



**Verified Carbon
Standard**

VALIDATION AND VERIFICATION OF “ENERGY EFFICIENT COOK STOVE IMPLEMENTATION IN INDIA”



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Summary:

LGAI Technological Center, S.A. (hereafter referred to as Applus+ Certification) has been contracted by Enen Green Services Private Limited to conduct the joint validation and verification of the project “Energy Efficient Cook Stove Implementation in India”, VCS PL ID 2336, against VCS Standard Version 4.1.

The validation and verification includes confirming the project’s design description, project’s baseline, monitoring plan and the project’s compliance with relevant VCS and host party criteria and implementation of the monitoring plan of the Joint PD and MR (Project ID 2336) and the application of the monitoring methodology as per VCS methodology VMR0006 “Methodology for Installation of High Efficiency Firewood Cookstoves”, Version 1/6/. The validity of Methodology version 1 is from 08/09/2020. A remote site visit was conducted to verify the data submitted in the monitoring report.

The project activity involves promotion of improved cooking stoves (ICS) to the people of socially deprived community in India. The project intends to avail the households with clean cooking solutions; thereby, displacing the less efficient traditional cooking stoves from the kitchen with stoves of better efficiency. Replacement of the traditional cooking stoves with ICS will reduce the exposure of the family members, specifically women, to the indoor air pollution and therefore result in saving of health related expenses.

The estimated annual average emission reductions over a 10 year period of first crediting period are 58,944 tCO₂e/year. The total emission reductions for 10 years crediting period will be 589,441 tCO₂e. Total GHG emission reduction in first monitoring period 28/06/2019 to 27/06/2020 is 33,439 tCO₂e.

The review of the project design documentation, monitoring report and additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and stakeholders have provided Applus+ Certification with sufficient evidence to validate the fulfillment of the stated criteria.

The purpose of the validation is to have a thorough and independent assessment of the proposed project activity against the applicable VCS requirements, in particular, the project’s baseline, monitoring plan and the project’s compliance with relevant VCS and host party criteria. These are validated in order to confirm that the project design, as documented, is sound and reasonable and meets the identified criteria. Validation is a requirement for all VCS projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of emission reductions. Applus+ Certification’s objective is to perform a thorough, independent assessment of the validation of the project activity.

The validation scope is defined as an independent and objective review of the Joint PD & MR. The Joint PD & MR is reviewed against the relevant criteria and guidance documents provided by VCS which included: VCS Program Guide (v4, dated 19/09/2019), VCS Standard (v4.1, dated 22/04/2021, Program Definitions (v4.1, dated 15/04/2021), Registration & Issuance Process (v4, dated 19/09/2019)/07/ applicable at the time in order to confirm that the project meets the applicability conditions of the selected baseline and monitoring methodology namely VMR0006,

Version 1/06/ and also assess the claims and assumptions made in the Joint PD & MR without limitation on the information provided by the project proponents.

The purpose of the verification is to review the Joint VCS PD & MR for the monitoring results and verify that monitoring methodology was implemented according to monitoring plan and monitoring data, further based on review of ER sheet confirm that the reductions in anthropogenic emissions by sources is sufficient, definitive and presented in a concise and transparent manner. In particular, monitoring plan, Joint VCS PD & MR, ER sheet and the project's compliance with relevant VCS, UNFCCC and host party criteria are verified in order to confirm that the project has been implemented in accordance with design and conservative assumptions, as documented.

The scope of the verification included as verification of project implementation and operation with respect to the Joint PD & MR, implemented monitoring plan with the Joint PD & MR and applied baseline and monitoring methodology, the actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan, Evaluation of the GHG emission reduction data and express a conclusion with a reasonable level of assurance about whether the reported GHG emission reduction data is free from material misstatement, confirmation of reported GHG emission data is sufficiently supported by evidence.

A risk based approach has been followed to perform this verification. In the course of validation and verification, 04 Corrective Action request (CARs) and 02 Clarification request (CRs) were raised and successfully closed. There is no FAR raised.

Applus+ Certification confirms that the project is meeting the criteria specified by Joint PD & MR template version 4, VCS Standard version 4.1 and applied methodology VMR0006, Version 1, hence be successfully validated, verified and further certified for emission reductions under VCS. Further confirms a combined positive validation and verification opinion confirming the project complies with the applicable VCS requirements, thus recommending the project for registration and issuance.

