Purpose of data	To calculate baseline emissions
Additional comment	For sampling and monitoring purposes, the end user database which is a subset of the number of installations reported in the QPR has been used.

Data / Parameter	$LE_{p,y}$
Unit	tCO_2e per year
Description	Leakage in project scenario p during year y
Source of data	Monitoring surveys for Leakage assessment
Value(s) applied	**VPA** / **Model/State** / **Values**: VPA31 / Jumbo/KA / 0
Measurement methods and procedures	Qualitative / quantitative assessment
Monitoring frequency	Every two years
QA/QC procedures	N.A.
Purpose of data	For calculation of leakage emissions
Additional comment	-

Solar Lighting System

SDG 13

Data / Parameter	ln
Unit	Lumens
Description	Lumen output of each solar lamp *n* deployed as part of project activity
Source of data	Refer to table 5 section B.4 in VPA-DD
Value(s) applied	1. ACE 2.1 – 140.538 (Manufacturer's specification is 200 Lumen which is more than threshold value of 140.538, hence 140.538 lumen value is considered)

	2. d.Light D333 – 140.538 (Manufacturer's specification is 520 Lumen which is more than threshold value of 140.538, hence 140.538 lumen value is considered) 3. d.Light S550– 140.538 (Manufacturer's specification is 240 Lumen which is more than threshold value of 140.538, hence 140.538 lumen value is considered) 4. Sunking Boom – 140.538 (Manufacturer's specification is 160 Lumen which is more than threshold value of 140.538, hence 140.538 lumen value is considered) 5. Sunking HLS – 140.538 (Manufacturer's specification is 400 Lumen which is more than threshold value of 140.538, hence 140.538 lumen value is considered) 6. Sunking pro 400 – 140.538 (Manufacturer's specification is 400 Lumen which is more than threshold value of 140.538, hence 140.538 lumen value is considered) 7. Grihajyothi – 140.538 (Manufacturer's specification is 750 Lumen which is more than threshold value of 140.538, hence 140.538 lumen value is considered) 8. Sunking Pro 200 – 140.538 (Manufacturer's specification is 200 Lumen which is more than threshold value of 140.538, hence 140.538 lumen value is considered) 9. Sunking Pro X – 140.538 (Manufacturer's specification is 175 Lumen which is more than threshold value of 140.538, hence 140.538 lumen value is considered)
Measurement methods and procedures	Will be recorded at time of sale/installation in MEC Credit Tracker system
Monitoring frequency	Annual
QA/QC procedures	Each light installation has been geocoded (GPS coordinate or other specific location data) or provided with address/location of household in the MEC Tracker System. Associated data resides in the MEC Tracker Database, allowing each installation to be monitored on a regular basis.
Purpose of data	To calculate baseline emissions
Additional comment	The lumen value for this model is recorded once and used for emission reduction calculations. The lumen value for

	the lamp setting with least luminosity is used for conservativeness. In line with the information given in the eligibility criteria section and table 5 in section B.4 of this VPA DD, the lumen value for solar lighting systems in this VPA has been capped at 140.54 Lumen for individual households (based on Table 5 for the year 2021). If the Lumen value of solar lighting systems in an individual household is greater than 140.54 Lumen, value of 140.54 Lumen is used to calculate emission reductions. If the Lumen value of solar lighting systems in an individual household is less than 140.54 Lumen, actual (lesser) lumen value is used to calculate emission reductions. Additionally, each household in the database only receives one solar lighting system and if any of the households are found to have another solar lighting system installed during quarterly monitoring, then no ERs are claimed for that household. Further, a consolidated database of sales is submitted to the verifying VVB to cross check the same.

Data / Parameter	$N_{i,a}$
Unit	Lamps
Description	Total number of solar lamps of type i that have been deployed in period a
Source of data	Primary data collected by PO/VPA implementer and recorded in Credit Tracker
Value(s) applied	

Models	**Values**
Samasta	
ACE 2.1 (KA)	1,372
ACE 2.1 (OD)	430
ACE 2.1 (TN)	449
d.light D333 (AS)	3
d.light D333 (BH)	69
d.light D333 (CG)	1
d.light D333 (KA)	163
d.light D333 (MH)	16

d.light D333 (OD)	207
d.light D333 (RJ)	320
d.light D333 (TN)	227
d.light D333 (WB)	2
d.light S550(AS)	4
d.light S550(BH)	363
d.light S550(CG)	3
d.light S550(KA)	176
d.light S550(MH)	21
d.light S550(OD)	650
d.light S550(RJ)	1,143
d.light S550(TN)	596
d.light S550(WB)	7
Sunking Boom(KA)	114
Sunking Boom(TN)	314
Sunking HLS(BH)	279
Sunking HLS(KA)	86
Sunking HLS(MH)	18
Sunking HLS(OD)	96
Sunking HLS(RJ)	165
Sunking HLS(TN)	56
Sunking HLS(WB)	1
Sunking Pro 400(BH)	1,241
Sunking Pro 400(Goa)	1
Sunking Pro 400(KA)	285
Sunking Pro 400(MH)	103
Sunking Pro 400(OD)	322
Sunking Pro 400(RJ)	839
Sunking Pro 400(TN)	261
Sunking Pro 400(WB)	6
GLP INDIA	
Sunking Boom(AP)	433
Sunking Boom(BH)	466
Sunking Boom(CG)	358

Sunking Boom(GJ)	23,107
Sunking Boom(HR)	33
Sunking Boom(KA)	56,139
Sunking Boom(MP)	1,778
Sunking Boom(MH)	7,660
Sunking Boom(OD)	134
Sunking Boom(RJ)	22,284
Sunking Boom(TN)	112,667
Sunking Boom(UP)	163
Sunking Boom(UK)	69
Sunking Boom(WB)	7
Grihajyothi(AP)	334
Grihajyothi(GJ)	29
Grihajyothi(KA)	994
Grihajyothi(MP)	1
Grihajyothi(RJ)	84
Grihajyothi(TN)	91
Sunking HLS(AP)	743
Sunking HLS(BH)	68
Sunking HLS(CG)	2
Sunking HLS(GJ)	68
Sunking HLS(KA)	10,237
Sunking HLS(MP)	5
Sunking HLS(MH)	129
Sunking HLS(OD)	117
Sunking HLS(RJ)	23
Sunking HLS(TN)	35,870
Sunking HLS(UP)	6
Sunking HLS(UK)	6
Sunking HLS(WB)	10
Sunking Pro 200(BH)	139
Sunking Pro 200(CG)	3,254
Sunking Pro 200(HR)	649
Sunking Pro 200(MP)	7,801

	Sunking Pro 200(MH)	3,644
	Sunking Pro 200(OD)	553
	Sunking Pro 200(RJ)	30
	Sunking Pro 200(UP)	2,142
	Sunking Pro 200(UK)	188
	Sunking Pro 200(WB)	15
	Sunking Pro 400(AP)	447
	Sunking Pro 400(BH)	195
	Sunking Pro 400(CG)	259
	Sunking Pro 400(GJ)	1,495
	Sunking Pro 400(HR)	5
	Sunking Pro 400(KA)	5,839
	Sunking Pro 400(MP)	58
	Sunking Pro 400(MH)	769
	Sunking Pro 400(OD)	160
	Sunking Pro 400(RJ)	2,858
	Sunking Pro 400(TN)	1,939
	Sunking Pro 400(UP)	15
	Sunking Pro 400(WB)	24
	Sunking Pro X (AP)	77
	Sunking Pro X (BH)	47
	Sunking Pro X (GJ)	6,787
	Sunking Pro X (KA)	10,203
	Sunking Pro X (MP)	461
	Sunking Pro X (MH)	245
	Sunking Pro X (RJ)	5,787
	Sunking Pro X (TN)	9,490
	Sunking Pro X (UP)	7
	Total	**350,106**
Measurement methods and procedures	N.A.	
Monitoring frequency	Annual	
QA/QC procedures	Each light installation is geocoded (GPS coordinates or other specific location identifiers) in the MEC Tracker System. Associated data will reside in the MEC Tracker	

	Database, allowing each installation to be monitored on a regular basis. The data in MEC tracker system can be crosschecked with the MIS system of the PO.
Purpose of data	Calculation of baseline emissions
Additional comment	6 models for Samasta and 6 models for GLP are distributed under this VPA.

