Gold Standard for the Global Goals

TEMPLATE

MONITORING REPORT

PUBLICATION DATE **14.10.2020**
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 – (delete below table if N/A)

GS ID of Programme	GS 11191
Title of Programme	BioLite Improved Cook Stoves Programme
Version of POA-DD applicable to this monitoring report	~~2.0~~4.0 dated 21/06/2022 (for design certified PoA TRF)
Name and GS ID of fully Validated CPA/VPAs (i.e. non compliance check)	**VPA Title** — **GS Ref ID** CPA 003 – BioLite HomeStove in Kenya — GS 11192 CPA 008 – Charcoal Stoves in Kenya — GS 11193 CPA 009 – Charcoal Stoves in Kenya — GS 11194 CPA 041 – BioLite HomeStove in Kenya — GS 11195 CPA 051 – Charcoal Stoves in Kenya — GS 11196 CPA 052 – Charcoal Stoves in Kenya — GS 11197 CPA 053 – Charcoal Stoves in Kenya — GS 11198 CPA 054 – Charcoal Stoves in Kenya — GS 11199 CPA 055 – Charcoal Stoves in Kenya — GS 11200 CPA 056 - Charcoal Stoves in Kenya — GS 11879 CPA 057 - Charcoal Stoves in Kenya — GS 11880 CPA 058 – Charcoal Stoves in Kenya — GS 11881 CPA 059 – Charcoal Stoves in Kenya — GS 11882 CPA 060 – Charcoal Stoves in Kenya — GS 11883 CPA 061 – Charcoal Stoves in Kenya — GS 11884 CPA 062 – Charcoal Stoves in Kenya — GS 11885 CPA 063 – Charcoal Stoves in Kenya — GS 11886 CPA 064 – Charcoal Stoves in Kenya — GS 11887 CPA 065 – Charcoal Stoves in Kenya — GS 11888 CPA 066 – Charcoal Stoves in Kenya — GS 11889 CPA 067 – Charcoal Stoves in Kenya — GS 11890

Key Project Information

GS ID (s) of Project (s)	**GS Ref ID:** GS 11192, GS 11193, GS 11194, GS 11195, GS 11196, GS 11197, GS 11198, GS 11199, GS 11200, GS 11879, GS 11880, GS 11881 and GS 11882
Title of the project (s) covered by monitoring report	GS 11192_-_CPA 003 – BioLite HomeStove in Kenya GS 11193_-_CPA 008 – Charcoal Stoves in Kenya GS 11194_-_CPA 009 – Charcoal Stoves in Kenya GS 11195_-_CPA 041 – BioLite HomeStove in Kenya GS 11196_-_CPA 051 – Charcoal Stoves in Kenya GS 11197_-_CPA 052 – Charcoal Stoves in Kenya GS 11198_-_CPA 053 – Charcoal Stoves in Kenya GS 11199_-_CPA 054 – Charcoal Stoves in Kenya GS 11200_-_CPA 055 – Charcoal Stoves in Kenya GS 11879_-_CPA 056 - Charcoal Stoves in Kenya GS 11880_-_CPA 057 - Charcoal Stoves in Kenya GS 11881_-_CPA 058 – Charcoal Stoves in Kenya GS 11882_-_CPA 059 – Charcoal Stoves in Kenya

Version number of the PDD/VPA-DD (s) applicable to this monitoring report	**VPA Title** — **VPA-DD version number**[1] CPA 003 – BioLite HomeStove in Kenya — 46.0 CPA 008 – Charcoal Stoves in Kenya — 46.0 CPA 009 – Charcoal Stoves in Kenya — 46.0 CPA 041 – BioLite HomeStove in Kenya — 46.0 CPA 051 – Charcoal Stoves in Kenya — 46.0 CPA 052 – Charcoal Stoves in Kenya — 46.0 CPA 053 – Charcoal Stoves in Kenya — 46.0 CPA 054 – Charcoal Stoves in Kenya — 46.0 CPA 055 – Charcoal Stoves in Kenya — 46.0 CPA 056 - Charcoal Stoves in Kenya — 43.0 CPA 057 - Charcoal Stoves in Kenya — 43.0 CPA 058 – Charcoal Stoves in Kenya — 43.0 CPA 059 – Charcoal Stoves in Kenya — 43.0
Version number of the monitoring report	34.0
Completion date of the monitoring report	2409/0811/2023
Date of project design certification	GS 11192 - GS 11194 – 20 Mar 2022 GS 11195 - GS 11200 – 07 Mar 2022 GS 11879 - GS 11882 – 11 Nov 2022~~17/02/2022~~
Date of Last Annual Report	11/10/2022
Monitoring period number	5th of the CP1
Duration of this monitoring period	(01/01/2022) to (31/12/2022) both days inclusive
Project Representative	BioLite India Private Limited
Host Country	Kenya
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-II.G: "Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass" (Version 03.0) ASB0035: Baseline woody biomass consumption for household cookstoves in Kenya (version 01.0)
Product Requirements applied	☒ GHG Emissions Reduction & Sequestration ☐ Renewable Energy Label ☐ N/A

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[1] Pertaining to the latest VPA TRF being submitted along with this issuance request (PRC under issuance approval track).

Table 1 - Sustainable Development Contributions Achieved

Sustainable Development Goals Targeted	SDG Impact	Amount Achieved	Units/ Products
SDG: 13 Climate Action	GSDM 13.2.1 Amount of GHG emissions avoided or sequestered	GS 11192 - 24,113~~24,564~~ GS 11193 - 36,194~~45,986~~ GS 11194 - 46,139 GS 11195 – 904 GS 11196 - 29,680 GS 11197 - 23,236 GS 11198 - 50,090 GS 11199 - 50,321 GS 11200 - 47,187 GS 11879 - 38,658 GS 11880 - 29,973 GS 11881 - 12,197 GS 11882 – 26 **Total ~~–~~ 388,718~~398,961~~**	tCO_2e (eq)
SDG: 1	GSDM 1.1.1 Average household savings i.e., decrease in expenditure on basic service such cooking	0[2]	KSH/year
SDG: 5 Gender Equality	GSDM 5.4.1 Average time saving associated with cooking and/or fuel collection time	0.33	Hrs/HH/day
SDG: 7 Affordable and Clean Energy	GSDM 7.1.1 Number of beneficiaries: Households	GS 11192 – 8,085 GS 11193 – 15,754 GS 11194 – 15,812 GS 11195 – 389 GS 11196 – 9,984 GS 11197 – 7,801 GS 11198 – 17,000 GS 11199 – 17,000 GS 11200 – 16,991 GS 11879 – 16,938 GS 11880 – 16,947 GS 11881 – 16,981 GS 11882 – 361 **Total – 160,043**	Number
SDG: 7	GSDG 7.1.2 Proportion of population with primary	88.61	%

[2] This parameter has not been claimed in this monitoring period.

Affordable and Clean Energy	reliance on clean fuels and technology: % Users reporting operational project stove		
SDG: 15 Life on Land	GSDM 15.1.1 Total non-renewable wood fuel saved	GS 11192 – 20,069 GS 11193 – 37,571 GS 11194 – 37,695 GS 11195 – 958 GS 11196 – 24,248 GS 11197 – 18,984 GS 11198 – 40,923 GS 11199 – 41,113 GS 11200 – 40,197 GS 11879 – 38,201 GS 11880 – 39,063 GS 11881 – 43,325 GS 11882 - 982 **Total – 383,328**	Tonnes/yr

Table 2 – Product Vintages

		Amount Achieved
Start Dates	**End Dates**	**VERs (tCO2e)**
01/01/2022	31/12/2022	388,718~~398,961~~

SECTION A. DESCRIPTION OF PROJECT

A.1. General description of project

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~~The current practice of utilization of biomass in traditional cook stoves with efficiency of 10% leads to inefficient combustion resulting in emissions such CO, particulate matter etc) into the atmosphere.~~ The ~~proposed programme activity~~GS PoA involves ~~the~~ substitution of traditional and inefficient biomass cook stoves with efficient biomass cook stove (wood, charcoal, gasifier stoves) technology/measures in rural and/or urban households in Kenya and Uganda. ~~replacement of inefficient traditional cook stoves with improved stoves which have the efficiency of greater than 25%.~~ This ~~will~~ results in reduction in usage of fuel (biomass) for cooking purposes simultaneously~~which~~ contribut~~inges~~ to environmental sustainability and community development..

Pre – project activity (Baseline Scenario):

Prior to implementation of project activity, the target beneficiary ~~is~~ would have used ~~using~~ biomass~~/fossil fuel~~ in traditional three stone fire without improved combustion system~~ and efficiency of 10%~~. The baseline practice of utilization of biomass in traditional cook stoves leads to inefficient combustion resulting in equivalent GHG emissions and other indoor air pollutants like CO, particulate matter etc. into the atmosphere.

General operating and implementing framework of PoA:

The ~~CDM~~ GS4GG Programme of Activities "BioLite Improved Cook Stoves Programme" involves ~~the~~ substitution of traditional and inefficient cook stoves with ~~efficient biomass cook stove~~ICS (wood, charcoal) in rural and/or urban households in ~~India,~~ Kenya and Uganda~~, in biomass deficient regions~~.

~~For the CPAs~~ VPAs ~~included in this monitoring report, International Carbon Portfolio Ltd. (ICPL), a Korean company, provides all implementation and ongoing project operation costs for the development of these CPAs~~VPAs~~, including total ICS purchase, distribution, and maintenance costs. BioLite India Private Limited (BioLite), the coordinating/managing entity (CME) coordinates the SSC~~Small scale PoA.

The programme of activity involves replacement of inefficient traditional cook stove with efficient fuel wood cook stoves with single/multiple pans in the rural and/or urban households of biomass deficient areas in ~~India,~~ Kenya and Uganda.

The VPAs covered in the monitoring report are located in Kenya and are coordinated by CME i.e. Biolite India Private Limited

A.2. Location of project

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Host Country: Kenya

Region/State/Province etc.: All regions of Kenya

City/Town/Community etc.: The boundary of the ~~CPAs~~ VPAs is identical and spans the entire host country of Kenya. The location of Kenya is between latitudes 5°N and

5°S, and longitudes 34° and 42°E. Nairobi is the national capital of Kenya and is located at 01.17°S and 36.48°E.

Figure 1: Location of Project Activity

A.3. Reference of applied methodology

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Methodology Applied:

AMS-II. G: "Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass" (Version 03.0)[3]

Standardized Baseline:

ASB0035: Baseline woody biomass consumption for household cookstoves in Kenya -(version 01.0)[4]

A.4. Crediting period of project

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GS Ref ID	Crediting Period	GS crediting Period Start Date	~~Length of Crediting Period~~GS crediting period (first) end date[5]

[3] UNFCCC small scale methodology, available for download here: https://cdm.unfccc.int/methodologies/DB/HLXIKEIBAXBE4EHO24H5IAB824MBD8

[4] UNFCCC standardized baseline, available for download here: https://cdm.unfccc.int/methodologies/standard_base/2015/sb103.html

[5] The end date of GS4GG first crediting period has been taken as 5 years from the start date of earliest crediting period (under CDM).