Our opinion relates to the projects GHG emissions and the resulting GHG emission reductions reported and related to the valid project baseline and monitoring and its associated documents. Based on the information seen and evaluated we confirm that the emission reductions from the project activity "Energy Efficient Cook Stove Implementation in India" during the period 28/06/2019 to 27/06/2020 (including both days) amount to 33,439 tonnes of CO₂e.

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1 INTRODUCTION

1.1 Objective

Applus+ Certification has been contracted by Enen Green Services Private Limited, (project proponent), to undertake the validation and verification of the energy efficiency improved project titled “Energy Efficient Cook Stove Implementation in India”. The verifiers have reviewed the GHG data collected to date for the monitoring period from 28/06/2019 to 27/06/2020(both days included) covered in this verification. The objective of the combined validation and verification is to have an independent third-party assessment of the Joint PD & MR/1/ and supporting documentation to ensure compliance with the rules, regulations and guidelines by CDM and VCS requirements. In particular;

- The project's baseline is assessed against “VMR0006 Methodology for Installation of High Efficiency Firewood Cookstoves, Version 1”/06/
- The project's monitoring plan is assessed against “VMR0006 Methodology for Installation of High Efficiency Firewood Cookstoves, Version 1”/06/
- The project's additionality justification is assessed against “VMR0006 Methodology for Installation of High Efficiency Firewood Cookstoves, Version 1” /06/
- The projects compliance with, the requirements of Article 12 of the Kyoto Protocol, the CDM Modalities and Procedures as agreed in the Marrakech Accords under decision 3/CMP.1, the annexes to this decision, subsequent decisions and guidance made by COP/MOP & CDM Executive Board and other relevant rules, including the Host Country legislation and sustainability criteria along with VCS standard version 4.1
- CDM project standard for project activities Version 02.0
- CDM project cycle procedure for project activities Version 02.0
- VCS standard v4.1
- VCS guideline v4.0

Validation and verification are a requirement for all VCS projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of verified carbon units (VCUs). This report contains the findings and resolutions from the validation and verification of the project activity.

1.2 Scope and Criteria

For validation:

The validation scope is given as an independent and objective review of the project design, the project's baseline study and monitoring plan (VMR0006 Methodology for Installation of High Efficiency Firewood Cookstoves, Version 1)/06/which are included in the VCS joint PD & MR/1/ and other relevant supporting documents. The scope of work covered in the validation is described below:

- To validate whether the project activity meets the requirements of VCS Standard and VCS program guide including additionality, proof of title and compliance with local laws.
- To evaluate whether the baseline and monitoring plan are in conformance with the applied methodology from the VCS approved GHG program
- To confirm that the information presented are completed, consistent, transparent and free of omission or material error
- Background investigation and follow up interviews
- Issuance of draft validation report with CARs, CRs & FARs, if any
- Final validation opinion

The information in the VCS joint PD & MR is reviewed against the criteria of VCS Standard; the VCS program guide and the applied consolidated baseline and monitoring CDM methodology.

Applus+ Certification has performed validation based on a risk based approach focusing mainly on the significant risks to meet the qualification criteria and the ability to generate Verified Carbon Units (VCUs).

For Verification:

The scope of the verification was the independent and objective review and ex-post determination of the monitored reductions in GHG emissions from “Energy Efficient Cook Stove Implementation in India”. The verification of this project was based on the validated VCS joint project description & monitoring report and supporting documents submitted by the project proponent to the verification team. The documents were reviewed against the following guidance and protocols:

- VCS Program Guide (v4, dated 19/09/2019)/07/
- VCS Standard (v4.1, dated 22/04/2021)/07/
- VCS Program Definitions (v4.1, dated 15/04/2021)/07/
- VCS Registration & Issuance Process (v4, dated 19/09/2019)/07/
- VCS approved methodology VMR0006 (version 1, dated 08/09/2020)/06/

The validation & verification is not meant to provide any consulting towards the client. However, stated request for clarifications and/or corrective actions may provide input for improvement of the project design

1.3 Level of Assurance

The level of assurance of the verification report falls under reasonable assurance engagements as selected by the Client. The verification team verified the complete monitoring data for all the parameters of the monitoring plan and confirms that the reported emission reductions are free from any type of material errors.