Data / Parameter	$d_{i,a,v}$
Unit	Days
Description	Average number of days lamps of type i that have been deployed in period a were operating in period v
Source of data	Monitoring partner, Credit Tracker
Value(s) applied	

Models	**days**
Samasta	
ACE 2.1 (KA)	359
ACE 2.1 (OD)	358
ACE 2.1 (TN)	359
d.light D333 (AS)	365
d.light D333 (BH)	360
d.light D333 (CG)	365
d.light D333 (KA)	361
d.light D333 (MH)	365
d.light D333 (OD)	361
d.light D333 (RJ)	358
d.light D333 (TN)	362
d.light D333 (WB)	365
d.light S550(AS)	365
d.light S550(BH)	360
d.light S550(CG)	365
d.light S550(KA)	359
d.light S550(MH)	365
d.light S550(OD)	360
d.light S550(RJ)	360
d.light S550(TN)	360
d.light S550(WB)	365
Sunking Boom(KA)	359

Sunking Boom(TN)	360
Sunking HLS(BH)	360
Sunking HLS(KA)	361
Sunking HLS(MH)	365
Sunking HLS(OD)	361
Sunking HLS(RJ)	361
Sunking HLS(TN)	365
Sunking HLS(WB)	365
Sunking Pro 400(BH)	362
Sunking Pro 400(Goa)	365
Sunking Pro 400(KA)	360
Sunking Pro 400(MH)	358
Sunking Pro 400(OD)	359
Sunking Pro 400(RJ)	361
Sunking Pro 400(TN)	359
Sunking Pro 400(WB)	365
GLP INDIA	
Sunking Boom(AP)	357
Sunking Boom(BH)	359
Sunking Boom(CG)	360
Sunking Boom(GJ)	363
Sunking Boom(HR)	365
Sunking Boom(KA)	363
Sunking Boom(MP)	360
Sunking Boom(MH)	363
Sunking Boom(OD)	360
Sunking Boom(RJ)	363
Sunking Boom(TN)	363
Sunking Boom(UP)	358
Sunking Boom(UK)	360
Sunking Boom(WB)	365
Grihajyothi(AP)	357
Grihajyothi(GJ)	365
Grihajyothi(KA)	359

Grihajyothi(MP)	365
Grihajyothi(RJ)	352
Grihajyothi(TN)	353
Sunking HLS(AP)	359
Sunking HLS(BH)	360
Sunking HLS(CG)	365
Sunking HLS(GJ)	349
Sunking HLS(KA)	363
Sunking HLS(MP)	365
Sunking HLS(MH)	357
Sunking HLS(OD)	359
Sunking HLS(RJ)	365
Sunking HLS(TN)	363
Sunking HLS(UP)	365
Sunking HLS(UK)	365
Sunking HLS(WB)	365
Sunking Pro 200(BH)	360
Sunking Pro 200(CG)	362
Sunking Pro 200(HR)	361
Sunking Pro 200(MP)	363
Sunking Pro 200(MH)	361
Sunking Pro 200(OD)	358
Sunking Pro 200(RJ)	365
Sunking Pro 200(UP)	362
Sunking Pro 200(UK)	361
Sunking Pro 200(WB)	365
Sunking Pro 400(AP)	357
Sunking Pro 400(BH)	359
Sunking Pro 400(CG)	357
Sunking Pro 400(GJ)	360
Sunking Pro 400(HR)	365
Sunking Pro 400(KA)	362
Sunking Pro 400(MP)	352
Sunking Pro 400(MH)	360

	Sunking Pro 400(OD)	358
	Sunking Pro 400(RJ)	361
	Sunking Pro 400(TN)	360
	Sunking Pro 400(UP)	365
	Sunking Pro 400(WB)	365
	Sunking Pro X (AP)	351
	Sunking Pro X (BH)	357
	Sunking Pro X (GJ)	362
	Sunking Pro X (KA)	362
	Sunking Pro X (MP)	358
	Sunking Pro X (MH)	356
	Sunking Pro X (RJ)	362
	Sunking Pro X (TN)	362
	Sunking Pro X (UP)	365
Measurement methods and procedures	Exact date of sale (in the case of solar lights) and installation (in the case of solar home systems) for all clean energy products is tracked by monitoring partners and recorded in Credit Tracker. For products newly sold/installed in period v, the date of sale or installation will be used to calculate total days of operation in period v. For products sold/installed prior to period v, $d_{i,a,v}$ will be equal to the total number of days in period v.	
Monitoring frequency	Annual	
QA/QC procedures	The data in MEC tracker system can be cross checked with the MIS system of the PO – GLP and Samasta.	
Purpose of data	Calculation of baseline emissions	
Additional comment	Individual number of days solar lighting systems have operated during the monitoring period is calculated and the average value is used for calculating the emission reductions.	

Data / Parameter	H
Unit	Hours/day
Description	Average operating hours of kerosene lamps in the baseline
Source of data	Methodology default

Value(s) applied	3.5
Measurement methods and procedures	N.A as default value is used.
Monitoring frequency	Annual
QA/QC procedures	-
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	$LFR_{i,v}$
Unit	%
Description	Lamp failure rate: Share of lamps of lamp type *i* in checked sample group gi,v not operational in period *v*
Source of data	Monitoring partner, Credit Tracker
Value(s) applied	

Models	**days**
Samasta	
ACE 2.1 (KA)	1.53%
ACE 2.1 (OD)	1.86%
ACE 2.1 (TN)	1.56%
d.light D333 (AS)	0.00%
d.light D333 (BH)	1.45%
d.light D333 (CG)	0.00%
d.light D333 (KA)	1.23%
d.light D333 (MH)	0.00%
d.light D333 (OD)	0.97%
d.light D333 (RJ)	1.88%
d.light D333 (TN)	0.88%
d.light D333 (WB)	0.00%
d.light S550(AS)	0.00%
d.light S550(BH)	1.38%
d.light S550(CG)	0.00%
d.light S550(KA)	1.70%
d.light S550(MH)	0.00%

d.light S550(OD)	1.38%
d.light S550(RJ)	1.49%
d.light S550(TN)	1.34%
d.light S550(WB)	0.00%
Sunking Boom(KA)	1.75%
Sunking Boom(TN)	1.27%
Sunking HLS(BH)	1.43%
Sunking HLS(KA)	1.16%
Sunking HLS(MH)	0.00%
Sunking HLS(OD)	1.04%
Sunking HLS(RJ)	1.21%
Sunking HLS(TN)	0.00%
Sunking HLS(WB)	0.00%
Sunking Pro 400(BH)	0.89%
Sunking Pro 400(Goa)	0.00%
Sunking Pro 400(KA)	1.40%
Sunking Pro 400(MH)	1.94%
Sunking Pro 400(OD)	1.55%
Sunking Pro 400(RJ)	1.19%
Sunking Pro 400(TN)	1.53%
Sunking Pro 400(WB)	0.00%
GLP INDIA	
Sunking Boom(AP)	2.08%
Sunking Boom(BH)	1.72%
Sunking Boom(CG)	1.40%
Sunking Boom(GJ)	0.49%
Sunking Boom(HR)	0.00%
Sunking Boom(KA)	0.47%
Sunking Boom(MP)	1.46%
Sunking Boom(MH)	0.68%
Sunking Boom(OD)	1.49%
Sunking Boom(RJ)	0.58%
Sunking Boom(TN)	0.45%
Sunking Boom(UP)	1.84%