GS 11192	19/01/2018– 18/01/2025	01/01/2021	18/01/2023~~7 years, renewable~~
GS 11193	17/04/2018– 16/04/2025	01/01/2021	16/04/2023 ~~7 years, renewable~~
GS 11194	17/04/2018– 16/04/2025	01/01/2021	16/04/2023 ~~7 years, renewable~~
GS 11195	15/12/2019– 14/12/2026	01/01/2021	14/12/2024~~7 years, renewable~~
GS 11196	15/12/2019– 14/12/2026	01/01/2021	14/12/2024~~7 years, renewable~~
GS 11197	15/12/2019– 14/12/2026	01/01/2021	14/12/2024~~7 years, renewable~~
GS 11198	15/12/2019– 14/12/2026	01/01/2021	14/12/2024~~7 years, renewable~~
GS 11199	15/12/2019– 14/12/2026	01/01/2021	14/12/2024~~7 years, renewable~~
GS 11200	15/12/2019– 14/12/2026	01/01/2021	14/12/2024~~7 years, renewable~~
GS 11879	15/12/2019– 14/12/2026	01/01/2021	14/12/2024~~7 years, renewable~~
GS 11880	15/12/2019– 14/12/2026	01/01/2021	14/12/2024~~7 years, renewable~~
GS 11881	15/12/2019– 14/12/2026	01/01/2021	14/12/2024~~7 years, renewable~~
GS 11882	15/12/2019– 14/12/2026	01/01/2021	14/12/2024~~7 years, renewable~~

SECTION B. IMPLEMENTATION OF PROJECT

B.1. Description of implemented project

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Description of implemented PoA

The management system is comprised of the following elements:

a) A clear definition of roles and responsibilities of personnel involved in the process of inclusion of ~~CPAs~~VPAs, including a review of their competencies

BioLite India Private Limited, as ~~a~~ the CME ~~to the~~of this PoA, has managed the relevant activities during the monitoring period~~ and since the post registration change of the PoA~~. ~~The compliance check on the new proposed CPAs were conducted by the CME to ensure that the CPAs meet all requirements and eligibility criteria before inclusion in the PoA. The compliance check was conducted by staff experienced with CDM projects. ICPL provides all implementation and ongoing project operation costs for the development of the CPAs in this monitoring report, including total ICS purchase, distribution, and maintenance costs.~~

b) Records of arrangements for training and capacity development for personnel

The CME trained all staff involved in distribution and monitoring activities. The CME ensured training of all on-site staff with respect to adherence to the Monitoring Plan of the project activity.

~~**c) Procedures for technical review of inclusion of CPAs**~~

~~All CPAs are managed by BioLite, the CME, and implemented by ICPL. The Director of Carbon Finance for BioLite drafted the CPA-DDs or designated a qualified person to do so and assigned trained individuals to gather sufficient documentation to demonstrate compliance with the eligibility criteria defined in the registered PoA. The documentation was reviewed and approved by the Director of Carbon Finance of BioLite.~~

d) A procedure to avoid double accounting (e.g. to avoid the case of including a new ~~CPA~~ VPA that has been already registered either as ~~CDM~~ project activity or as a VC~~PA of another PoA)

Each ICS registered under the PoA is identified by a unique serial number. Therefore, each ICS recorded in the project database is unique.

The quality control and quality assurance procedures avoid the double counting cases. Using the functions available in Microsoft Excel, any duplicate entry within a ~~CPA~~ VPA or between the ~~CPAs~~ VPAs was identified and removed from database. In addition, each ~~CPA~~ VPA was cross-checked with other ~~CPAs~~ VPAs in this ~~SSC~~ PoA and with ~~CPAs~~ VPAs in any other ~~SSC~~ PoA or in other ~~CDM~~ similar carbon project activities operating in the country using the UNFCCC, the Gold Standard, and other relevant voluntary carbon schemes website information to ensure that the ~~CPAs~~ VPAs were not included in any other ~~SSC~~ PoA, ~~CDM~~ project activity or voluntary carbon project activity.

e) Records and documentation control process for each ~~CPA~~ VPA under the PoA

An ICS database for the ~~CPAs~~ VPAs is maintained continuously. Specifically, a Registration Card (known in the field as a Customer Registration Form, or CRF) is collected from the field for each ~~stove~~ ICS distributed that provides all the information required for each ~~stove~~ICS. That information is then collated into excel, taking special care to avoid any errors by double checking all entries through a series of QA/QC procedures. The following information is captured in the Registration Card which is in line with PoA requirements:

i. Unique identification of ~~stove~~ ICS (~~stove~~ serial number)
ii. Partner organization name, address, and telephone
iii. Date of dissemination and model/type of project technology sold
iv. Quantity of project technology sold

The information collected is then transferred to a server which serves as the electronic project database. The server is updated regularly and maintained by the CME. The database is backed up by the CME in an Excel spreadsheet. Each VC~~PA has its own database with number of registered ICSs limited to the maximum units allowed under the VC~~PA (equivalent to 180GWh$_{th}$ annual energy savings).

The database is available to select a random, representative sample for monitoring and verification purposes. This sample set is integrated into the database to include additional monitoring parameters as required or as appropriate.

f) Measures for continuous improvements of the ~~SSC~~ PoA management system
The CME is engaged in continuous review and improvement of the overall ~~SSC~~ PoA management system. The CME is satisfied with the overall performance of the ~~CPA~~ VPA implementation and database maintenance.

g) Sampling
Cross-~~CPA~~ VPA sampling was conducted for monitoring of the thirteen ~~CPAs~~ VPAs included in this monitoring period. In each case, the minimum level of precision (95/10) was exceeded for each variable in question.

h) Installed technology
~~The CPAs involve the marketing and distribution of high efficiency biomass stoves.~~ The BioLite HomeStove is a super-efficient wood stove that also generates electricity to power a fan (for clean combustion), as well as a light or mobile phone charging. The BioLite Jiko Malkia, EcoZoom Jiko Bora Mama Yao, EcoZoom Jiko Bora, EcoZoom Jiko Fresh are efficient charcoal stove that are being distributed in the V~~C~~PAs. There is no other technical equipment involved in ~~CPA~~ VPA implementation. The stoves are operated by users.

Description of implemented ~~CPAs~~VPAs-
a) Purpose of the ~~CPA~~VPA(s) and the measures taken for GHG emission reductions or net GHG removals by sinks –
Purpose: The ~~CPA~~VPAs involve the distribution of domestic fuel-efficient cook stoves, specifically the BioLite HomeStove, BioLite Jiko Malkia, EcoZoom Jiko Bora Mama Yao, EcoZoom Jiko Bora and EcoZoom Jiko Fresh. Currently >60% ~~most~~ population~~eople~~ in Kenya ~~are using~~use ~~the~~ three stone fire/open fire or traditional cook stove without a chimney for cooking[6]. ~~for cooking i.e 3 stone stove or other rudimentary technology.~~ This method is inefficient and leads to unsustainable non-renewable biomass use. The replacement of these inefficient stoves with ~~improved efficient cook stove~~project ICS leads to the reduction in biomass consumption, specifically the reduction of wood and charcoal.

Measures taken: The ~~CPA~~VPAs covered in this monitoring report involve marketing and distribution of ~~improved cook stoves~~ICS for low-income households in Kenya. The ICSs provide clean energy for cooking. The total number of ICS distributed under these ~~CPA~~VPAs is as follows:

S.No.	VPA ID	Number of ICS Distributed
1	GS 11192	8,085
2	GS 11193	15,754
3	GS 11194	15,812
4	GS 11195	389
5	GS 11196	9,984

[6] Kenya DHS-2022, published in June 2023, table 2.2, page 27

6	GS 11197	7,801
7	GS 11198	17,000
8	GS 11199	17,000
9	GS 11200	16,991
10	GS 11879	16,938
11	GS 11880	16,947
12	GS 11881	16,981
13	GS 11882	361
Total		**160,043**

b) Description of the technology employed and installed equipment and/or infrastructure, including information requested by the eligibility criteria

~~The HomeStove is an ultra-clean burning fan-assisted wood stove that cuts toxic pollutant emissions by 90% for a cleaner planet and a healthier household and reduces fuel use by 50%. In addition, utilizing BioLite's patented Direct Conduction Thermoelectric System (DCTS), the HomeStove also generates its own electricity, providing users with enough reliable, on-demand electricity in a day's cooking to fully charge a mobile phone and provide an evening's worth of bright, LED light.~~

The ~~table~~ section below presents an overview of the physical and design specifications of the ~~HomeStove~~project ICSs, as determined by tests carried out at BioLite's manufacturing and testing facilities:

HomeStove

The HomeStove is an advanced combustion wood stove that saves significant amounts of fuel and dramatically reduces toxic emissions. The HomeStove is an ultra-clean burning fan-assisted wood stove that cuts toxic pollutant emissions by 90% for a cleaner planet and a healthier household and reduces fuel use by 50%. In addition, utilizing BioLite's patented Direct Conduction Thermoelectric System (DCTS), the HomeStove also generates its own electricity, providing users with enough reliable, on-demand electricity in a day's cooking to fully charge a mobile phone and provide an evening's worth of bright, LED light.

The stove offers these characteristics:

- USB power output – 2 Watts at 5 Volts
- Flexi light Lumens – 100 Lumens
- 33.5 cm diameter
- Stainless Steel body, cast iron top
- Thermal efficiency – 45.30%[7]
- Expected useful life is up to 5 years

[7]

Jiko Malkia

The Jiko Malkia is an advanced combustion charcoal stove that saves significant amounts of fuel and dramatically reduces toxic emissions. The stove offers these characteristics:

- Secondary-Air Combustion Technology
- 30 cm cooktop diameter
- 2 tone, 2 material stove body construction
- Extra-long locking handle design for improved safety.
- Thermal efficiency – 50.07%[8]
- Expected useful life is up to 5 years

Jiko Bora Mama Yao

The Jiko Bora Mama Yao is the premium stove compared to the other two stoves. The stove offers the following key characteristics:

- 28cm diameter
- Non-slip rubber feet
- Silicon and metal handles
- Three-pronged universal cast iron stovetop
- Refractory metal combustion chamber
- Painted sheet metal with reinforced door
- Thermal efficiency – 40.40%[9]
- Expected useful life is up to 5 years

Jiko Bora

The Jiko Bora reduces toxic emissions, cooks faster than traditional stoves and saves even more charcoal than the Jiko Fresh compared to the baseline technology. The stove offers the following key characteristics:

- 28cm diameter
- Refractory metal combustion chamber
- Lightweight / high temperature thermal ceramic insulation
- Three-pronged universal cast iron stovetop
- Painted sheet metal with reinforced door
- Steel and silicone handles
- Door of metal with silicone grip on latch
- Non-slip rubber feet
- Thermal efficiency – 37.74%[10]
- Expected useful life is up to 5 years

KENYA INDUSTRIAL RESEARCH AND DEVELOPMENT INSTITUTE (KIRDI), NAIROBI, KENYA, BIOLITE HOME STOVE TEST REPORT – 11TH MARCH 2016. KIRDI is an approved Regional Testing Center for the Global Alliance for Clean Cookstoves

[8] Manufacturer's rating

[9] KENYA INDUSTRIAL RESEARCH AND DEVELOPMENT INSTITUTE (KIRDI), NAIROBI, KENYA, DECEMBER 2017

[10] University of Nairobi, 2015

Jiko Fresh
The Jiko Fresh reduces toxic emissions, cooks faster than traditional stoves and saves an significant quantities of charcoal compared to the baseline technology. The stove offers the following key characteristics:

- 26cm diameter
- Refractory metal combustion chamber
- Lightweight / high temperature thermal ceramic insulation
- Three-pronged universal cast iron stovetop
- Painted sheet metal with reinforced door
- Steel and silicone handles
- Door of metal with silicone grip on latch
- Non-slip rubber feet
- Thermal efficiency – 36.21%[11]
- Expected useful life is up to 5 years

c) Relevant dates for the specific-case VPA(s) (e.g. construction, commissioning, continued operation periods, etc.);

GS Ref ID	~~CPA~~VPA Start Date as per VPA-DD	Date of First stove distributed under the VPA
GS 11192	13/11/2017	13/11/2017
GS 11193	17/03/2017	17/03/2017
GS 11194	01/08/2018	01/08/2018
GS 11195	15/12/2019	16/12/2019
GS 11196	15/12/2019	18/12/2019
GS 11197	15/12/2019	18/12/2019
GS 11198	15/12/2019	18/12/2019
GS 11199	15/12/2019	18/12/2019
GS 11200	15/12/2019	17/12/2019
GS 11879	15/12/2019	01/01/2022
GS 11880	15/12/2019	01/01/2022
GS 11881	15/12/2019	01/01/2022
GS 11882	15/12/2019	01/01/2022

~~While cookstove projects do not lend themselves well to the standard definitions of "construction" and "commissioning," for our purposes the date of first distribution of the stove is taken to communicate these concepts, with the relevant dates outlined in the table above.~~ Since the first stove was sold, implementation and operation of each ~~CPA~~VPA has continued uninterrupted.