1.4 Summary Description of the Project

The project will be broadly implemented in the state Assam country India. Starting with implementation in Month of June 2019, it is envisaged to disseminate ICS to households within three districts Baksa, Udalguri and Barpeta. Districts in India are second level of administrative divisions after state. Districts are subdivided in tehsil. The Households in this region of the project activity are characterized by the consumption of the solid biomass based fuel. More than 62% of the rural households in these districts use firewood for cooking purpose. Similarly, another 29% use dung cake to meet their daily cooking energy requirements.

The majority of communities are rural and some lack direct road access. This combination of actors drives the high reliance on fuelwood as the primary source of cooking fuel. Despite high prevalence of biogas throughout India, the average penetration rates of biogas and LPG throughout the project boundary is less than 2% each and access to kerosene is also very limited mostly due to high fuel prices.

The project intends to disseminate a locally made smart ICS to the disadvantaged communities in the project district. The dissemination of ICS will happen phase wise and accordingly the ICS will be included in the project design.

District wise breakup of distributed cookstove:

State	District	Tehsil	No of Household
Assam	Baksa	Baksa	1300
		Goreswar	1450
		Jalah	1340
		Mushalpur	1440
		Rangia	1905
	Udalguri	Dalgaon	1200
		Dhekiajuli	2678
		Mazbat	1994
		Udalguri	2012
		Harisinga	2096
	Barpeta	Baghabore	1430
		Bajali	1750
		Barnagar	2425
		Barpeta	2500
			25520



Figure: Design of ICS

Technical Specification

Height	190 mm
Diameter	250 mm
Chimney	

Internal Diameter	105 mm
Outer Diameter	110 mm
Thickness	5 mm
Made up of red clay, treated at high temperature	700°C
Outer Body	
Thickness	20 gauge
Black powder coated and treated at high temperature	
Total weight	4.5 kg
Used glass wood as insulator	

The estimated annual average emission reductions over a 10 year period of first crediting period are 58,944 tCO₂e/year. The total emission reductions for 10 years crediting period will be 589,441 tCO₂e. Total GHG emission reduction in first monitoring period 28th June 2019 to 27th June 2020 is **33,439 tCO₂e**.

This was confirmed based on review of Joint PD & MR/1/, ER verification spreadsheet/02/, ICS database/03/.

2 VALIDATION AND VERIFICATION PROCESS

2.1 Method and Criteria

Validation and Verification was conducted using Applus+ Certification's procedures in line with the requirements specified in the VCS standard Requirements, CDM M&P, the latest version of the CDM Validation and Verification Standard, and relevant decisions of the COP/MOP and the CDM EB and applying standard auditing techniques.

In case of the current validation & verification, being in India, a developing country the validation team determined the sample size for acceptance sampling by evaluating the following, using its own professional judgment and guidance in the Standard 'Sampling and surveys for CDM project activities and programme of activities' version 07.0: Considering Acceptable Quality Level (AQL): 0.5% Unacceptable Quality Level (UQL): 20% and producer risk of 5% and consumer risk of 20% a sample size of 8 was required as per Table 1 in the referred Standard. Acceptance number (c) thus determined for the sample size is 0. Team verified 24 samples on conservative side to validate and verify the project activity. The verification team selected random samples from the

list of cookstoves installation database. Team has assessed (by remote verification, & desk review of contract document between PO & user) a total of 24 samples (randomly selected) selected from different district. The presence of project stoves was checked during the remote visit on video call. The stoves details (unique serial number, date of installation, type of ICS, name of user and address) were also checked and found to be consistent with that reported in the installation database. No inconsistency was observed for any of the 24 samples with respect to the observations in the field.

It is to be assessed and determined whether the proposed implementation and operation of the project activity, and the steps taken to report emission reductions comply with the criteria and relevant guidance provided by the VCS Board. The validation and verification process consist of the following three phases;

- A desk review of the Joint PD and MR
- Remove visit and follow up interviews with project stakeholders
- The resolution of outstanding issues and issuance of final report and opinion

2.2 Document Review

The verification is performed primarily as a document review of the joint PD and MR and associated documents as stated in detail in appendix 1 of this document. The assessment is performed by a verification team using a protocol. The cross checks between information provided in the Joint PD and MR and information from sources other than those used, if available, the team's sectoral or local expertise and, if necessary, independent background investigations.