Sunking Boom(UK)	1.45%
Sunking Boom(WB)	0.00%
Grihajyothi(AP)	2.10%
Grihajyothi(GJ)	0.00%
Grihajyothi(KA)	1.51%
Grihajyothi(MP)	0.00%
Grihajyothi(RJ)	3.57%
Grihajyothi(TN)	3.30%
Sunking HLS(AP)	1.62%
Sunking HLS(BH)	1.47%
Sunking HLS(CG)	0.00%
Sunking HLS(GJ)	4.41%
Sunking HLS(KA)	0.63%
Sunking HLS(MP)	0.00%
Sunking HLS(MH)	2.33%
Sunking HLS(OD)	1.71%
Sunking HLS(RJ)	0.00%
Sunking HLS(TN)	0.48%
Sunking HLS(UP)	0.00%
Sunking HLS(UK)	0.00%
Sunking HLS(WB)	0.00%
Sunking Pro 200(BH)	1.44%
Sunking Pro 200(CG)	0.83%
Sunking Pro 200(HR)	1.08%
Sunking Pro 200(MP)	0.65%
Sunking Pro 200(MH)	1.07%
Sunking Pro 200(OD)	1.81%
Sunking Pro 200(RJ)	0.00%
Sunking Pro 200(UP)	0.89%
Sunking Pro 200(UK)	1.06%
Sunking Pro 200(WB)	0.00%
Sunking Pro 400(AP)	2.24%
Sunking Pro 400(BH)	1.54%
Sunking Pro 400(CG)	2.32%

Sunking Pro 400(GJ)	1.34%
Sunking Pro 400(HR)	0.00%
Sunking Pro 400(KA)	0.72%
Sunking Pro 400(MP)	3.45%
Sunking Pro 400(MH)	1.43%
Sunking Pro 400(OD)	1.88%
Sunking Pro 400(RJ)	1.05%
Sunking Pro 400(TN)	1.44%
Sunking Pro 400(UP)	0.00%
Sunking Pro 400(WB)	0.00%
Sunking Pro X (AP)	3.90%
Sunking Pro X (BH)	2.13%
Sunking Pro X (GJ)	0.91%
Sunking Pro X (KA)	0.84%
Sunking Pro X (MP)	1.95%
Sunking Pro X (MH)	2.45%
Sunking Pro X (RJ)	0.86%
Sunking Pro X (TN)	0.74%
Sunking Pro X (UP)	0.00%

Measurement methods and procedures	CME/PO have tracked the usage status of all solar lighting systems from each quarter of the year with results recorded in Credit Tracker. At the end of each quarter of the calendar year, PO tracks and reports back to CME on whether the household is using their solar device and also whether they have purchased any other solar lighting product. This quarterly monitoring is conducted in March, June, September, and December months of every year. In cases where the end of the monitoring period does not coincide with the end month of a calendar year quarter, field staff from POs also conducts the quarterly monitoring in the same month as the end of the monitoring period. POs conduct quarterly monitoring during the course of their regular interactions with Self-Help Groups (SHGs), which hold weekly meetings with MFI Field Officers. At the end of each quarterly monitoring period, MFI Field Officers survey clients as to the product usage status and information on presence of any other solar product.

	This data is reported to MEC through and recorded in the Credit Tracker platform. Any solar lighting systems that are non-operational (due to failure or disuse by owner) are recorded as "failed" lamps. For such solar lighting systems emission reduction are not claimed. This data is stored in Credit Tracker and output in a report format.
Monitoring frequency	Annual
QA/QC procedures	CME/PO has tracked the usage status of all solar lighting systems from each quarter of the year with results recorded in Credit Tracker.
Purpose of data	Calculation of baseline emissions
Additional comment	Quarterly monitoring also checks if the households have any other solar product in the household. If the users report having additional solar product then no ERs are claimed for that household.

Data / Parameter	$CF_{i,v,LFR}$
Unit	%
Description	This factor corrects the total number of lamps of type i by the share of these lamps that were found to be operational according to the sampling in period v. The statistical error is included in the parameter (confidence level 90%) when 90/10 precision is not met. Otherwise, the mean value of LFR will be used.
Source of data	$LFR_{i,v}$
Value(s) applied	

Models	**Value,%**
Samasta	
ACE 2.1 (KA)	95.97%
ACE 2.1 (OD)	95.27%
ACE 2.1 (TN)	95.85%
d.light D333 (AS)	100.00%
d.light D333 (BH)	95.74%
d.light D333 (CG)	100.00%
d.light D333 (KA)	96.37%
d.light D333 (MH)	100.00%
d.light D333 (OD)	96.96%

d.light D333 (RJ)	95.36%
d.light D333 (TN)	97.16%
d.light D333 (WB)	100.00%
d.light S550(AS)	100.00%
d.light S550(BH)	96.18%
d.light S550(CG)	100.00%
d.light S550(KA)	95.47%
d.light S550(MH)	100.00%
d.light S550(OD)	96.23%
d.light S550(RJ)	96.07%
d.light S550(TN)	96.28%
d.light S550(WB)	100.00%
Sunking Boom(KA)	95.05%
Sunking Boom(TN)	96.38%
Sunking HLS(BH)	96.05%
Sunking HLS(KA)	96.27%
Sunking HLS(MH)	100.00%
Sunking HLS(OD)	96.53%
Sunking HLS(RJ)	96.17%
Sunking HLS(TN)	100.00%
Sunking HLS(WB)	100.00%
Sunking Pro 400(BH)	97.25%
Sunking Pro 400(Goa)	100.00%
Sunking Pro 400(KA)	96.10%
Sunking Pro 400(MH)	94.75%
Sunking Pro 400(OD)	95.86%
Sunking Pro 400(RJ)	96.59%
Sunking Pro 400(TN)	95.83%
Sunking Pro 400(WB)	100.00%
GLP INDIA	
Sunking Boom(AP)	94.90%
Sunking Boom(BH)	95.57%
Sunking Boom(CG)	96.15%
Sunking Boom(GJ)	98.33%

Sunking Boom(HR)	100.00%
Sunking Boom(KA)	98.38%
Sunking Boom(MP)	96.12%
Sunking Boom(MH)	97.67%
Sunking Boom(OD)	95.60%
Sunking Boom(RJ)	98.15%
Sunking Boom(TN)	98.43%
Sunking Boom(UP)	94.94%
Sunking Boom(UK)	95.69%
Sunking Boom(WB)	100.00%
Grihajyothi(AP)	94.87%
Grihajyothi(GJ)	100.00%
Grihajyothi(KA)	96.03%
Grihajyothi(MP)	100.00%
Grihajyothi(RJ)	91.98%
Grihajyothi(TN)	92.50%
Sunking HLS(AP)	95.81%
Sunking HLS(BH)	95.69%
Sunking HLS(CG)	100.00%
Sunking HLS(GJ)	90.67%
Sunking HLS(KA)	97.80%
Sunking HLS(MP)	100.00%
Sunking HLS(MH)	94.06%
Sunking HLS(OD)	95.19%
Sunking HLS(RJ)	100.00%
Sunking HLS(TN)	98.33%
Sunking HLS(UP)	100.00%
Sunking HLS(UK)	100.00%
Sunking HLS(WB)	100.00%
Sunking Pro 200(BH)	95.71%
Sunking Pro 200(CG)	97.36%
Sunking Pro 200(HR)	96.81%
Sunking Pro 200(MP)	97.74%
Sunking Pro 200(MH)	96.86%

	Sunking Pro 200(OD)	95.44%
	Sunking Pro 200(RJ)	100.00%
	Sunking Pro 200(UP)	97.22%
	Sunking Pro 200(UK)	96.48%
	Sunking Pro 200(WB)	100.00%
	Sunking Pro 400(AP)	94.67%
	Sunking Pro 400(BH)	95.51%
	Sunking Pro 400(CG)	94.49%
	Sunking Pro 400(GJ)	96.38%
	Sunking Pro 400(HR)	100.00%
	Sunking Pro 400(KA)	97.60%
	Sunking Pro 400(MP)	92.18%
	Sunking Pro 400(MH)	95.73%
	Sunking Pro 400(OD)	94.88%
	Sunking Pro 400(RJ)	96.92%
	Sunking Pro 400(TN)	96.55%
	Sunking Pro 400(UP)	100.00%
	Sunking Pro 400(WB)	100.00%
	Sunking Pro X (AP)	91.39%
	Sunking Pro X (BH)	94.42%
	Sunking Pro X (GJ)	97.17%
	Sunking Pro X (KA)	97.62%
	Sunking Pro X (MP)	95.15%
	Sunking Pro X (MH)	94.23%
	Sunking Pro X (RJ)	97.27%
	Sunking Pro X (TN)	97.83%
	Sunking Pro X (UP)	100.00%
Measurement methods and procedures	The value is calculated using the recorded value for $LFR_{i,v}$ – $$CF_{i,v,LFR} = 1 - (LFR_{i,v} + z * \sqrt{\frac{LFRi,v * (1 - LFRi,v)}{ni,v,total}})$$	
Monitoring frequency	Annual	
QA/QC procedures	The statistical error is included in this parameter (confidence level 90%) when 90/10 precision is not met. But in this monitoring period, 90/10 precision is met.	
Purpose of data	Calculation of baseline emissions	