[11] University of Nairobi, 2015

d) Total GHG emission reductions or net GHG removals by sinks achieved in this monitoring period for the specific-case VPA(s), including information on how double counting is avoided

Year	Emission Reductions tCO_2e
2022	388,718~~398,961~~

B.1.1 Forward Action Requests
>>
Not applicable

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
>>
Not applicable, no temporary deviation has been made post design certification of the VPAs under GS4GG.
~~Not applicable~~

B.2.2. Corrections
>>
~~Approval date: 05/01/2018~~
~~Reference number: PRC 7997-002~~[12]

~~Type of change~~	~~Description~~	~~Rationale for change~~
~~**Permanent change:** Correction~~	~~Change of title: Initially the title of the PoA was Improved cook stoves Program – India and it has now been changed to BioLite Improved cook stoves Program.~~	~~To reflect the multi-country, focus rather than just India~~
~~**Permanent change:** Changes to the programme design of a registered programme of activities~~	~~The registered PoA DD was only limited to India, currently Kenya and Uganda were added to programme boundary.~~	~~Increase geographical scope of PoA~~
~~**Permanent change:** Correction~~	~~CME change: The registered PoA DD mentions General Carbon Advisory Services as the CME. The New CME for the PoA is BioLite India Private Limited.~~	~~There was a commercial change of control that took place in the PoA, thus the CME entity was changed.~~
~~**Permanent change:** Correction~~	~~More accurately characterizing a water boiling test (WBT), correctly describing it as a laboratory test rather than a field test.~~	~~Accuracy and avoiding future confusion.~~
~~**Permanent change:** Correction~~	~~Threshold criteria for small scale CPA has corrected to 180GWh.~~	~~Making information inline to the project standard~~

~~12~~
~~http://cdm.unfccc.int/PRCContainer/DB/prcp33380243/view~~

Permanent change: Correction	Some new sections were added in order to comply with the new CPA-DD template	Adherence to the latest templates as required

Not applicable, no corrections have been made post design certification of the VPAs under GS4GG.

B.2.3. Changes to start date of crediting period
>>
Not applicable, no change to start date have been made post design certification of the VPAs under GS4GG.

B.2.4. Permanent changes from the Design Certified monitoring plan, applied methodology or applied standardized baseline
>>
Approval date: 05/01/2018
Reference number: PRC-7997-002

Type of change	Description	Rationale for change
Permanent change: Permanent change to the registered monitoring plan	Cross-CPA sampling is allowed in the case of similar CPAs (if 95/10 is adhered to).	Make monitoring/baseline more applicable for multi-country implementation
Permanent change: Permanent change to the registered monitoring plan	fNRB for Kenya and Uganda to be fixed for a crediting period rather than re-assessed each verification, use of default values for fNRB if appropriate	More appropriate for a multi-country PoA and African geographies.
Permanent change: Permanent change to the registered monitoring plan	Record keeping system for each CPA under	Make monitoring more applicable for multi-country implementation
Permanent change: Permanent change to the registered monitoring plan	Multiplication of Charcoal conversion factor to the calculate Bold.	Consequential change for the addition of improved charcoal stoves
Permanent change: Changes to the programme design of a registered programme of activities	Application of standardized baseline to CPAs to be implemented in Kenya	Incorporation of latest data and conservative approaches
Permanent change: Permanent change to the registered monitoring plan	Bold is now an ex-ante parameter	The quantity of biomass consumed in baseline is not updated. Only the no. of appliances disseminated will be updated, which is another parameter
Permanent change: Permanent change to the registered monitoring plan	If a three-stone fire is found not to be the baseline stove, or where it is found that the baseline stove has a grate or a chimney, 0.20 will be applied to those specific beneficiaries.	To comply with the applied methodology
Permanent change: Permanent change to the registered monitoring plan	Addition to sampling plan: Equation to calculate sample size for mean values added. Cross sampling monitoring plan added.	To comply with the standard: Sampling and survey for PA and PoAs

The SDG monitoring plan of the design certified VPAs has been revised to include additional SDG parameters and its indicator as follows:

- Inclusion of sustainable development goal, SDG 1 (No Poverty): SDG 1 aims to target the impact GSDM 1.1.1, 1 Average household savings i.e., decrease in expenditure on basic service such cooking. The approach adopted by the CME is to monitor the average household savings resulting from the adoption of project technology/measures.
- Inclusion of sustainable development goal, SDG 7 (Affordable and Clean Energy): SDG 7 aims to target the impact GSDG 7.1.2 Proportion of population with primary reliance on clean fuels and technology. The approach adopted by the CME is to monitor the % of ICS distributed and operating under the project as an indicator of providing clean technology (relative to baseline stoves).

B.2.5. Changes to project design of approved project

>>

~~Approval date: 05/01/2018~~

~~Reference number: PRC-7997-002~~

~~Type of change~~	~~Description~~	~~Rationale for change~~
~~Permanent change: Changes to programme design of a registered programme of activities~~	~~Change from CPA to PoA level: stakeholder consultations conducted at PoA level; environmental analysis conducted at PoA level~~	~~Make PoA more applicable for multi-country implementation.~~
~~Permanent change: Changes to the programme design of a registered programme of activities~~	~~Adding charcoal to baseline/ project scenario to allow for the addition of improved charcoal stoves.~~	~~As of now BioLite only manufactures an improved wood stove, but it is possible that in the future, BioLite will also manufacture a charcoal stove~~

Not applicable, no change to project design have been made post design certification of the VPAs under GS4GG.

SECTION C. DESCRIPTION OF MONITORING SYSTEM APPLIED BY THE PROJECT

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All the ~~CPA~~VPAs apply the same monitoring system. The monitoring system applied involves a number of key elements to ensure that the CME and ~~CPA~~VPA-Implementer have high-quality, unbiased and reliable information regarding the performance of the project.

Monitored Systems

The CME operates a monitoring plan during each verification period. The monitoring includes the following parameters

1. ~~1.~~ η_{new}, Efficiency of system being deployed as part of the project activity
2. ~~2.~~ N_{yi} Number of ~~stoves~~ ICS in operation
3. ~~3.~~ Continuous use of baseline stoves
4. ~~4.~~ $B_{y\ savings}$ Quantity of woody biomass that is saved in tonnes
5. Other SDG parameters

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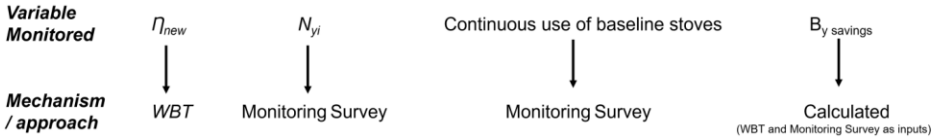
The monitoring system is implemented through a series of random samples, on which tests and surveys are conducted in order to arrive at values for each variable in question. ~~CPA~~VPAs under verification applied the approach of stratified random sampling in line with the registered monitoring/sampling plan in the included ~~CPA~~VPAs/registered PoA-DD. The following line diagram shows specifically how (which type of survey or test) each of the above variables have been monitored during this period:



As per paragraph 15 of AMS-II.G version 03, Monitoring shall consist of checking the efficiency of all appliances or a representative sample thereof, at least once every two years (biennial) to ensure that they are still operating at the specified efficiency (η_{new}).

As per paragraph 16 of AMS-II.G Version 03, Monitoring shall also consist of checking of all appliances or a representative sample thereof, at least once every two years (biennial) to determine if they are still operating or are replaced by an equivalent in service appliance (*Ny)*. Survey is conducted on selected sample of appliances annually.

As per paragraph 20 of AMS-II.G Version 03, if baseline stoves continue to be used, monitoring shall ensure that the fuel-wood consumption of those stoves is excluded from B_{old}. This situation is thus monitored to accurately take in to account the impact on B_{old}.

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The CME has overall operational and management responsibility for the implementation and monitoring of the PoA and is therefore acting as the PoA Managing Entity.

The CME, is responsible for the following operational and management activities related to each ~~CPA~~VPA currently under verification:

- ~~-~~Technical development of PoA concept and related documents
- ~~-~~Working with ~~CPA~~VPA implementers and providing them with project packages (implementation plans and guidance) to invest and facilitate their role as ~~CPA~~VPA implementer.
- ~~-~~Following procedures to avoid double counting
- ~~-~~Maintaining records and documentation control processes for each ~~CPA~~VPA
- ~~-~~Verification activities

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SECTION D. DATA AND PARAMETERS

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

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Unless otherwise noted, the following parameters are identical for the three ~~CPA~~VPAs that are claiming CERs and are included in the monitoring report:

Relevant SDG Indicator	SDG 13: Climate Action
Data/parameter	η_{old}
Unit	Fraction
Description	*Efficiency of the baseline cook stove*
Source of data	Default value given in AMS II.G version 03
Value(s) applied	0.10 or 0.20
Choice of data or measurement methods and procedures	According to the methodology, 0.10 default value may be optionally used if the replaced system is the three stone fire or a conventional system lacking improved combustion air supply mechanism and flue gas ventilation system i.e., without a grate as well as a chimney. The replaced systems in the project area are lacking improved combustion air supply mechanism and flue gas ventilation system. In instances where a three stone fire is not the baseline stove, or where the baseline stove has a grate or a chimney, 0.20 will be used. A weighted average will be calculated based on this information.
Purpose of data	Calculation of baseline emissions
Additional comment	—At the time of ICS distribution, the baseline technology being replaced at the beneficiary location is recorded for each ICS distributed. The all ICS covered in the monitoring report, the baseline stove technology was recorded as three stone fire /open fire, hence a value of 10% baseline thermal efficiency has been applied.