2.3 Interviews

Due to the current situation with the global COVID-19 pandemic scenario and travel to site was not possible due to which on-site inspection has not been performed by the assessment team. However, the representatives of the PP and users were interviewed telephonically on 26/02/2021 & 27/02/2021. The details of the people interviewed are mentioned in the table

S N	Name	Role	Organization
1	Ms. Ruchika Sharma	Project Consultant	Enen services Private Limited
2	Mr. Avinash Sharma	Project Consultant	Enen services Private Limited
3	Mr. Viral Pushpavadan	Project Implementor	Greentech Environment

ICS Users survey in remote audit:

Sr.No.	Unique-ID	Name	District	Family Members	Date	Date of Interview
1	BKS-0607	Archana Nath	Baksa	6	21/05/19	25/02/21
2	BKS-	Nipin Berman	Baksa	5	15/06/19	25/02/21

	0946					
3	BKS-1045	Dhiren Boro	Baksa	5	22/06/19	25/02/21
4	BKS-1158	DIPAK HALOY	Baksa	5	30/06/19	25/02/21
5	BKS-0032	GalapiKalita	Baksa	5	13/04/19	25/02/21
6	BKS-0237	Raghuram Madahi	Baksa	5	29/04/19	25/02/21
7	BKS-0468	MinalKalita	Baksa	4	15/05/19	25/02/21
8	BKS-0726	Bagaram Rajbanshi	Baksa	4	04/06/19	25/02/21
9	BRPT-0948	Namita Deka	Barpeta	5	13/08/19	25/02/21
10	BRPT-1233	Parbati Deka	Barpeta	8	05/09/19	25/02/21
11	BRPT-1409	Ritamani Deka	Barpeta	4	17/09/19	25/02/21
12	BRPT-1707	Munindar Sarkar	Barpeta	4	10/10/19	26/02/21
13	BRPT-0599	Renubala Devi	Barpeta	4	21/07/19	26/02/21
14	BRPT-0818	Haran Barman	Barpeta	4	07/08/19	26/02/21
15	BRPT-0087	Minu Deku	Barpeta	5	23/06/19	26/02/21
16	BRPT-0886	Prankrishna Sarkar	Barpeta	7	22/08/19	26/02/21
17	UDL-1754	Mrs. BimoliDaimari	Udalguri	4	11/11/19	26/02/21
18	UDL-0658	DilipDaimari	Udalguri	6	07/10/19	26/02/21
19	UDL-1151	PratulDaimari	Udalguri	5	10/11/19	26/02/21
20	UDL-0351	NiranDaimari	Udalguri	5	01/08/19	26/02/21
21	UDL-1321	NilimaDaimari	Udalguri	7	14/10/19	26/02/21
22	UDL-1549	Atul Daimari	Udalguri	2	02/11/19	26/02/21
23	UDL-1868	Nurul Islam	Udalguri	2	13/11/19	26/02/21
24	UDL-1208	NirsonDaimari	Udalguri	4	09/10/19	26/02/21

The topics covered during interview ranges from general features and implementation of project to project technical details of the project like design & technical specification, project implementation status, project start date, location, baseline identification, monitoring survey, data recording and archiving procedures, baseline stove use. The assessment was drawn based on the feedback received during interview coupled with the documentation and observations.

2.4 Site Inspections

Site Location visited: Various Location in India

A remote site visit was undertaken by the verification team on 26/02/2021 – 27/02/2021 to carry out the following;

- An assessment of the project design and technical specification, project location, implementation status and operation of the project activity as per the Joint PD and MR;
- A review of information flows for generating, aggregating and reporting the monitoring parameters;
- Interviews with relevant personnel to determine whether the operational and data collection procedures are implemented in accordance with the monitoring plan in the Joint PD and MR;
- A cross check between information provided in the monitoring report and data from other sources such as ICS database, survey records or similar data sources;/14/
- A check of the ICS working and observations of monitoring practices against the requirements of the Joint PD and MR, the applied methodology including applicable tool(s), and, where applicable, the applied standardized baseline;
- A check thermal efficiency test conducted by an independent third party /5/
- A review of calculations and assumptions made in determining the GHG data and emission reductions;
- An identification of quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

The assessment team has verified sufficient appropriate audit evidences, to reduce audit risk to an acceptably low level as requisite to achieve reasonable level of assurance for the current verification.