Additional comment	-

Data / Parameter	$n_{,i,v,total}$
Unit	Lamps
Description	Total number of lamps checked for which a valid result was obtained.
Source of data	Monitoring partner, Credit Tracker
Value(s) applied	

Models	**Value**
Samasta	
ACE 2.1 (KA)	40
ACE 2.1 (OD)	37
ACE 2.1 (TN)	38
d.light D333 (AS)	3
d.light D333 (BH)	30
d.light D333 (CG)	1
d.light D333 (KA)	35
d.light D333 (MH)	16
d.light D333 (OD)	37
d.light D333 (RJ)	40
d.light D333 (TN)	38
d.light D333 (WB)	2
d.light S550(AS)	4
d.light S550(BH)	38
d.light S550(CG)	3
d.light S550(KA)	35
d.light S550(MH)	21
d.light S550(OD)	40
d.light S550(RJ)	41
d.light S550(TN)	39
d.light S550(WB)	7
Sunking Boom(KA)	28
Sunking Boom(TN)	38
Sunking HLS(BH)	37
Sunking HLS(KA)	29
Sunking HLS(MH)	18

Sunking HLS(OD)	29
Sunking HLS(RJ)	29
Sunking HLS(TN)	30
Sunking HLS(WB)	1
Sunking Pro 400(BH)	42
Sunking Pro 400(Goa)	1
Sunking Pro 400(KA)	37
Sunking Pro 400(MH)	29
Sunking Pro 400(OD)	38
Sunking Pro 400(RJ)	40
Sunking Pro 400(TN)	36
Sunking Pro 400(WB)	6
GLP INDIA	
Sunking Boom(AP)	37
Sunking Boom(BH)	38
Sunking Boom(CG)	38
Sunking Boom(GJ)	59
Sunking Boom(HR)	30
Sunking Boom(KA)	59
Sunking Boom(MP)	41
Sunking Boom(MH)	41
Sunking Boom(OD)	29
Sunking Boom(RJ)	60
Sunking Boom(TN)	60
Sunking Boom(UP)	29
Sunking Boom(UK)	29
Sunking Boom(WB)	7
Grihajyothi(AP)	37
Grihajyothi(GJ)	29
Grihajyothi(KA)	41
Grihajyothi(MP)	1
Grihajyothi(RJ)	29
Grihajyothi(TN)	30
Sunking HLS(AP)	40

Sunking HLS(BH)	30
Sunking HLS(CG)	2
Sunking HLS(GJ)	29
Sunking HLS(KA)	43
Sunking HLS(MP)	5
Sunking HLS(MH)	29
Sunking HLS(OD)	29
Sunking HLS(RJ)	23
Sunking HLS(TN)	55
Sunking HLS(UP)	6
Sunking HLS(UK)	6
Sunking HLS(WB)	10
Sunking Pro 200(BH)	29
Sunking Pro 200(CG)	42
Sunking Pro 200(HR)	40
Sunking Pro 200(MP)	42
Sunking Pro 200(MH)	41
Sunking Pro 200(OD)	39
Sunking Pro 200(RJ)	30
Sunking Pro 200(UP)	41
Sunking Pro 200(UK)	29
Sunking Pro 200(WB)	15
Sunking Pro 400(AP)	38
Sunking Pro 400(BH)	29
Sunking Pro 400(CG)	37
Sunking Pro 400(GJ)	42
Sunking Pro 400(HR)	5
Sunking Pro 400(KA)	42
Sunking Pro 400(MP)	29
Sunking Pro 400(MH)	29
Sunking Pro 400(OD)	29
Sunking Pro 400(RJ)	42
Sunking Pro 400(TN)	59
Sunking Pro 400(UP)	15

	<table><tr><td>Sunking Pro 400(WB)</td><td>24</td></tr><tr><td>Sunking Pro X (AP)</td><td>28</td></tr><tr><td>Sunking Pro X (BH)</td><td>29</td></tr><tr><td>Sunking Pro X (GJ)</td><td>41</td></tr><tr><td>Sunking Pro X (KA)</td><td>59</td></tr><tr><td>Sunking Pro X (MP)</td><td>38</td></tr><tr><td>Sunking Pro X (MH)</td><td>36</td></tr><tr><td>Sunking Pro X (RJ)</td><td>41</td></tr><tr><td>Sunking Pro X (TN)</td><td>59</td></tr><tr><td>Sunking Pro X (UP)</td><td>7</td></tr></table>
Measurement methods and procedures	The solar lighting systems are monitored based on a survey with sample size calculated in line with the CDM standard for Sampling and surveys for CDM project activities and programme of activities version 9.0 and guideline for Sampling and surveys for CDM project activities and programme of activities version 4.0. The total number of solar lighting systems which are found to be operational are noted down and used for this parameter.
Monitoring frequency	Annual
QA/QC procedures	CME/PO randomly and representatively tracked households contacted and reached for monitoring lamp usage status for each lamp type *i* in the monitoring period, *p*. This data is recorded in Credit Tracker. Survey methods are used.
Purpose of data	Calculation of baseline emissions
Additional comment	For some of the solar lighting systems distributed under this VPA, this monitoring parameter has been conservatively calculated by assuming that any solar lighting system with "installed_damaged" status as a result of the annual usage status monitoring is not working and that for these "installed_damaged" products it is assumed that usage is 0. This has been done despite providing evidence to VVB that the products with this status had minor repairs that did not impact its functionality.

Data / Parameter	Kerosene Usage in the Baseline
Unit	n/a
Description	Determination of whether or not the end user used kerosene for lighting prior to the project activity

Source of data	Primary data collected by PO/CME/monitoring partner and recorded in Credit Tracker
Value(s) applied	100%
Measurement methods and procedures	At the time of loan application for the solar lighting system, the household is asked about the fuel they use for lighting. A baseline document is used for this purpose that is part of the loan application form filled out by the customer while applying for a loan to buy the product. The results are recorded. Any solar lighting system with a different baseline is removed from crediting.
Monitoring frequency	Annual
QA/QC procedures	The recorded information is stored on credit tracker platform.
Purpose of data	Calculation of baseline emissions
Additional comment	The emission reduction calculation sheet accounts for this parameter by removing any solar lighting system from crediting that does not have kerosene as the baseline for lighting. All solar lighting systems distributed under this VPA used kerosene for lighting purposes in the baseline.

SDG 1

Data / Parameter	$BSA_{Project}$
Unit	Number
Description	Number of ICS/SLS distributed in Project
Source of data	Monitoring Survey Records
Value(s) applied	**VPA** / **ICS** / **SLS** VPA31 / 20,300 / 350,106
Measurement methods and procedures	Monitoring and recording of number of ICS/SLS distributed under the project
Monitoring frequency	Annually
QA/QC procedures	-
Purpose of data	SDG 1 contribution
Additional comment	-

SDG 3

Data / Parameter	$SPM_{HH,Project}$
Unit	%

Description	% HH reporting reduction in smoke while cooking on improved stove in project
Source of data	Monitoring survey records
Value(s) applied	**VPA**: VPA31; **ICS**: 86%
Measurement methods and procedures	Monitoring survey records
Monitoring frequency	Annually
QA/QC procedures	-
Purpose of data	SDG 3 contribution
Additional comment	-

SDG 5

Data / Parameter	$HHTS_{Project}$
Unit	%
Description	% HH reporting time saving from fuel collection due to reduced fuel consumption in project
Source of data	Monitoring Survey Records
Value(s) applied	**VPA**: VPA31; **ICS**: 86%
Measurement methods and procedures	Monitoring Survey Records
Monitoring frequency	Annual
QA/QC procedures	-
Purpose of data	SDG 5 contribution
Additional comment	-

SDG 7

Data / Parameter	$ACS_{Project}$
Unit	Number
Description	Access to affordable and clean energy (Number of operating ICS/SLS units under Project)
Source of data	ICS/SLS distribution records
Value(s) applied	**VPA**: VPA31; **ICS**: 17,458; **SLS**: 343,189
Measurement methods and procedures	Monitor the number of ICS/SLS distributed under the project as an indicator of providing reliable, clean and modern technology (relative to baseline stoves).