Relevant SDG Indicator	SDG 13: Climate Action
Data/parameter	$NCV_{biomass}$
Unit	TJ/tonne
Description	Net Calorific value of non-renewable woody biomass that is consumed in the baseline and project scenarios.
Source of data	Default value given in AMS II.G version 03
Value(s) applied	0.015
Choice of data or measurement methods and procedures	The default net calorific value of woody biomass as given in the methodology
Purpose of data	Calculation of baseline emissions
Additional comment	-

Relevant SDG Indicator	SDG 13: Climate Action
Data/parameter	$EF_{projected\_fossilfuel}$
Unit	tCO2/TJ
Description	Emission factor for substitution of non- renewable woody biomass by similar consumers
Source of data	Default value given in AMS-II.G Version 03
Value(s) applied	81.6
Choice of data or measurement methods and procedures	This is a default value as given in the methodology AMS II.G version 03
Purpose of data	Calculation of baseline emissions
Additional comment	-

Relevant SDG Indicator	SDG 13: Climate Action
Data/parameter	L_y
Unit	Percentage
Description	Leakage correction factor
Source of data	Default value given in AMS-II.G Version 03
Value(s) applied	0.95
Choice of data or measurement methods and procedures	Default value as per the para 13a of the methodology AMS II.G version 03
Purpose of data	Calculation of baseline emissions
Additional comment	-

<table>
<tr><td>Relevant SDG Indicator</td><td>SDG 13: Climate Action</td></tr>
<tr><td>Data/parameter</td><td>B_{old}</td></tr>
<tr><td>Unit</td><td>Tonnes/household/year</td></tr>
<tr><td>Description</td><td>Quantity of woody biomass used in the absence of the project activity in tonnes</td></tr>
<tr><td>Source of data</td><td>Calculated using standardized baseline ASB0035</td></tr>
<tr><td>Value(s) applied</td><td>
<table>
<tr><th>VPA ID</th><th>B_{old}</th></tr>
<tr><td>GS 11192</td><td>4.72</td></tr>
<tr><td>GS 11193</td><td>4.55</td></tr>
<tr><td>GS 11194</td><td>4.55</td></tr>
<tr><td>GS 11195</td><td>4.66</td></tr>
<tr><td>GS 11196</td><td>4.60</td></tr>
<tr><td>GS 11197</td><td>4.61</td></tr>
<tr><td>GS 11198</td><td>4.56</td></tr>
<tr><td>GS 11199</td><td>4.58</td></tr>
<tr><td>GS 11200</td><td>4.49</td></tr>
<tr><td>GS 11879</td><td>4.30</td></tr>
<tr><td>GS 11880</td><td>4.38</td></tr>
<tr><td>GS 11881</td><td>4.81</td></tr>
<tr><td>GS 11882</td><td>5.11</td></tr>
</table>

Calculated as per values fixed in registered ~~CPA~~VPA-DD as 5.17 t/household/y rural, 3.98 t/household/y urban and corresponding distribution of the ICS in the VPA in urban/rural areas.</td></tr>
<tr><td>Choice of data or measurement methods and procedures</td><td>Calculated</td></tr>
<tr><td>Purpose of data</td><td>Calculation of baseline emissions</td></tr>
<tr><td>Additional comment</td><td>-</td></tr>
</table>

Relevant SDG Indicator	SDG 13: Climate Action
Data/Parameter	$f_{NRB,y}$
Unit	Fraction
Description	Fraction of woody biomass saved by the project activity in period y that can be established as non-renewable biomass
Source of data	Various third-party data, as specified in the 'fNRB Calculation' tab of the ex-ante ER calculator, column J.
Value(s) applied	
Choice of data or measurement methods and procedures	Third party data and calculations as per the applied methodology
Purpose of data	Calculation of baseline emissions
Additional comment	~~This value was validated during previous verification and review request, MP from 01 Jan 2019 – 25 Jan 2020 ()~~ --

VPA ID	$f_{NRB,y}$
GS 11192	0.9150
GS 11193	0.9150
GS 11194	0.9150
GS 11195	0.9217
GS 11196	0.9217
GS 11197	0.9217
GS 11198	0.9217
GS 11199	0.9217
GS 11200	0.9217
GS 11879	0.9217
GS 11880	0.9217
GS 11881	0.9217
GS 11882	0.9217

Relevant SDG Indicator	SDG 1: No Poverty
Data/parameter	$HHS_{Baseline}$
Unit	KSH / year
Description	Average household savings due to decrease in expenditure on basic services such as cooking in baseline
Source of data	-
Value(s) applied	0
Choice of data or Measurement methods and procedures	-
Purpose of data	SDG 1 Impact calculation
Additional comment	-

Relevant SDG Indicator	SDG 5: Gender Equality
Data/parameter	$HHTS_{Baseline}$
Unit	Hrs/HH/day
Description	Average time saving associated with cooking time and fuel collection in baseline
Source of data	-

Value(s) applied	0
Choice of data or Measurement methods and procedures	-
Purpose of data	SDG 5 Impact calculation
Additional comment	-

Relevant SDG Indicator	SDG 7: Affordable and Clean Energy
Data/parameter	$HHB_{Baseline}$
Unit	Number
Description	Number of beneficiaries household under Baseline
Source of data	-
Value(s) applied	0
Choice of data or Measurement methods and procedures	-
Purpose of data	SDG 7 Impact calculation
Additional comment	-

Relevant SDG Indicator	SDG 7: Affordable and Clean Energy
Data/parameter	$ACS_{Baseline}$
Unit	%
Description	Access to affordable and clean energy (% of operating ICS units under Baseline)
Source of data	-
Value(s) applied	0
Choice of data or Measurement methods and procedures	-
Purpose of data	SDG 7 Impact calculation
Additional comment	-

Relevant SDG Indicator	SDG 15: Life on Land
Data/parameter	$FS_{Baseline}$
Unit	tonnes/year
Description	Quantity of non-renewable woody biomass saved in baseline
Source of data	fixed ex-ante PDD
Value(s) applied	0
Choice of data or Measurement methods and procedures	-

Purpose of data	SDG 15 Impact calculation
Additional comment	-

D.2 Data and parameters monitored

>>

Relevant SDG Indicator	SDG 13: Climate Action
Data / Parameter	N_y
Unit	Number
Description	Number of cook stoves in operation or replaced
Source of data	Survey conducted on sample of households and visually assess if the stove is in operation.
Value(s) applied	VPA ID / Ny: GS 11192: 7,163; GS 11193: 13,958; GS 11194: 14,010; GS 11195: 344; GS 11196: 8,846; GS 11197: 6,912; GS 11198: 15,062; GS 11199: 15,062; GS 11200: 15,054; GS 11879: 15,008; GS 11880: 15,015; GS 11881: 15,046; GS 11882: 319
Measurement methods and procedures	The parameter was assessed through household visits of randomly selected sample of household annually. The households selected were visited by staff/third party appointed by the ~~CPA~~VPA Implementer. During each visit, the existence and functionality of the appliance was confirmed through a visual assessment of the appliance with the unique ID clearly visible. All data is kept for 2 years following the crediting period or the last issuance of the CERs of the project activity.
Monitoring frequency	Annually
QA/QC procedures	No of days the improved stove is in operation
Purpose of data	Calculation of baseline emissions
Additional comment	Will be adjusted up or down in order to match the ~~SSC~~ methodology threshold

Relevant SDG Indicator	SDG 13: Climate Action
Data / Parameter	η_{new}
Unit	Fraction
Description	Efficiency of the system being deployed as part of the project activity
Source of data	Ex-post Water Boiling Test records
Value(s) applied	39.24% - weighted average value for all technologies deployed, considering deployment date

Measurement methods and procedures	The tests were conducted following the WBT protocol by trained field personnel by third party. Scales were used, each of which were calibrated prior to measurements. All calibration certificates have been submitted. Sample appliances were randomly selected from the population of stoves in use, as specified in the PoA-DD. The WBTs were carried out in accordance with WBT protocol 4.2.3. The weighted average efficiency based on distribution of each stove type was used across all ~~CPA~~VPAs.
Monitoring frequency	Annually
QA/QC procedures	Calibrated equipment was used.
Purpose of data	Calculation of baseline emissions
Additional comment	The tests were conducted by independent third party (CIRCODU) from Jan - Feb 2022.

Relevant SDG Indicator	SDG 13: Climate Action
Data / Parameter	Continuous use of baseline stoves (CU)
Unit	Numbers
Description	Number of households continuously using baseline stoves
Source of data	Survey conducted on sample of households
Value(s) applied	VPA ID / CU GS 11192 / 3,281 GS 11193 / 6,393 GS 11194 / 6,417 GS 11195 / 158 GS 11196 / 4,052 GS 11197 / 3,166 GS 11198 / 6,899 GS 11199 / 6,899 GS 11200 / 6,895 GS 11879 / 6,874 GS 11880 / 6,877 GS 11881 / 6,891 GS 11882 / 146
Measurement methods and procedures	Annual sampling and surveying was conducted to determine whether the households are still continuing with the inefficient baseline stoves along with the improved cook stove, then the fuel wood consumption in baseline stoves is excluded from B_{old} and accordingly emission reduction are calculated. This is accomplished by asking end user household how much fuel they burn in traditional stoves during field surveys by a dedicated team.
Monitoring frequency	Annually
QA/QC procedures	The data ~~will be~~is collected at the end of each verification period and ~~will be~~ used for the calculation of emission reductions
Purpose of data	Calculation of baseline emissions

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Additional comment	N/A

Relevant SDG Indicator	SDG 13: Climate Action
Data / Parameter	$B_{y\ savings}$
Unit	Tonnes/HH/year
Description	Quantity of woody biomass that is saved in tonnes
Source of data	Per the underlying variables
Value(s) applied	
Measurement methods and procedures	By savings is calculated using option 2 under paragraph 6 of AMS II.G version 03 $B_{y,savings} = B_{old} * (1 - \eta_{old} / \eta_{new})$ The fuel wood consumption in the baseline, efficiency of stove used in the baseline and efficiency of improved cook stoves are considered to determine the $B_{y\ savings}$.
Monitoring frequency	NA
QA/QC procedures	The data ~~will be~~is collected at the end of each verification period and ~~will be~~ used for the calculation of emission reductions
Purpose of data	Calculation of baseline emissions
Additional comment	N/A

VPA ID	$B_{y\ savings}$
GS 11192	3.06
GS 11193	2.94
GS 11194	2.94
GS 11195	3.02
GS 11196	2.97
GS 11197	2.98
GS 11198	2.95
GS 11199	2.96
GS 11200	2.90
GS 11879	2.76
GS 11880	2.82
GS 11881	3.12
GS 11882	3.34

Relevant SDG Indicator	SDG 1: No Poverty
Data / Parameter	$HHS_{Project}$
Unit	KSH / year
Description	Average household savings due to decrease in expenditure on basic services such as cooking in project
Source of data	Usage Survey Data
Value(s) applied	0
Measurement methods and procedures	This parameter ~~will be~~was monitored as part of the monitoring survey. Users ~~will be~~were asked as a part of monitoring survey to quantify the money saving(s) if they have been able to save money because of usage of improved cookstove.
Monitoring frequency	Annual / Biennial