2.5 Resolution of Findings

The objective of this step is to identify, discuss and conclude on the issues related to the project description, technical specification, baseline and additionality, monitoring parameter and monitoring plan, implementation status and operations of the registered project activity that could impair the capacity of the registered project activity to achieve emission reductions or influence the monitoring and reporting of emission reductions. This is done based on the desk review and site assessment. The verification team prepares and/or updates a validation and verification protocol (internal document) that records the conformities and non-conformities, which may be of following types;

CAR (Corrective Action Request) is raised if one of the following occurs:

Non-compliance with the project description, applicability of monitoring methodology and its tools, additionality tools and has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient;

Non-compliance with the monitoring plan, the methodology or the standardized baseline are found in monitoring and reporting and has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient;

Modifications to the implementation, operation and monitoring of the registered project activity has not been sufficiently documented by the project participants;

Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impact the quantity of emission reductions;

Issues identified in a FAR during validation to be verified during verification or previous verification(s) have not been resolved by the project participants.

Clarification request (CR) is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met. All CARs and CRs raised by the Applus+ Certification during validation and verification shall be resolved prior to submitting a request for registration and issuance.

During the current validation and verification, 04 Corrective Action request (CARs) and 02 Clarification request (CRs) were raised and successfully closed.

All the findings that are raised and communicated to project participant during the validation and verification are included under Appendix 3. The section also includes the response, if provided, by the project participants and an assessment by the verification team if it was closed out or otherwise.

2.5.1 Forward Action Requests

The project activity is undergoing Joint validation and Verification under VCS; there were no FAR raised during the current Joint validation and verification.

3 VALIDATION FINDINGS

3.1 Project Details

The project is a small scale project which involves promotion of improved cooking stoves (ICS) to the people of socially deprived community in India. The project intends to avail the households with clean cooking solutions; thereby, displacing the less efficient traditional cooking stoves from the kitchen with stoves of better efficiency. Replacement of the traditional cooking stoves with ICS will reduce the exposure of the family members, specifically women, to

the indoor air pollution and therefore result in saving of health related expenses. Project is implemented by Greenway Grameen Infra Pvt. Ltd and Enen Green Services Private Limited on ground. Enen Green is providing consulting support in development under group VCS project.

All project activity instances included in the project are located within the country of India only.

The start date of project activity is 28/06/2019 which is the date considered as first batch distribution with signature of end user agreement by beneficiary household. Therefore, the commissioning of ICS is when the beneficiary household received ICS and start operation of ICS (i.e. start cooking). Hence, the commercial operation start of the project is same day when beneficiary household receive the ICS.

The estimated annual emission reductions over a 10 year period are 58,944 tCO₂e/year. The total emission reductions for 10 years crediting period start from 28th June 2019 to 27th June 2029 will be 589,441 tCO₂e. Total GHG emission reduction in first monitoring period 28th June 2019 to 27th June 2020 is 33,439 tCO₂e.

As per the calculation in the section, each ICS will reduce emissions by approximately 2.43 tonnes of CO₂e per year (net of leakage and continued use of the baseline stoves). To achieve the initial targeted volume of emission reductions, the project proponent aims to disseminate 25520 ICS in the project activity where as only 17,379 ICS has been distributed. Project started first batch distribution from 28th June 2019 and last batch distributed on 10th Jan 2021.

There exists no mandatory law or regulation in the host country requiring the introduction of ICS in India, therefore the project is a voluntary effort by the project proponent. The project is in compliance with relevant laws, statutes and other regulatory frameworks. The project does not violate any laws, statutes and or other regulatory frameworks in India.

Scenario existing prior to the implementation of project activity:

The scenario existing prior to the implementation of the project activity instances is the usage of traditional biomass and inefficient cook stoves with poor ventilation, causing excessive indoor air pollution (IAP) and has been a serious health risk for women and children who spend several hours in the kitchen.

The project activity is the green field activity, which involves installation of new ICS systems in the households where prior to the implementation of the project activity fire wood was in use for thermal energy needs. The baseline scenario is the use of fire wood for domestic thermal energy needs. Hence, it complies with the applied methodology.

The proposed group project reduces the use and demand for fossil fuels and non-renewable biomass that would have been used in the replaced stove to achieve the same output (i.e cooking daily meals and boiling hot water) with the ICS. This directly leads to reduced GHG

emissions. Therefore, the project has been implemented to generate GHG emissions for the purpose of their subsequent reduction, removal or destruction.

Based on secondary research which is highlighted by PP in Joint PD and MR, non-renewable biomass has been used since 31st Dec 1989 in India.