Monitoring frequency	Continuous
QA/QC procedures	-
Purpose of data	SDG 7 contribution
Additional comment	-

SDG 8

Data / Parameter	QE $IG_{project}$
Unit	Number
Description	Quantitative Employment and income generation
Source of data	Employment records
Value(s) applied	**VPA**: VPA31 / **Employment**: 60
Measurement methods and procedures	Recording the number of employees (male / female) in the project under administrative, sales, production and management positions
Monitoring frequency	Annually
QA/QC procedures	-
Purpose of data	SDG 8 contribution
Additional comment	-

D.3. Comparison of monitored parameters with last monitoring period

Data/Parameter	Value obtained in this monitoring period	Value obtained last monitoring period
$N_{p,y}$	VPA31 / Jumbo KA / 20,300	VPA31 / Jumbo KA / 20,300
$U_{p,y}$	VPA31 / Smart KA / 86%	VPA4 / Smart KA / 90%
$P_{p,y}$	VPA31 / Jumbo KA / 0.00305	-[6]
$N_{i,a}$	VPA31 / 350,106	VPA31 / 350,106
$LFR_{i,v}$	Refer to Section D.2	Refer to MR in CDM
$CF_{i,v,LFR}$	Refer to Section D.2	Refer to MR in CDM
$n_{i,v,total}$	Refer to Section D.2	Refer to MR in CDM

[6] This is due to change in methodology from AMS II.G to TPDDTEC

Ln	140.54	116.9
SDG 13	VPA31 | 174,018	VPA31 | 65,734
SDG 1	**ICS** VPA31-20,300 **SLS** VPA31-350,106	NA[7]
SDG 3	**ICS** VPA31- 86%	NA
SDG 5	**ICS** VPA31- 86%	NA
SDG 7	**ICS** VPA 31-17,458 **SLS** VPA31- 343,189	NA
SDG 8	VPA31- 70	NA

D.4. Implementation of sampling plan

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List of VPAs to which the sampling plan was applied

Sampling plan was applied to VPA31 included in this issuance request.

Description of implemented sampling design

As per the registered PoA-DD, CDM standard on "Sampling and surveys for CDM project activities and programme of activities" version 9.0 and TPDDTEC v3.1, the following sampling design was implemented for each VPA –

Solar Lighting System:

The following steps were taken as part of the sampling procedure for VPA31-

[7] Under CDM, SDGs were not quantified. Considering this is first issuance under GS4GG, there is not previous monitoring data for SDG1,3,5,7,8.

1. For VPAs with more than 1 partner organization (PO), the total sales population was split per partner organization.
2. For each partner organization, where sales were made in more than 1 state, the population was further split into state wise sales. This was done in order to capture the variation in solar product usage in different climatic zones.
3. Simple random sample was then applied for the proportion-based parameter "Total number of lamps checked for which a valid result was obtained" to determine the sample size. Simple random sample was adopted as the pilot data showed homogeneity regarding the usage of solar products for all POs' in the VPA with solar lighting system sales. The pilot data results used for determining the sample size is given in the emission reduction calculation sheet for the VPA. The sample size calculation equation was taken from Section 2.1.1, para 12, page 28 of the CDM guidelines for Sampling and surveys for CDM project activities and programmes of activities version 4.0.
4. The determined number of samples takes into consideration the vintage split. For e.g. if the total VPA population is 300 with 60 lights of vintage 0-1 years, 100 of vintage 1-2 years and 140 of vintage 2-3 years, the selected samples were 6 for vintage 0-1 years, 10 for vintage 1-2 years and 14 for vintage 2-3 years for a sample size of 30.
5. The vintage analysis sheet is provided to the VVB including the approach for selecting samples based on vintage and a further demonstration of the vintage split reflected in the monitored samples. For e.g. table below shows the vintage split for VPA31 GLP Sunking Boom (GJ) with a total sample requirement of 67:

Model	**State**	**Sample Requirement**	**Vintage Period**	**Sales based on corresponding vintage**	**Fraction of Each Vintage in the Sales Population**	**Samples Monitored for Each Vintage**	**Fraction of Each Vintage in the Monitored Samples**
GLP Sunking Boom	Gujarat	67	0-1 (01/01/2021 to 31/12/2021)	0	0%	0	0%

			1-2 (01/01/2020 to 31/12/2020)	0	0%	0	0%
			2-3 (01/01/2019 to 31/12/2019)	5,147	22%	15	22%
			3-4 (01/01/2018 to 31/12/2018)	15,378	67%	45	67%
			4-5 (01/01/2017 to 31/12/2017)	2,582	11%	7	11%

For improved cookstoves:
As per Section B.7.2 of the VPA-DD and TPDDTEC v3.1, the following sampling design was implemented for the VPA-

The VPA is implemented in Karnataka which has a homogenous distribution of its population within the state. Due to the homogeneity feature within the state, simple random sampling method was applied. A simple random sample is a subset of a population (e.g. villages, individuals, buildings, pieces of equipment) chosen randomly, such that each element (or unit) of the population has the same probability of being selected. The sample-based estimate (mean or proportion) is an unbiased estimate of the population parameter.

- **Usage Survey**

1. As per the requirement TPDDTEC v3.1, a minimum total sample size for Usage Survey is 100 with at least 30 samples for project technologies of each age being credited. For

VPAs where there are multiple POs, states and models sampling has been done PO, model and state-wise.

- **Project KPT**

For determining the sample size for project fuel consumption, Annex 4 of the TPDDTEC v3.1 was referenced. The COV value was determined based on pilot data. Additionally, simple random sampling was used to select the households from the entire population.

Considering both baseline and project KPT has been conducted, samples are selected based on INDEPENDENT sampling approach mentioned in Annex 4 of the TPDDTEC v3.1. Total of 90 samples had to be selected.

Table 2 : Sample sizes in cases of INDEPENDENT samples (households sampled in the project situation are different from households sampled in the baseline situation). This is the size required for each of the baseline and project samples.

COV	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2
90/30 precision	90	105	122	140	159	180	201	224	248

The monitoring frequency specified in the registered monitoring plan for different technologies within these VPAs is met as follows –

VPA31 GSID 11491

Technology	**Monitoring Frequency**	**CEPs added during the MP (01/01/2021 to 31/12/2021)**	**Previous Monitoring Dates**	**Validity of Previous Monitoring results till**	**New Monitoring for this MP**
Improved cookstoves	Annual	No	16/01/2021 to 15/02/2021	26/06/2021	Yes
Project KPT	Biennial	No	-	-	Yes
Solar Lighting System	Annual	No	10/01/2021 to 15/02/2021	26/06/2021	Yes

Improved Cookstoves: Monitoring usage surveys for various parameters in this monitoring period was conducted in 03/01/2022 to 18/01/2022. Project KPT was conducted in the month of July/August 2021 (wet season) and January/February 2022 (dry season). For next monitoring period, fresh usage survey and KPT will be conducted.

Solar lighting systems:
Monitoring usage surveys for various parameters in this monitoring period was conducted in 03/01/2022 to 14/02/2022. Quarterly monitoring will be ongoing to determine the Lamp Failure Rate. For the next monitoring period fresh monitoring may be carried.