QA/QC procedures	-

Purpose of data	SDG 1 contribution
Additional comment	-

Relevant SDG Indicator	SDG 5: Gender Equality
Data / Parameter	$HHTS_{Project}$
Unit	Hrs/HH/day
Description	Average time saving associated with cooking and/or fuel collection time in project
Source of data	Usage Survey Data
Value(s) applied	0.33
Measurement methods and procedures	This parameter ~~will be~~was monitored as part of the monitoring survey. Users ~~will be~~were asked as part of monitoring survey if they have been able to save time due to use of improved cookstove.
Monitoring frequency	Annual / Biennial
QA/QC procedures	-
Purpose of data	SDG 5 contribution
Additional comment	-

Relevant SDG Indicator	SDG 7: Affordable and Clean Energy
Data / Parameter	$HHB_{Project}$
Unit	Number
Description	Number of beneficiaries household under project
Source of data	CME database
Value(s) applied	
Measurement methods and procedures	The number of improved cookstoves distributed will be recorded as part of the CME database which will be used to estimate this parameter
Monitoring frequency	Continuous

VPA ID	ICS Distributed
GS 11192	8,085
GS 11193	15,754
GS 11194	15,812
GS 11195	389
GS 11196	9,984
GS 11197	7,801
GS 11198	17,000
GS 11199	17,000
GS 11200	16,991
GS 11879	16,938
GS 11880	16,947
GS 11881	16,981
GS 11882	361
Total	**160,043**

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

Relevant SDG Indicator	SDG 7: Affordable and Clean Energy
Data / Parameter	$ACS_{Project}$
Unit	%
Description	Access to affordable and clean energy (% of operating ICS units under project)
Source of data	Usage Survey Data
Value(s) applied	88.61%
Measurement methods and procedures	Determined ex-post via monitoring over a sample of project ICS users using a survey questionnaire
Monitoring frequency	Annual / Biennial
QA/QC procedures	-
Purpose of data	SDG 7 contribution
Additional comment	-

Relevant SDG Indicator	SDG 15: Life on Land
Data / Parameter	$FS_{Project}$
Unit	Tonnes/year
Description	Quantity of non-renewable woody biomass saved in project
Source of data	Refer cell B47:B59, "SD Parameters Assessment" tab of CP1 MP5 ER Calculator
Value(s) applied	
Measurement methods and procedures	Calculated as: Project consumption * f_{NRB}
Monitoring frequency	Annual / Biennial
QA/QC procedures	-
Purpose of data	SDG 15 contribution

VPA ID	Non-renewable fuel Consumption (tonnes)
GS 11192	20,069
GS 11193	37,571
GS 11194	37,695
GS 11195	958
GS 11196	24,248
GS 11197	18,984
GS 11198	40,923
GS 11199	41,113
GS 11200	40,197
GS 11879	38,201
GS 11880	39,063
GS 11881	43,325
GS 11882	982

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
η_{new}	39.24%[13]	VPA 11192 to 11194 – 37.36%~~40.24%~~ VPA 11195 to 11200 - 40.24%
N_{yi}	88.61%	VPA 11192 to 11194 – 89%~~91.39%~~ VPA 11195 to 11200- 91.39%
Continuous use of baseline stoves (CU)	0.4 t/yr[14]	VPA 11192 to 11194 – 0.50 t/yr ~~0.34 t/yr~~ VPA 11195 to 11200 - 0.34 t/yr

D.4. Implementation of sampling plan

>>

A stratified random sampling was carried out across all specific-case ~~CPA~~VPAs covered in this monitoring report.

a. List of ~~CPA~~VPAs to which the sampling was applied

All of the ~~CPA~~VPAs were covered in the stratified sampling plan, with different variables included in different samples.

VPA ID	HS	JB	JF	MY	JM
GS 11192	8,085	0	0	0	0
GS 11193	0	12,087	269	3,398	0
GS 11194	0	805	980	14,027	0
GS 11195	389	0	0	0	0
GS 11196	0	0	0	9,983	1
GS 11197	0	0	0	6	7,795
GS 11198	0	0	0	14,697	2,303
GS 11199	0	0	0	14,094	2,906
GS 11200	0	0	0	10,601	6,390
GS 11879	0	0	0	14,334	2,604
GS 11880	0	0	0	7,786	9,161
GS 11881	0	0	0	3,927	13,054
GS 11882	0	0	0	125	236
Total	**8,474**	**12,892**	**1,249**	**92,978**	**44,450**

[13] Specifically for the three VPAs i.e., GS11192 - GS11194 - the weighted average thermal efficiency value obtained for current MP is 35.7%. ~~t~~This is deemed natural on account of ageing effect of the ICS over time. The inclusion of ~120k new ICS within the population, shifts the weighted average value higher from 37.36% to 39.24% a~~nds~~ the crediting population has become younger than last MP owing to many new ICS additions. In the previous MP, the ICS population was approximately 40k, while in the current MP, the total ICS population for all 13 VPAs is around 160k. Moreover, this concern was already raised by DoE and resolved, please refer to FAR#4 raised at page 23 of verification report.

[14] For the VPA 11192 to 11194 the CU value obtained for this MP is 0.55 t/yr but if we consider the total population of ~160k ICS the CU reduces to 0.4 t/yr. The inclusion of ~120k new ICS within the population, shifts the CU value lower and the crediting population has become younger than last MP owing to many new ICS additions.

b. Description of stratified random sampling

i. Sampling overview

Due to the large number of ICS envisioned to be distributed as part of the ~~CPA~~VPAs to be included in the ~~SSC-~~PoA, it is not economically feasible to monitor each individual ICS unit distributed. Therefore, representative sampling has been undertaken as part of a ~~SSC-~~PoA-wide Sampling Plan (by grouping and sampling across ~~CPA~~VPAs). The Sampling was based on 95/10 confidence/precision.

ii. Objectives and Reliability Requirements

The objective was to obtain an unbiased and reliable estimate of the proportion or mean value of the following parameters over the course of the monitoring period, and with 95/10 confidence/precision for sampling across ~~CPA~~VPAs.

1. Thermal Efficiency of operational ICS: $\eta_{new,y,i}$
2. Drop-off of technologies in use per year: input variable to **Ny**
3. Continuous use of traditional stoves (**CU**)

iii. Target Population

The target population for the three parameters stated above are all ICS recorded in the project database.

iv. Sampling Frame

The target population is the stoves that were distributed and recorded. Since not all of the criteria for homogenous end users are met, a stratified random sampling approach was pursued. As such, the following sampling frames were determined for each variable in question:

Variable(s)	Sampling frame	Strata	Rationale for stratification
$\eta_{new,y,i}$	Stratified random sampling for a mean parameter	By stove type and vintage:	Stove type and vintage
		HS 2017/2018	Same values were expected for these models of stove and vintages
		JB 2017	Different values were expected for this model of stove and vintage
		JB 2018	See above
		JF 2018	See above
		MY 2018	See above
		HS 2019/20/21/22	Conservatively applying the monitored efficiency value of 2019 vintage stoves to other vintages.
		JB 2019	Different values were expected for this model of stove and vintage
		JF 2019	See above

		MY 2019	See above
		MY 2020	See above
		JM 2020	See above
		MY 2021	See above
		JM 2021	See above
		MY 2022	See above
		JM 2022	See above
Ny	Stratified random sampling for a proportional parameter	By stove type, vintage and geography:	Based stove model, geography (urban/rural) and vintage
		U JB, JF, MY 2018	JB, JF & MY combined since no meaningful difference in values expected, urban / rural and vintage kept separate
		R JB, JF, MY 2018	See above
		U JB, JF, MY 2019	See above
		R JB, JF, MY 2019	See above
		U JB 2017	See above
		R JB 2017	See above
		U JF 2017	See above
		R JF 2017	See above
		U HS 2017/2018	See above
		R HS 2017/2018	See above
		U HS 2019/20/21/22	See above
		R HS 2019/20/21/22	See above
		U MY 2020	See above
		R MY 2020	See above
		U JM 2020	See above
		R JM 2020	See above
		U MY 2021	See above
		R MY 2021	See above
		U JM 2021	See above
		R JM 2021	See above
		U MY 2022	See above
		R MY 2022	See above
		U JM 2022	See above
		R JM 2022	See above
CU	Stratified random sampling for a mean parameter	By stove type, vintage and geography:	Based stove model, geography (urban/rural) and vintage
		U JB, JF, MY 2018	JB, JF & MY combined since no meaningful difference in values expected, urban / rural and vintage kept separate
		R JB, JF, MY 2018	See above
		U JB, JF, MY 2019	See above

		R JB, JF, MY 2019	See above
		U JB 2017	See above
		R JB 2017	See above
		U JF 2017	See above
		R JF 2017	See above
		U HS 2017/2018	See above
		R HS 2017/2018	See above
		U HS 2019/20/21/22	See above
		R HS 2019/20/21/22	See above
		U MY 2020	See above
		R MY 2020	See above
		U JM 2020	See above
		R JM 2020	See above
		U MY 2021	See above
		R MY 2021	See above
		U JM 2021	See above
		R JM 2021	See above
		U MY 2022	See above
		R MY 2022	See above
		U JM 2022	See above
		R JM 2022	See above

v. Sampling Method

Stratified Random Sampling was applied across the ICS population. Random numbers were generated using the using online random number generator. The ICS distribution data was arranged by date of distribution, and the samples corresponding to the random numbers obtained were picked for sampling.

vi. Sampling Size

The required sample sizes were derived using equation (1), (2), (3), (4) and (9) of Appendix 3 of the Guideline: Sampling and surveys for CDM project activities and programmes of activities, Version 04.0 for monitoring parameter as follows:

$$n \geq \frac{z^2 * N * V}{(N-1) * precision^2 + z^2 * V}$$

Where,

n = number of ICS to be sampled

N = Total number of ICS in the population

z = Constant referring to level of confidence (1.96 for 95 % confidence)

Precision = Required precision (e.g. 10% = 0.10)

$$V = \frac{SD^2}{p^{-2}}$$

Where (for proportion parameters):

$$SD^2 = \frac{\sum_{i=1}^{k} g_i * p_i * (1 - p_i)}{N}$$

$$p^{-} = \frac{\sum_{i=1}^{k} g_i * p_i}{N}$$

Where,

g_i = weight of strata i in the population

p_i = expected proportion of strata i in the population

k = total number of strata in the population
and Where (for mean parameters):

$$SD^2 = \frac{\sum_{i=1}^{k} g_i * SD_i^2)}{N}$$

$$Mean = \frac{\sum_{i=1}^{k} g_i * m_i}{N}$$

Where,
SD_i = expected standard deviation of strata i in the population
m_i = expected mean of strata i in the population

The ~~CPA~~VPA sub-group population was arranged chronologically for each stratum. The ICS were selected by randomly assigning, in corresponding stratum, a number to each stove and sorting in increasing order from lower to higher number. Random numbers were generated using online random number generator for each stratum and the numbers obtained were used to identify the samples from the stratum population. A higher number of samples were identified than that required to cover for outliers / non-response and ensure that the desired precision / confidence is achieved. The following tables demonstrate the sample size determined:

Stove Efficiency η_{new}					
Stove Model (Sampling Frame)		Total Sales (Sampling Frame Size)	Expected Mean Efficiency(%)	Expected SD	Calculated Sample Size (n)
HS	2018	7047	37.00%	3.70%	2
HS	2019	1427	38.00%	3.80%	2
JB	2017	8595	33.00%	3.30%	2
JB	2018	4032	33.75%	3.38%	2
JB	2019	265	34.50%	3.45%	2
JF	2018	370	33.00%	3.30%	2
JF	2019	879	34.00%	3.40%	2
MY	2018	7185	38.00%	3.80%	2
MY	2019	10420	38.50%	3.85%	2
MY	2020	9828	38.90%	3.89%	2
MY	2021	34024	39.25%	3.93%	2
MY	2022	31521	39.60%	3.96%	2
JM	2020	7796	42.25%	4.23%	2
JM	2021	9838	42.75%	4.28%	2
JM	2022	26816	43.25%	4.33%	2
Sample size determination					
Estimated efficiency (mean)					39.59%
Estimated Standard Deviation of efficiency (SD)					3.97%
V_{mean} = (SD/mean)^2					0.01
Minimum Sample Size required (efficiency)					4
tDistribution sample size adjustment				Iteration 1	11
				Iteration 2	5
				Iteration 3	8
				Iteration 4	6
				Iteration 5	7
				Iteration 6	7

Stove Operating Fraction Uy (input to Ny)					
Stove Model (Sampling Frame)			Total Sales (Sampling Frame Size)	expected operational proportion (SoF)	Calculated Sample Size (n)
Urban	JB, JF, MY	2018	5985	0.84	3
Rural	JB, JF, MY	2018	5602	0.84	2
Urban	JB, JF, MY	2019	5555	0.86	2
Rural	JB, JF, MY	2019	6009	0.86	3
Urban	JB	2017	4509	0.82	2
Rural	JB	2017	4086	0.82	2
Urban	HS	2018	620	0.83	2
Rural	HS	2018	6427	0.84	3
Urban	HS	2019	271	0.86	2
Rural	HS	2019	1156	0.86	2
Urban	MY	2020	5348	0.88	2
Rural	MY	2020	4480	0.88	2
Urban	JM	2020	4240	0.88	2
Rural	JM	2020	3556	0.88	2
Urban	MY	2021	15518	0.90	6
Rural	MY	2021	18506	0.90	7
Urban	JM	2021	4487	0.90	2
Rural	JM	2021	5351	0.90	2
Urban	MY	2022	14947	0.90	6
Rural	MY	2022	16574	0.90	6
Urban	JM	2022	13806	0.90	5
Rural	JM	2022	13010	0.90	5
Sample size determination					
Estimated SOF (p)					0.8832
Estimated Standard Deviation of SOF (SD)					0.320
$V_{SOF} = (SD/p)^2$					0.13
Sample Size required (Uy)					56

CU						
Stove Model (Sampling Frame)			Total Sales (Sampling Frame Size)	Expected Mean value (tonnes per annum)	Expected SD	Calculated Sample Size (n)
Urban	JB, JF, MY	2018	5985	0.5	0.05	2
Rural	JB, JF, MY	2018	5602	0.5	0.05	2
Urban	JB, JF, MY	2019	5555	0.5	0.05	2
Rural	JB, JF, MY	2019	6009	0.5	0.05	2
Urban	JB	2017	4509	0.5	0.05	2
Rural	JB	2017	4086	0.5	0.05	2
Urban	HS	2018	620	0.5	0.05	2
Rural	HS	2018	6427	0.5	0.05	2
Urban	HS	2019	271	0.5	0.05	2
Rural	HS	2019	1156	0.5	0.05	2
Urban	MY	2020	5348	0.5	0.05	2
Rural	MY	2020	4480	0.5	0.05	2
Urban	JM	2020	4240	0.5	0.05	2
Rural	JM	2020	3556	0.5	0.05	2
Urban	MY	2021	15518	0.5	0.05	2
Rural	MY	2021	18506	0.5	0.05	2
Urban	JM	2021	4487	0.5	0.05	2
Rural	JM	2021	5351	0.5	0.05	2
Urban	MY	2022	14947	0.5	0.05	2
Rural	MY	2022	16574	0.5	0.05	2
Urban	JM	2022	13806	0.5	0.05	2
Rural	JM	2022	13010	0.5	0.05	2
Sample size determination						
Estimated (p)						0.50
Estimated Standard Deviation (SD)						0.05
$V_{mean} = (SD/p)^2$						0.01
Minimum Sample Size required						4

c. Collected data (electronic spreadsheets may be attached and referenced)

Data was collected using surveys done by trained consultants and expert regional testing labs. The method of collecting data is field surveys and lab testing. The data collected from the surveys and lab tests were compiled into the Excel spreadsheet. In order to achieve the 95/10 for annual sampling, additional stoves were sampled from the database than required to cover for non-responses and unexpected variability in the data, if any. Water boiling tests were conducted using WBT protocol 4.2.3 by a leading regional testing laboratory (CIRCODU). The monitoring was conducted from 02nd January 2023 – 13th March 2023.

d. Analysis of the collected data

Data obtained from the samples were used to estimate proportions and mean values for the parameters described above. The values were then being factored into the emissions reduction calculations.

Sampling Constants	Values
Monitoring period Start date	1-Jan-22
Monitoring period End date	31-Dec-22
Monitoring frequency (years)	1.00
Level of sampling	PoA
Confidence (%) (90 or 95)	95%
Margin of Error (%)	10%
Z value	1.96

Stove Efficiency η_{new}					
Monitoring Results					
Stove Model (Sampling Frame)		Sampling frame size	Monitored Sample Size	Monitored Efficiency (%)	Monitored Standard Deviation
HS	2018	7047	3	36.13%	0.29%
HS	2019	1427	2	36.29%	0.35%
JB	2017	8595	3	32.70%	0.31%
JB	2018	4032	2	33.33%	0.25%
JB	2019	265	2	34.02%	0.05%
JF	2018	370	2	32.43%	0.06%
JF	2019	879	2	32.92%	0.16%
MY	2018	7185	3	37.45%	0.40%
MY	2019	10420	3	38.09%	0.13%
MY	2020	9828	3	38.61%	0.33%
MY	2021	34024	3	38.93%	0.22%
MY	2022	31521	4	39.38%	0.21%
JM	2020	7796	3	41.95%	0.25%
JM	2021	9838	3	42.49%	0.25%
JM	2022	26816	4	42.99%	0.12%
Reliability Check					
Samples Monitored					42
Mean Efficiency (not considering deployment date)					39.24%
Standard error of mean					0.04%
Relative precision (Margin of error) (%)					0.09%
Result					Ok, acceptable
Lower Bound confidence value					not applicable

Stove Operating Fraction Uy (input to Ny)					
Monitoring Results					
Stove Model (Sampling Frame)			Sampling frame size	Monitored Sample Size	Monitored Usage (%)
Urban	JB, JF, MY	2018	5985	8	0.88
Rural	JB, JF, MY	2018	5602	2	1.00
Urban	JB, JF, MY	2019	5555	6	0.83
Rural	JB, JF, MY	2019	6009	7	0.86
Urban	JB	2017	4509	3	0.67
Rural	JB	2017	4086	5	0.60
Urban	HS	2018	620	5	0.80
Rural	HS	2018	6427	3	1.00
Urban	HS	2019	271	2	1.00
Rural	HS	2019	1156	7	0.86
Urban	MY	2020	5348	6	0.83
Rural	MY	2020	4480	7	0.86
Urban	JM	2020	4240	3	1.00
Rural	JM	2020	3556	5	0.80
Urban	MY	2021	15518	11	0.82
Rural	MY	2021	18506	15	0.93
Urban	JM	2021	4487	6	0.83
Rural	JM	2021	5351	4	1.00
Urban	MY	2022	14947	13	0.92
Rural	MY	2022	16574	12	0.92
Urban	JM	2022	13806	11	0.91
Rural	JM	2022	13010	9	0.89
Reliability Check					
Samples Monitored					150
Monitored Uy (p)					88.61%
Standard Error of Uy					2.57%
Relative precision (Margin of error)					0.15%
Result					Ok, acceptable
Lower Bound confidence value					not applicable

CU						
Monitoring Results						
Stove Model (Sampling Frame)			Sampling frame size	Monitored Sample Size	Monitored Mean Value of baseline stove fuel consumption	Monitored Standard Deviation
Urban	JB, JF, MY	2018	5985	7	1.02	0.25
Rural	JB, JF, MY	2018	5602	2	0.65	0.00
Urban	JB, JF, MY	2019	5555	5	0.86	0.16
Rural	JB, JF, MY	2019	6009	6	1.27	0.30
Urban	JB	2017	4509	2	1.33	0.00
Rural	JB	2017	4086	3	1.72	0.16
Urban	HS	2018	620	4	1.19	0.20
Rural	HS	2018	6427	3	1.51	0.30
Urban	HS	2019	271	2	1.05	0.40
Rural	HS	2019	1156	6	1.34	0.04
Urban	MY	2020	5348	5	0.88	0.16
Rural	MY	2020	4480	6	0.99	0.00
Urban	JM	2020	4240	3	0.85	0.30
Rural	JM	2020	3556	4	0.99	0.00
Urban	MY	2021	15518	9	0.76	0.20
Rural	MY	2021	18506	14	0.81	0.34
Urban	JM	2021	4487	5	0.90	0.14
Rural	JM	2021	5351	4	1.10	0.54
Urban	MY	2022	14947	12	0.76	0.25
Rural	MY	2022	16574	11	0.45	0.00
Urban	JM	2022	13806	10	0.69	0.16
Rural	JM	2022	13010	8	0.78	0.25
Reliability Check						
Samples Monitored						131
Mean fuel consumption (Tonnes/HH/Year)						0.87
Standard error of mean						2.19%
Relative precision (Margin of error) (%)						2.09%
Result						ok acceptable
Baseline stove use proportion (fraction)						0.46
Applicable Value (tonnes/year)						0.40

CU						
Monitoring Results						
Stove Model (Sampling Frame)			Sampling frame size	Monitored Sample Size	Monitored Mean Value of use of baseline stove	Monitored Standard Deviation
Urban	JB, JF, MY	2018	5985	8	1.02	0.25
Rural	JB, JF, MY	2018	5602	2	0.65	0.00
Urban	JB, JF, MY	2019	5555	6	0.86	0.16
Rural	JB, JF, MY	2019	6009	7	1.27	0.30
Urban	JB	2017	4509	3	1.33	0.00
~~Rural~~	~~JB~~	~~2017~~	~~4836~~	~~5~~	1.72	0.16
Urban	HS	2018	620	5	1.19	0.20
Rural	HS	2018	6427	3	1.51	0.30
Urban	HS	2019	271	2	1.05	0.40
Rural	HS	2019	1156	7	1.34	0.04
Urban	MY	2020	5348	6	0.88	0.16
Rural	MY	2020	4480	7	0.99	0.00
Urban	JM	2020	4240	3	0.85	0.30
Rural	JM	2020	3556	5	0.99	0.00
Urban	MY	2021	15518	11	0.76	0.20
Rural	MY	2021	18506	15	0.81	0.34
Urban	JM	2021	4487	6	0.90	0.14
Rural	JM	2021	5351	4	1.10	0.54
Urban	MY	2022	14947	13	0.76	0.25
Rural	MY	2022	16574	12	0.45	0.00
Urban	JM	2022	13806	11	0.69	0.16
Rural	JM	2022	13010	9	0.78	0.25
Reliability Check						
Samples Monitored						150
Baseline stove use proportion (fraction)						0.46
Mean value						0.87
Standard error of mean						2.10%
Relative precision (Margin of error) (%)						2.01%
Result						ok acceptable
~~Applicable Value (tonnes/year)~~						~~0.40~~

e. Demonstration of whether the required confidence/precision has been met

Refer above. The VER calculation spreadsheet contains calculation of relative precision. Since the relative margin of error obtained is less than 10%, the data are statistically acceptable and deemed representative of the population.

f. Demonstration of whether the samples were randomly selected and are representative of the population

The samples were randomly selected using Stratified Random Sampling across the ~~CPA~~VPA population and the identified strata. Random numbers were generated using online random number generator available at stattrek random number generator[15] for each stratum as per the minimum sample size requirements. Under Stratified Random Sampling, each member of the population of each stratum has an equal chance of being selected, thus the samples selected were deemed to be representative of the population.