The sampling approach followed, and the sample size obtained for these VPAs included in this monitoring report is summarized as follows –

VPA31 GSID 11491

Improved Cookstoves (SKDRDP)

S.No	Parameter	Sampling approach	Sample size
1	Usage rate in project scenario p during year y ($U_{p,y}$)	Simple random sampling for proportion-based parameter	100
2	Quantity of fuel that is consumed in project scenario p during year y ($P_{p,y}$)	Carry out KPTs- Simple random sampling for mean based parameter	90

Solar Lighting System (GLP and Samasta)

S. No.	Parameter	Sampling approach	Sample size	Comments
1	Total number of lamps checked for which a valid result was obtained	Simple random sampling for proportion-based parameter	For e.g. **As per sample size calculation, sample size**	As per guidance given in para 13 and 14, page 7 and 8 of Standard for Sampling and surveys for CDM project activities and programme of activities

			requirement for: Samasta d. light 333 (MH)– 11 GLP Sunking Boom (UP) - 26 GLP Sunking Pro X (TN)- 67 **Actual monitored samples for:** Samasta d. light 333 (MH)– 16 GLP Sunking Boom (UP) - 30 GLP Sunking Pro X (TN)- 67	version 9.0, 30 samples each are chosen randomly. For e.g. 30 samples are chosen randomly for monitoring for GLP Sunking Boom (UP). For some models such as Samasta d. light 333 (MH) where total sales is less than 30, all sales (16) are monitored. For some models like GLP Sunking Pro X (TN), the sample size is more than 30 and hence the required sample size requirement (67) are randomly selected and monitored. Detailed sample size for all other models and calculation is provided in Emission reduction calculation sheet.

Collected data/analysis of collected data and meeting required confidence/precision

The data collected after carrying out the monitoring surveys was further analysed to see if the required confidence/precision is met. The data collected from the surveys were compiled into the Excel spreadsheet. In order to achieve the 90/10 reliability level for simple random sampling few additional stoves were sampled from the database than that required to cover for non-responses, if any. The confidence/precision for solar lighting systems are met as per the CDM Standard for "Sampling and surveys for CDM project activities and programmes of activities Version 9.0" and applied methodology AMS-I.A version 14.0. When the required confidence/precision is not met for any of the

Improved cookstoves (ICS) monitored parameters, the upper or lower bound is conservatively applied to arrive at final values for the parameter as per TPDDTEC v3.1. This approach of calculating the precision and applying the upper/lower bound to the results is a conservative approach. These details are included in the emission reduction calculation sheets for the VPA.

Demonstration of whether the selected samples are representative of the population and are randomly selected

The selected samples are representative of the population as they are selected using the guidance given in TPDDTEC v3.1 and CDM standard on "Sampling and surveys for CDM project activities and programme of activities version 9.0" using simple random sampling approaches.

Excel based randomization tool was used to randomly select samples from a population. This tool provides randomly generated numbers when the population size to be sampled and number of samples required are inputted.

SECTION E. CALCULATION OF SDG IMPACTS

E.1. Calculation of baseline value or estimation of baseline situation of each SDG Impact

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SDG 1: No Poverty

$BSA_{Baseline}$ Number of ICS/SLS distributed in baseline = 0

SDG 3: Good Health and Well Being

$SPM_{HH,Baseline}$ % HH reporting reduction in smoke while cooking on improved stove in baseline = 0

SDG 5: Gender Equality

$HHTS_{Baseline}$ % HH reporting time saving from fuel collection due to reduced fuel consumption in baseline = 0

SDG 7: Affordable and Clean Energy

$ACS_{Baseline}$ Access to affordable and clean energy (Number of operating ICS/SLS units under Baseline) = 0

SDG 8: Decent Work and Economic Growth

$QE\ IG_{Baseline}$ Quantitative Employment and income generation (Number of person (male and female) hired under Baseline) = 0

SDG 13: Climate Action

Improved Cookstoves

The overall GHG reductions achieved by the project activity will be calculated as follows:

$$ERy = \Sigma_{b,p} (N_{p,y} * U_{p,y} * P_{p,b,y} * NCV_{b,\ fuel} * (f_{NRB,b,\ y} * EF_{fuel,\ CO2} + EF_{fuel,\ nonCO2})) - \Sigma\ LE_{p,y}$$

Where:

$\Sigma_{b,p}$	Sum over all relevant (baseline b/project p) couples
$N_{p,y}$	Cumulative number of project technology-days included in the project database for project scenario p against baseline scenario b in year y
$U_{p,y}$	Cumulative usage rate for technologies in project scenario p in year y, based on cumulative adoption rate and drop off rate revealed by usage surveys (fraction)
$P_{p,b,y}$	Specific fuel savings for an individual technology of project p against an individual technology of baseline b in year y, in tons/day, as derived from the statistical analysis of the data collected from the field tests
$f_{NRB,b,\ y}$	Fraction of biomass used in year y for baseline scenario b that can be established as non-renewable biomass (drop this term from the equation when using a fossil fuel baseline scenario)
$NCV_{b,fuel}$	Net calorific value of the fuel that is substituted or reduced (IPCC default for wood fuel, 0.015 TJ/ton)
$EF_{b,fuel,CO2}$	CO_2 emission factor of the fuel that is substituted or reduced. 112 tCO_2/TJ for Wood/Wood Waste, or the IPCC default value of other relevant fuel
$EF_{b,fuel,nonCO2}$	Non-CO_2 emission factor of the fuel that is reduced
$LE_{p,y}$	Leakage for project scenario p in year y (tCO_2e/yr)

For example, calculation for baseline emission for Jumbo Stove Karnataka for VPA31 has been demonstrated below:

ER_y = 7,409,500* 0.86 * (0.00711-0.00305) * 0.0156 * (0.86*112+37.25) - 0

= 53,999 tCO_2e

Total emission reduction for ICS is 53,999 tCO_2e

Solar Lighting System

$$BE_v = \sum_{i=1}^{n} BE_{i,v}$$

Parameter	Unit	Type	Value
BE_v	tCO_2	Calculated	Emissions generated in the absence of the project activity in period *v* by all lamps
$BE_{i,v}$	tCO_2	Calculated	Emissions generated in the absence of the project activity in period *v* by all lamps of type *i*

Ex post baseline emission for each lamp type *i* is calculated with the following equation:

$$BE_v = \sum_{a=1}^{n}(N_{i,a} * d_{i,a,v}) * l_i * h * \frac{1}{LE_{ker}} * EF_{ker} * 10^{-6} * 3.6 * CF_{i,v,LFR}$$

Parameter	Unit	Type	Value
$BE_{i,v}$	tCO_2	Calculated	Emissions generated in the absence of the project activity in period *v* by all lamps of type *i*
$N_{i,a}$	-	Monitored	The total number of solar lamps of type *i* deployed in period *a*
$d_{i,a,v}$	Days	Monitored/calculated	Average number of days lamps of type *i* that have been deployed in period *a* were operating in period *v*
l_i	Lumen	Monitored (once per lamp type)	Nominal lumen output of solar lamps of the type *I* deployed as part of the project activity
h	Hours/day	Fixed	Average number of hours solar lamps are used per day
LE_{ker}	Lumen/W	Fixed	The specific light output of kerosene when burnt in a kerosene lantern
EF_{ker}	tCO_2/GJ	Fixed	The specific CO_2-emissions of kerosene

$CF_{i,v,LFR}$	-	Monitored/Calculated	This factor corrects the total number of lamps of type *i* by the share of these lamps that were found to be operational according to the sampling in period *v*. The statistical error is included in this parameter (confidence level 90%).

Where

$$CF_{i,v,LFR} = 1 - \left(LFR_{i,v} + z * \sqrt{\frac{LFR_{i,v}*(1-LFR_{i,v})}{n_{i,v,total}}}\right)$$

Parameter	**Unit**	**Type**	**Value**
$CF_{i,v,LFR}$	%	Calculated	This factor corrects the total number of lamps of type *i* by the share of these lamps that were found to be operational according to the sampling in period *v*. The statistical error is included in this parameter (confidence level 90%).
$LFR_{i,v}$	%	Monitored	Share of lamps of lamp type *i* in checked sample group $g_{i,v}$ not operational in period *v*.
z	-	Given	Standard normal for a confidence level of 90%
$n_{i,v,total}$	-	Monitored	Total number of lamps checked for which a valid result was obtained.

Sample calculation for solar lighting systems for product model GLP Sunking Boom for the state of Tamil Nadu

$$BE_v = \sum_{a=1}^{n}(N_{i,a} * d_{i,a,v}) * l_i * h * \frac{1}{LE_{ker}} * EF_{ker} * 10^{-6} * 3.6 * CF_{i,v,LFR}$$

BEv = (112,667*365)*140.54*3.5*(1/0.13)*0.0719*10^{-6}*3.6*98.43%

= 39,463.35 tCO_2

The above example is sample calculation for one of the Model-State combinations for the VPA. The baseline emissions for solar lighting systems

included in VPA31 requesting issuance as part of this monitoring report is 120,019 tCO_2e.

E.2. Calculation of project value or estimation of project situation of each SDG Impact

>>

SDG 1: No Poverty

$BSA_{project}$ = Number of households with clean energy products

Net Benefit (SDG 1) = $BSA_{Project}$ – $BSA_{Baseline}$

ICS

VPA Number	$BSA_{Project}$	$BSA_{Baseline}$	Net Benefit
VPA31	20,300	0	20,300

SLS

VPA Number	$BSA_{Project}$	$BSA_{Baseline}$	Net Benefit
VPA31	350,106	0	350,106

SDG 3: Good Health and Well Being

$SPM_{HH,Project}$ % HH confirming less smoke with the use of improved cookstove

Net Benefit (SDG 3) = $SPM_{HH,Project}$ – $SPM_{HH,Baseline}$

ICS

VPA Number	$SPM_{HH,Project}$	$SPM_{HH,Baseline}$	Net Benefit
VPA31	86%	0	86%

SDG 5: Gender Equality

$HHTS_{Project}$ % HH reporting time saving from fuel collection due to reduced fuel consumption in project

Net Benefit (SDG 5) = $HHTS_{Project}$ – $HHTS_{Baseline}$

ICS

VPA Number	$HHTS_{Project}$	$HHTS_{Baseline}$	Net Benefit
VPA31	86%	0	86%

SDG 7: Affordable and Clean Energy

$ACS_{Project}$ Access to affordable and clean energy (Number of operating ICS/SLS units under Project)

Net Benefit (SDG 7) = $ACS_{Project}$ – $ACS_{Baseline}$

ICS

VPA Number	$ACS_{Project}$	$ACS_{Baseline}$	Net Benefit
VPA31	17,458	0	17,458

SLS

VPA Number	$ACS_{Project}$	$ACS_{Baseline}$	Net Benefit
VPA31	343,189	0	343,189

SDG 8: Decent Work and Economic Growth

QE $IG_{Project}$ Quantitative Employment and income generation (Number of person (male and female) hired under Project)

Net Benefit (SDG 8) = QE $IG_{Project}$ - QE $IG_{Baseline}$

VPA Number	QE $IG_{Project}$	QE $IG_{Baseline}$	Net Benefit
VPA31	60	0	60

SDG 13: Climate Action

There are no project emission calculations for this VPA requesting issuance. For solar lighting systems, there are no project emissions. For improved cookstoves, the equation for calculating emission reductions already accounts for project emissions.

E.3. Calculation of leakage

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Leakage for these VPAs = 0

E.4. Calculation of net benefits or direct calculation for each SDG Impact

SDG	SDG Impact	Baseline estimate	Project estimate	Net benefit
13	Amount of VERs	174,018	0	174,018
1	Number of households with clean energy products (ICS)	0	20,300	20,300

1	Number of households with clean energy products (SLS)	0	350,106	350,106
3	% Households confirming less smoke with use of ICS	0%	86%	86%
5	% Households confirming time saving with cooking and fuel collection	0%	86%	86%
7	Number of beneficiaries (ICS)	0	17,458	17,458
7	Number of beneficiaries (SLS)	0	343,189	343,189
8	Quantitative Employment and income generation	0	60	60

E.5. Comparison of actual SDG Impacts with estimates in approved PDD

SDG	Values estimated in ex ante calculation of approved PDD for this monitoring period	Actual values[8] achieved during this monitoring period

[8] Whenever emission reductions are capped, both the original and capped values used for calculations must be transparently reported. Use brackets to denote original values.

13	191,648 tCO_2e	174,018 tCO_2e
1 (ICS)	24,320	20,300
1 (SLS)	350,106	350,106
3	100%	86%
5	100%	86%
7 (ICS)	21,888	17,458
7 (SLS)	350,106	343,189
8	20	60

E.5.1. Explanation of calculation of value estimated ex ante calculation of approved PDD for this monitoring period

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"Amount estimated ex ante for this monitoring period in the VPA-DD (tCO2e)" is calculated from the Total emission reduction estimated for year of operation of the VPAs and number of crediting days in the current monitoring period.

To achieve a comparable value of estimates for this monitoring period for VPA31, these are the factors/values considered:

- Since both the technologies (Improved cookstoves and solar lighting systems) in these VPAs are implemented total value of ex ante emission reduction is used for estimation. Total ex ante estimated value for Year-2 and Year-3 of CP-1 of operation of the VPA from start date of crediting period is considered.

- The estimation of ex ante value is made for 354 days (Year 2) and 11 days (Year 3) totaling to 365 days (which is crediting days for this monitoring period[9].

E.6. Remarks on increase in achieved SDG Impacts from estimated value in approved PDD

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[9] For detailed calculation of "Amount estimated ex ante for this monitoring period in the VPA-DD (t CO_2e)" of this VPA, please refer to the emission reduction calculation sheet.

The SDG impact achieved for SGD 8 is more than the estimated value of 20. After the project implementation there was increased need on the ground for energy officers for sales, marketing, end user awareness, demonstration, monitoring, after sales services etc.

SECTION F. SAFEGUARDS REPORTING

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Assessment Questions/ Requirements	Justification of Relevance (Yes/potentially/no)	How Project will achieve Requirements through design, management or risk mitigation.	Mitigation Measures added to the Monitoring Plan (if required)
Principle 1. Human Rights			
1. The Project Developer and the Project shall respect internationally proclaimed human rights and shall not be complicit in violence or human rights abuses of any kind as defined in the Universal Declaration of Human Rights	No	The VPA and CME both respect human rights and are not complicit in violence or human rights abuses.	Not required
2. The Project shall not discriminate with regards to participation and inclusion	No	The VPA does not discriminate with regards to participation and inclusion	Not required
Principle 2. Gender Equality			
1. The Project shall not directly or indirectly lead to/contribute to adverse impacts on gender equality and/or the situation of women a. Sexual harassment and/or any forms of violence against women – address the multiple risks of gender-based violence, including sexual exploitation or human trafficking.	No	Not relevant	Not required

b. Slavery, imprisonment, physical and mental drudgery, punishment or coercion of women and girls.	No	Not relevant	Not required
c. Restriction of women's rights or access to resources (natural or economic).	No	Not relevant	Not required
d. Recognise women's ownership rights regardless of marital status – adopt project measures where possible to support to women's access to inherit and own land, homes, and other assets or natural resources.	No	Not relevant	Not required
2. Projects shall apply the principles of non-discrimination, equal treatment, and equal pay for equal work a. Where appropriate for the implementation of a VPA, paid, volunteer work or community contributions will be organised to provide the conditions for equitable participation of men and women in the identified tasks/activities.	No	Not relevant	Not required
b. Introduce conditions that ensure the participation of women or men in Project activities and benefits based on pregnancy, maternity/paternity leave, or marital status.	No	Not relevant	Not required
c. Ensure that these conditions do not limit the access of women or men, as the case may be, to VPA participation and benefits.	No	Not relevant	Not required