SECTION E. CALCULATION OF SDG IMPACTS

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

>>

SDG	SDG Impact	Baseline estimate
1 No Poverty	Average household savings due to decrease in expenditure on basic services such as purchased fuel in baseline ($HHS_{Baseline}$)	0

[15] http://stattrek.com/statistics/random-number-generator.aspx

SDG	SDG Impact	Baseline estimate
5 Gender Equality	Average time saving associated with cooking and/or fuel collection time in baseline ($HHTS_{Baseline}$)	0

SDG	SDG Impact	Baseline estimate
7 Affordable and Clean Energy	Number of beneficiaries household under Baseline ($HHB_{Baseline}$)	0

SDG	SDG Impact	Baseline estimate
7 Affordable and Clean Energy	% users reporting an operational ICS in baseline ($ACS_{Baseline}$)	0

SDG	SDG Impact[16]	Baseline estimate
13 Climate Action	Amount of CO_2e emissions reduced by the project per year in baseline	0

SDG	SDG Impact	Baseline estimate
15 Life on Land	Quantity of non-renewable woody biomass saved in baseline ($FS_{Baseline}$)	0

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

>>

SDG	SDG Impact	Project estimate
1 No Poverty	Average household savings due to decrease in expenditure on basic services such as purchased fuel in Project ($HHS_{Project}$)	0

SDG	SDG Impact	Project estimate
5 Gender Equality	Average time saving associated with cooking and/or fuel collection time in Project ($HHTS_{Project}$)	0.33 hrs/HH/day

SDG	SDG Impact	Project estimate
7 Affordable and Clean Energy	Number of beneficiaries household under Project ($HHB_{Project}$)	

[16] For SDG 13, AMS II.G. does not provide any calculation equation for BEy, PE¬y, or Ly separately. Instead, the methodology directly provides equation for emission reductions, without separate baseline, project, or leakage emission reduction equations as discussed in section E.4 below.

VPA ID	ICS Distributed
GS 11192	8,085
GS 11193	15,754
GS 11194	15,812
GS 11195	389
GS 11196	9,984
GS 11197	7,801
GS 11198	17,000
GS 11199	17,000
GS 11200	16,991
GS 11879	16,938
GS 11880	16,947
GS 11881	16,981
GS 11882	361
Total	**160,043**

SDG	SDG Impact	Project estimate
7 Affordable and Clean Energy	% of operating ICS under project ($ACS_{Project}$)	88.61%

SDG	SDG Impact[17]	Project estimate
13 Climate Action	Amount of CO2e emissions reduced by the project per year in project	See table below

VPA ID	Project emissions (t CO_2)
GS 11192	24,113~~564~~
GS 11193	36,194~~45,986~~
GS 11194	46,139
GS 11195	904
GS 11196	29,680
GS 11197	23,236
GS 11198	50,090
GS 11199	50,321
GS 11200	47,187
GS 11879	38,658
GS 11880	29,973
GS 11881	12,197
GS 11882	26
Total	**388,718~~398,961~~**

SDG	SDG Impact	Project estimate
15 Life on Land	Quantity of non-renewable woody biomass saved in project ($FS_{Project}$)	See table below

VPA ID	Non-renewable wood consumption (tonnes)
GS 11192	20,069
GS 11193	37,571
GS 11194	37,695
GS 11195	958
GS 11196	24,248

[17] For SDG 13, AMS II.G. does not provide any calculation equation for BEy, PE¬y, or Ly separately. Instead, the methodology directly provides equation for emission reductions, without separate baseline, project, or leakage emission reduction equations as discussed in section E.4 below.

GS 11197	18,984
GS 11198	40,923
GS 11199	41,113
GS 11200	40,197
GS 11879	38,201
GS 11880	39,063
GS 11881	43,325
GS 11882	982
Total	**383,328**

Sample Calculations:
ER Calculation

Description	Unit	VPA 11192	VPA 11193	VPA 11194	VPA 11195	VPA 11196	VPA 11197	VPA 11198	VPA 11199	VPA 11200	VPA 11879	VPA 11880	VPA 11881	VPA 11882
Operating Stove under VPA (Ny)	number	7,163	13,958	14,010	344	8,846	6,912	15,062	15,062	15,054	15,008	15,015	15,046	319
Year equivalent fraction	fraction	1.000	1.000	1.000	0.771	1.000	1.000	1.000	1.000	0.959	0.827	0.627	0.230	0.022
B_{old}	Tonnes/household/year	4.72	4.55	4.55	4.66	4.60	4.61	4.56	4.58	4.49	4.30	4.38	4.81	5.11
Continuous use of baseline stoves (CU)	number	3,281	6,393	6,417	158	4,052	3,166	6,899	6,899	6,895	6,874	6,877	6,891	146
Biomass consumed in baseline stove (CU)	tonnes wood/ year	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
$B_{old,adjusted}$	Tonnes/household/year	4.33	4.16	4.15	4.27	4.20	4.21	4.16	4.18	4.09	3.90	3.99	4.41	4.72
L_y	Percentage	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
η_{old}	fraction	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
η_{new}	Fraction	0.3924	0.3924	0.3924	0.3924	0.3924	0.3924	0.3924	0.3924	0.3924	0.3924	0.3924	0.3924	0.3924
$B_{y,saving}$	tons wood-eq/HH-yr	3.06	2.94	2.94	3.02	2.97	2.98	2.95	2.96	2.90	2.76	2.82	3.12	3.34
$B_{y,saving}$ (VPA wide)	tonnes/yr	21,933	41,061	41,197	1,039	26,308	20,597	44,400	44,605	43,612	41,446	42,382	47,005	1,065
N_y (adjusted for year equivalent fraction)	Number	7163	13958	14010	265	8846	6912	15062	15062	14438	12409	9413	3461	7
$f_{NRB,y}$	Fraction	0.9150	0.9150	0.9150	0.9217	0.9217	0.9217	0.9217	0.9217	0.9217	0.9217	0.9217	0.9217	0.9217
$NCV_{biomass}$	TJ/tonne	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015
$EF_{projected\_fossil\_fuel}$	tCO_2/TJ	81.60	81.60	81.60	81.60	81.60	81.60	81.60	81.60	81.60	81.60	81.60	81.60	81.60
ER_y	tCO_2	24564	45986	46139	904	29680	23236	50090	50321	47187	38658	29973	12197	26
annual thermal energy savings achieved during monitoring period	GWh_{th}	80.974	151.592	152.095	2.960	97.128	76.041	163.919	164.678	154.422	126.510	98.090	39.915	0.087
Emission Reduction (ER)	**tCO_2e**	**24,564**	**45,986**	**46,139**	**904**	**29,680**	**23,236**	**50,090**	**50,321**	**47,187**	**38,658**	**29,973**	**12,197**	**26**

Description	Unit	VPA 11192	VPA 11193	VPA 11194	VPA 11195	VPA 11196	VPA 11197	VPA 11198	VPA 11199	VPA 11200	VPA 11879	VPA 11880	VPA 11881	VPA 11882
Operating Stove under VPA (Ny)	number	7,163	13,958	14,010	344	8,846	6,912	15,062	15,062	15,054	15,008	15,015	15,046	319
Year equivalent fraction	fraction	0.982	0.787	1.000	0.771	1.000	1.000	1.000	1.000	0.959	0.827	0.627	0.230	0.022
B_{old}	Tonnes/household/year	4.72	4.55	4.55	4.66	4.60	4.61	4.56	4.58	4.49	4.30	4.38	4.81	5.11
Continuous use of baseline stoves (CU)	number	3,281	6,393	6,417	158	4,052	3,166	6,899	6,899	6,895	6,874	6,877	6,891	146
Biomass consumed in baseline stove (CU)	tonnes wood/ year	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
$B_{old,adjusted}$	Tonnes/household/year	4.33	4.16	4.15	4.27	4.20	4.21	4.16	4.18	4.09	3.90	3.99	4.41	4.72
L_y	Percentage	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
η_{old}	fraction	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
η_{new}	Fraction	0.3924	0.3924	0.3924	0.3924	0.3924	0.3924	0.3924	0.3924	0.3924	0.3924	0.3924	0.3924	0.3924
$B_{y,saving}$	tons wood-eq/HH-yr	3.06	2.94	2.94	3.02	2.97	2.98	2.95	2.96	2.90	2.76	2.82	3.12	3.34
$B_{y,saving}$ (VPA wide)	tonnes/yr	21,933	41,061	41,197	1,039	26,308	20,597	44,400	44,605	43,612	41,446	42,382	47,005	1,065
N_y (adjusted for year equivalent fraction)	Number	7032	10986	14010	265	8846	6912	15062	15062	14438	12409	9413	3461	7
$f_{NRB,y}$	Fraction	0.9150	0.9150	0.9150	0.9217	0.9217	0.9217	0.9217	0.9217	0.9217	0.9217	0.9217	0.9217	0.9217
$NCV_{biomass}$	TJ/tonne	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015
$EF_{projected\_fossil\_fuel}$	tCO_2/TJ	81.60	81.60	81.60	81.60	81.60	81.60	81.60	81.60	81.60	81.60	81.60	81.60	81.60
ER_y	tCO_2	24113	36194	46139	904	29680	23236	50090	50321	47187	38658	29973	12197	26
annual thermal energy savings achieved during monitoring period	GWh_{th}	79.489	119.314	152.095	2.960	97.128	76.041	163.919	164.678	154.422	126.510	98.090	39.915	0.087
Emission Reduction (ER)	**tCO_2e**	**24,113**	**36,194**	**46,139**	**904**	**29,680**	**23,236**	**50,090**	**50,321**	**47,187**	**38,658**	**29,973**	**12,197**	**26**

For details, please refer tab "ER Calculation" of the ER calculator

SD Parameters:

Relevant SDG Indicator/Safeguarding Principle	GSDM 1.1.1 Average household savings i.e., decrease in expenditure on basic service such cooking
Data / Parameter	$HHS_{Project}$
Unit	KSH/ year
Description	Average household savings due to decrease in expenditure on basic services such as cooking in project
Source of data	Monitoring Survey data
Average household savings due to decrease in expenditure on basic services such as cooking in project	0
Relevant SDG Indicator/Safeguarding Principle	**GSDM 5.4.1 Average time saving associated with cooking and/or fuel collection time**
Data / Parameter	$HHTS_{Project}$
Unit	Hrs/HH/day
Description	Average time saving associated with cooking and/or fuel collection time in project
Source of data	Monitoring Survey data
Average time saving associated with cooking and/or fuel collection time in project	0.33
Relevant SDG Indicator/Safeguarding Principle	**GSDM 7.1.1 Number of beneficiaries: Households**
Data / Parameter	$HHB_{Project}$
Unit	Number
Description	Number of beneficiaries household under project
Source of data	Sales Database
VPA 11192	8,085
VPA 11193	15,754
VPA 11194	15,812
VPA 11195	389
VPA 11196	9,984
VPA 11197	7,801
VPA 11198	17,000
VPA 11199	17,000
VPA 11200	16,991
VPA 11879	16,938
VPA 11880	16,947
VPA 11881	16,981
VPA 11882	361
Total	**1,60,043**

Relevant SDG Indicator/Safeguarding Principle	GSDG 7.1.2 Proportion of population with primary reliance on clean fuels and technology
Data / Parameter	$ACS_{Project}$
Unit	%
Description	Access to affordable and clean energy (% of operating ICS units under project)
Source of data	Sample Size cal and results
% of operating ICS units under project	88.61%

Relevant SDG Indicator/Safeguarding Principle	GSDM 15.1.1 Total non-renewable wood fuel saved
Data / Parameter	Quantity of woody biomass saved in tonnes
Unit	Tonnes/year
Description	Non-renewable Woodfuel eq savings reported by user in the project
Source of data	ER Calculation
VPA 11192	20,069
VPA 11193	37,571
VPA 11194	37,695
VPA 11195	958
VPA 11196	24,248
VPA 11197	18,984
VPA 11198	40,923
VPA 11199	41,113
VPA 11200	40,197
VPA 11879	38,201
VPA 11880	39,063
VPA 11881	43,325
VPA 11882	982

For details, please refer tab "SD Parameters Assessment" of the ER calculator.