3. The Project shall refer to the country's national gender strategy or equivalent national commitment to aid in assessing gender risks	No	The Project takes into account the National Policy for the Empowerment of Women (2011) in the "advancement of gender equality and empowerment of women". The Project is designed to empower women and improve livelihoods. No gender risks are envisaged in the PoA	Not required
4. (where required) Summary of opinions and recommendations of an Expert Stakeholder(s)	No	Not relevant	Not required
Principle 3. Community Health, Safety and Working Conditions			
1. The Project shall avoid community exposure to increased health risks and shall not adversely affect the health of the workers and the community	Yes	The VPA reduces exposure to indoor air pollutants and smoke levels, further reducing incidence of respiratory illness compared to cooking on traditional biomass stoves using solid biomass fuel.	Not required
Principle 4.1 Sites of Cultural and Historical Heritage			
1. Does the Project Area include sites, structures, or objects with historical, cultural, artistic, traditional or religious values or intangible forms of culture?	No	Not relevant	Not required
Principle 4.2 Forced Eviction and Displacement			

1. Does the Project require or cause the physical or economic relocation of peoples (temporary or permanent, full or partial)?	No	Not relevant	Not required
Principle 4.3 Land Tenure and Other Rights			
1. Does the Project require any change, or have any uncertainties related to land tenure arrangements and/or access rights, usage rights or land ownership?	No	Not relevant	Not required
Principle 4.4 - Indigenous people			
1. Are indigenous peoples present in or within the area of influence of the Project and/or is the Project located on land/territory claimed by indigenous peoples?	No	Since this is an Improved cookstove and Solar Lighting system project at household/institution level, there is no risk to land/territory claimed by indigenous people. The devices will be distributed to all willing customers within the project boundary.	N/A
Principle 5. Corruption			
1. The Project shall not involve, be complicit in or inadvertently contribute to or reinforce corruption or corrupt Projects	No	The CME does not promote/ or is complicit in direct or indirect corruption.	Not required
Principle 6.1 Labour Rights			

1. The Project Developer shall ensure that all employment is in compliance with national labour occupational health and safety laws and with the principles and standards embodied in the ILO fundamental conventions	No	The VPA does not involve any forced labour and the CME/VPA Implementer ensures that all employment is in compliance with local labour regulations and laws.	Not required
2. Workers shall be able to establish and join labour organisations	No	The CME puts no constraints / limitation on employees to form a union.	Not required
3. Working agreements with all individual workers shall be documented and implemented and include: a. Working hours (must not exceed 48 hours per week on a regular basis), AND b. Duties and tasks, AND c. Remuneration (must include provision for payment of overtime), AND d. Modalities on health insurance, AND e. Modalities on termination of the contract with provision for voluntary resignation by employee, AND f. Provision for annual leave of not less than 10 days per year, not including sick and casual leave.	No	The CME's policies and employment contracts are compliant with the requirement	Not required
4. No child labour is allowed (Exceptions for children working on their families' property requires an Expert Stakeholder opinion)	No	The CME does not promote / or is complicit in child labour	Not required

5. The Project Developer shall ensure the use of appropriate equipment, training of workers, documentation and reporting of accidents and incidents, and emergency preparedness and response measures	No	Not relevant	Not required
Principle 6.2 Negative Economic Consequences			
1. Does the project cause negative economic consequences during and after project implementation?	No	No negative economic consequences are deemed applicable	Not required
Principle 7.1 Emissions			
1. Will the Project increase greenhouse gas emissions over the Baseline Scenario?	No	The VPA reduces GHG emissions relative to baseline scenario	Not required
Principle 7.2 Energy Supply			
1. Will the Project use energy from a local grid or power supply (i.e., not connected to a national or regional grid) or fuel resource (such as wood, biomass) that provides for other local users?	No	The project will reduce fuel resource consumption instead	Not required
Principle 8.1 Impact on Natural Water Patterns/Flows			
1. Will the Project affect the natural or pre-existing pattern of watercourses, ground-water and/or the watershed(s) such as high seasonal flow variability, flooding potential, lack of aquatic connectivity or water scarcity?	No	Not applicable	Not required
Principle 8.2 Erosion and/or Water Body Instability			

1. Could the Project directly or indirectly cause additional erosion and/or water body instability or disrupt the natural pattern of erosion?	No	The VPA shall result in reduction in demand of biomass fuel in the region putting less pressure of forests for deforestation and will hence indirectly avoid erosion associated with tree cutting/ felling.	Not required
Principle 9.1 Landscape Modification and Soil			
1. Does the Project involve the use of land and soil for production of crops or other products?	No	Not applicable	Not required
Principle 9.2 Vulnerability to Natural Disaster			
1. Will the Project be susceptible to or lead to increased vulnerability to wind, earthquakes, subsidence, landslides, erosion, flooding, drought or other extreme climatic conditions?	No	Not applicable	Not required
Principle 9.3 Genetic Resources			
1. Could the Project be negatively impacted by or involve genetically modified organisms or GMOs (e.g., contamination, collection and/or harvesting, commercial development, or take place in facilities or farms that include GMOs in their processes and production)?	No	Not applicable	Not required
Principle 9.4 Release of pollutants			
1. Could the Project potentially result in the release of pollutants to the environment?	No	Not applicable	Not required
Principle 9.5 Hazardous and Non-hazardous Waste			

1. Will the Project involve the manufacture, trade, release, and/ or use of hazardous and non-hazardous chemicals and/or materials?	No	Not applicable	Not required
Principle 9.6 Pesticides & Fertilisers			
1. Will the Project involve the application of pesticides and/or fertilisers?	No	Not applicable	Not required
Principle 9.7 Harvesting of Forests			
1. Will the Project involve the harvesting of forests?	No	The VPA does not involve harvesting of forests. The VPA shall result in reduction in demand of biomass fuel in the region putting less pressure of forests for deforestation and will hence indirectly avoid erosion associated with tree cutting/ felling.	Not required
Principle 9.8 Food			
1. Does the Project modify the quantity or nutritional quality of food available such as through crop regime alteration or export or economic incentives?	No	Not applicable	Not required
Principle 9.9 Animal husbandry			
1. Will the Project involve animal husbandry?	No	Not applicable	Not required
Principle 9.10 High Conservation Value Areas and Critical Habitats			
1. Does the Project physically affect or alter largely intact or High Conservation Value (HCV) ecosystems, critical habitats, landscapes, key biodiversity areas or sites identified?	No	Not applicable	Not required
Principle 9.11 Endangered Species			

Are there any endangered species identified as potentially being present within the Project boundary (including those that may route through the area)? AND/OR Does the Project potentially impact other areas where endangered species may be present through transboundary affects?	No	Not applicable	Not required

SECTION G. STAKEHOLDER INPUTS AND LEGAL DISPUTES

G.1. List all Inputs and Grievances which have been received via the Continuous Input and Grievance Mechanism together with their respective responses/mitigations.

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The grievance mechanism is in place as per the table shown below. No negative comments that would require adjustments of the PoA/VPA were identified. Partner organization has feedback book at local offices for feedback collection. This was found to be the most effective input/grievance mechanism. However, during the current monitoring period, no grievance was received.Method	**Include all details of Chosen Method (s) so that they may be understood and, where relevant, used by readers.**
	Continuous input / Grievance Expression process book is available at partner local offices.
Continuous Input / Grievance Expression Process Book (mandatory)	By maintaining feedback book at the local office, it is ensured that stakeholders that don't have access to electronic media for expressing concerns / grievances are also able to share their concerns / feedback. Additionally, the end users always have an option to contact the partner organization (representative of MFI/ manufacturers

	etc.) in case of any feedback / complaints with the product post distribution
GS Contact (mandatory)	help@goldstandard.org
Other	Email: info@cedarretail.in, info@muthoot.com, indira.ghosh@arohan.in

G.2. Report on any stakeholder mitigations that were agreed to be monitored.

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Not Applicable

G.3. Provide details of any legal contest that has arisen with the project during the monitoring period

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Not Applicable, project is in compliance with the Host Country's legal, environmental, ecological, and social regulation and has not reported any challenges related to the same in the concerned monitoring period

Revision History

Version	Date	Remarks
1.1	14 October 2020	Hyperlinked section summary to enable quick access to key sections Improved clarity on Key Project Information Section for POA monitoring Forward action request section Improved Clarity on SDG contribution/SDG Impact term used throughout Clarity on safeguard reporting Clarity on design changes Leakage section added for VER/CER projects Addition of Comparison of monitored parameters with last monitoring period Provision of an accompanying Guide to help the user understand detailed rules and requirements
1.0	10 July 2017	Initial adoption