E.3. Calculation of leakage

>>

Not Applicable

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

SDG 1

Net Benefit = $HHS_{Project}$ - $HHS_{Baseline}$

Where:

$HHS_{Baseline}$	Average household savings due to decrease in expenditure on purchased fuel in baseline
$HHS_{Project}$	Average household savings due to decrease in expenditure on purchased fuel in project

SDG 5

Net Benefit = $HHTS_{Project}$ - $HHTS_{Baseline}$

Where:

$HHTS_{Baseline}$	Average time saving associated with cooking and/or fuel collection time in baseline
$HHTS_{Project}$	Average time saving associated with cooking and/or fuel collection time in project

SDG 7

Net Benefit = $HHB_{Project}$ - $HHB_{Baseline}$

Where:

$HHB_{Baseline}$	Number of beneficiaries household under Baseline
$HHB_{Project}$	Number of beneficiaries household under Project

SDG 7

Net Benefit = $ACS_{Project}$ - $ACS_{Baseline}$

Where:

$ACS_{Baseline}$	Access to affordable and clean energy (% of operating ICS units under Baseline)
$ACS_{Project}$	Access to affordable and clean energy (% of operating ICS units under Project)

For SDG13

As per the ~~SSC~~ PoA-DD, emission reductions for the ~~SSC CPA~~VPA (Same for all 5 ~~CPA~~VPAs) have been calculated according to the following formula:

$ERy = (B_{y,savings} * N_y) * (fNRB_{,y} * NCV_{biomass} * EF_{projected\_fossil\ fuel})$ Equation (1)

Where:

ERy	Emission reductions during the period y in tCO2e
fNRB,y	Fraction of woody biomass saved by the project activity in period y that can be established as non-renewable biomass
$NCV_{biomass}$	Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.015 TJ/tonne)
$EF_{projected\_fossil\ fuel}$	Emission factor for the substitution of non-renewable woody biomass by similar consumers. Use a value of 81.6 tCO2/TJ
Ny	Number of cook stoves in operation or replaced
$B_{y,savings}$	Quantity of woody biomass that is saved in tonnes per appliance.

$B_{y,savings,i}$ is estimated using option 2 of the methodology AMS II.G V3:

$B_{y,savings} = [(B_{old} - CU) * L] * (1 - \eta_{old}/\eta_{new})$ Equation (2)

B_{old}	Quantity of biomass used in the absence of the project activity in tonnes/ year
CU	Quantity of woody biomass for the continuous use (CU) of baseline stoves
η_{old}	Weighted average value is used since the replaced systems are unimproved and improved baseline technologies.
η_{new}	The result obtained from independent testing is used. Efficiency of the system being deployed as part of the project activity (fraction), as determined using the Water Boiling Test (WBT) protocol. Use weighted average values if more than one type of system is being introduced by the project activity.
L	Leakage adjustment factor (fraction)

SDG 15

Net Benefit (SDG 15) = $FS_{Project}$ - $FS_{Baseline}$

Where:

$FS_{Baseline}$	Quantity of non-renewable woody biomass saved in baseline
$FS_{Project}$	Quantity of non-renewable woody biomass saved in project

SDG	SDG Impact	Baseline estimate	Project estimate	Net benefit
13 Climate Action (GS 11192)	Amount of CO_2e emissions reduced by the project per year	0	24,113~~24,564~~	24,113~~24,564~~
13 Climate Action (GS 11193)		0	36,194~~45,986~~	36,194~~45,986~~
13 Climate Action (GS 11194)		0	46,139	46,139
13 Climate Action (GS 11195)		0	904	904
13 Climate Action (GS 11196)		0	29,680	29,680
13 Climate Action (GS 11197)		0	23,236	23,236
13 Climate Action (GS 11198)		0	50,090	50,090
13 Climate Action (GS 11199)		0	50,321	50,321
13 Climate Action (GS 11200)		0	47,187	47,187
13 Climate Action (GS 11879)		0	38,658	38,658
13 Climate Action (GS 11880)		0	29,973	29,973
13 Climate Action (GS 11881)		0	12,197	12,197
13 Climate Action (GS 11882)		0	26	26
Total		**0**	**388,718~~398,961~~**	**388,718~~398,961~~**

SDG	SDG Impact	Baseline estimate	Project estimate	Net benefit
1 No Poverty	1.1 By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than $1.25 a day. **Indicator:** Average household savings due to decrease in expenditure on basic services due to adoption of project technology/ measures	0	0	0

SDG	SDG Impact	Baseline estimate	Project estimate	Net benefit
5 Gender Equality	5.4 Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate.	0	0.33 hrs/HH/day	0.33 hrs/HH/day

	Indicator: Average time saving associated with cooking time and fuel collection			

SDG	SDG Impact	Baseline estimate	Project estimate	Net benefit
7 Affordable and Clean Energy	7.1 By 2030, ensure universal access to affordable, reliable and modern energy services **Indicator:** Number of beneficiary Households under the project	0	160,043	160,043

SDG	SDG Impact	Baseline estimate	Project estimate	Net benefit
7 Affordable and Clean Energy	7.1 By 2030, ensure universal access to affordable, reliable and modern energy services **Indicator:** % users reporting an operational ICS in project (ACS)	0	88.61%	88.61%

SDG	SDG Impact	Baseline estimate	Project estimate	Net benefit
15 Life on Land	15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements **Indicator:** Non-renewable Woodfuel eq savings reported by user in the project	GS 11192 – 0 GS 11193 – 0 GS 11194 – 0 GS 11195 – 0 GS 11196 – 0 GS 11197 – 0 GS 11198 – 0 GS 11199 - 0 GS 11200 – 0 GS 11879 – 0 GS 11880 – 0 GS 11881 – 0 GS 11882 - 0	GS 11192 – 20,069 GS 11193 – 37,571 GS 11194 – 37,695 GS 11195 – 958 GS 11196 – 24,248 GS 11197 – 18,984 GS 11198 – 40,923 GS 11199 – 41,113 GS 11200 – 40,197 GS 11879 – 38,201 GS 11880 – 39,063 GS 11881 – 43,325 GS 11882 - 982	GS 11192 – 20,069 GS 11193 – 37,571 GS 11194 – 37,695 GS 11195 – 958 GS 11196 – 24,248 GS 11197 – 18,984 GS 11198 – 40,923 GS 11199 – 41,113 GS 11200 – 40,197 GS 11879 – 38,201 GS 11880 – 39,063 GS 11881 – 43,325 GS 11882 - 982

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[18] achieved during this monitoring period
13 (GS 11192)	48,236	24,113~~24,564~~
13 (GS 11193)	48,238	36,194~~45,986~~
13 (GS 11194)	48,238	46,139
13 (GS 11195)	48,589	904
13 (GS 11196)	48,733	29,680
13 (GS 11197)	48,733	23,236
13 (GS 11198)	48,733	50,090
13 (GS 11199)	48,733	50,321
13 (GS 11200)	48,733	47,187
13 (GS 11879)	48,733	38,658
13 (GS 11880)	48,733	29,973
13 (GS 11881)	48,733	12,197
13 (GS 11882)	48,733	26
Total	**631,898**	388,718~~398,961~~

E.5.1. Explanation of calculation of value estimated ex ante calculation of approved PDD for this monitoring period
>>
The ex-ante estimate per VPA for the monitoring period has been calculated as follows:
= Ex-ante ER as per VPA-DD (Section B.4.4) * (Number of Days monitored / No. of days in a year)

For GS 11192
= 48,236*365[19]/365 = 48,236

For GS 11193 - GS 11194
= 48,238*365/365 = 48,238

For GS 11195
= 48,589*365/365 = 48,589

For GS 11196 - GS 11200 & GS 11879 - GS 11882
= 48,733*365/365 = 48,733

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

>>

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

[19] No.of Days monitored in Year 2022 = Days(31-12-2022,01-01-2022)+1= 365

The actual emission reductions are lower as compared to ex-ante calculation in the registered VPA-DD.

SECTION F. SAFEGUARDS REPORTING

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Safeguards reporting is not deemed applicable as there are no safeguarding principles that require any mitigative action.

SECTION G. STAKEHOLDER INPUTS AND LEGAL DISPUTES

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

>>
Not applicable. No major grievances on the project were received. Minor grievance received (primarily warranty claims and repair requests) during the monitoring period were duly resolved.

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

>>
Not applicable

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

>>
Not Applicable, the project is in compliance with the Host Country's legal, environmental, ecological, and social regulations and has not been legally challenged in the concerned monitoring period.~~Not applicable~~

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Appendix 1: Contact information of project participants and responsible persons/entities

Project participant and/or responsible person/ entity	☒ Project participant ☐ Person/entity responsible for completing the Template – Monitoring Report~~CDM-MR-FORM~~
Organization name	BioLite India Private Limited
Street/P.O. Box	65 jay street, Floor 4
Building	
City	Brooklyn
State/region	NY
Postcode	11201
Country	USA
Telephone	
Fax	
E-mail	erik@bioliteenergy.com
Website	https://global.bioliteenergy.com/
Contact person	Mr. Erik Wurster
Title	
Salutation	Mr.
Last name	Wurster
Middle name	-
First name	Erik
Department	

Project participant and/or responsible person/ entity	☐ Project participant ☒ Person/entity responsible for completing the Template – Monitoring Report~~CDM-MR-FORM~~
Organization name	Climate Secure ~~India Pvt. Ltd.~~
Street/P.O. Box	Club Road
Building	Pragati Apartments
City	West Delhi
State/Region	Delhi
Postcode	110063
Country	India
Telephone	+91 11 2521 3080
Fax	--
E-mail	info@climate-secure.com
Website	www.climate-secure.com
Contact person	Rohit Lohia

Title	Director

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

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