It has been confirmed in the Joint PD & MR /01/ that the project or any of its components are applying for VCS registration and till now it has not been registered under any GHG program. The PP has provided an undertaking about the project was not rejected by other GHG program, same was found correct and hence accepted by assessment team.

Based on its assessment through review of relevant documentation (as cited above), the assessment team confirms that the description given in the Joint PD & MR /01/ is accurate, complete, and provides an understanding of the nature of the project, and the project has been implemented as described in the Joint PD & MR /01/.

3.2 Participation under Other GHG Programs

The project activity by Greentech Environment has not been registered and is not seeking registration under any other GHG emission program to avail carbon benefits during the crediting period of the project activity. The PP has submitted an undertaking/04/ about none of VCU & creation of another form of environmental credit will be used to avoid double counting. This was checked and confirmed by review of the undertaking letter /04/, hence accepted.

3.3 Safeguards

3.3.1 No Net Harm

No potential negative environmental and socio-economic impacts have been identified by the project proponent. The project activity promotes environmental and socio-economic well-being as it results in zero GHG emissions due to installation and operation of clean technology.

This is as per the requirements of the VCS Standard (version 4.1) /07/ and deemed acceptable to the validation team.

3.3.2 Local Stakeholder Consultation

The local stakeholder consultation process has been described in detail, by the PP, in section 2.2 of the Joint PD & MR/01/. Stakeholders were identified as those whose activities directly or indirectly impact the project, and those who were to be impacted by the project activities. Full lists of invitees and attendees submitted to VVB. Due to COVID-19 participation was less and PP also follows government guideline of social distancing and public gathering less than 50 persons.

Enen Green organized the stakeholder consultation meeting on 28th October 2020 at **Jalaram Mandir, Fatasil Ambari, Guwahati, Assam**. The meeting was attended by the teachers, students, consultants, suppliers, contractors, local NGOs and the local residents in the area. The objective of the meeting was to inform the stakeholders about the environmental and social impacts of the project activity and discuss their concerns regarding the same, if any. The comments and suggestions were invited throughout the period of Stakeholders meet.

During the remote visit the assessment team interviewed some stakeholder. Based on the replies of the stakeholder, the validation team was convinced that the process of stakeholder consultation was carried out as described in the joint PD & MR/01/. The stakeholder also confirmed that they were invited for the meeting through personal invitation on phone. This was found to be consistent with the invitation process mentioned in the joint PD & MR/01/. Assessment team checked with stakeholder about grievance reporting process, and they confirm that they were communicated in stakeholder consultation process about grievance reporting process. No grievance reporting found in current monitoring period which is verified from copy of grievance register.

3.3.3 Environmental Impact

- Environmental Benefits: Reduction in firewood consumption and emission of greenhouse gases, forest and biodiversity conservation.
- Economic Benefits: Employment creation and saving of health cost.
- Air quality: Sufficiently enhance indoor air quality thereby improving health of women and children and reducing incidences of smoke and fire related injuries.
- Social Benefit : Reduces drudgery of women, time saving and the use of saved time for other productive activities

Thus, no EIA has been carried out by the PP which is deemed acceptable to the validation team.

3.3.4 Public Comments

The project has undergone Public Comment period from 21/09/2020 – 21/10/2020. Following comments received during public commenting period and VVB assessment team also verified the same as follows:

Sr. No.	Comments	PP Response	Assessment team response
1	DOE should thoroughly verify each households and visit each households to check that the beneficiaries are using traditional cook stoves in the baseline. Also PP should provide detailed survey records as well as government reports to demonstrate that ICS penetration is less than 5%.	PP did third party survey of households and found that rural households don't have fund to purchase LPG therefore they are still using traditional stoves who consumes more firewood. Refer following literature ¹ on adoption of firewood as major fuel in Assam.	It's not possible for assessment team to visit each households, whereas sampling requirement was 8 samples, Assessment team did remote survey of 24 users and found that users are not using traditional baseline stove in project activity after getting ICS. They don't have capacity to purchase LPG bottles because it costs INR 700-800 per bottle.
2	The additionality demonstration is not correct, since para 18 of AMS II G, ver 11.1 states " Demonstrate ex ante that the penetration of ICS is equal to or less than 5 per cent of the technologies providing similar services in the region in order to be considered as automatically additional. ", so how PP has demonstrated the ICS penetration is less than 5%.	PP has changed methodology from AMS II G to VCS methodology VMR0006 Methodology for installation of High efficiency firewood cookstove and explain additionality based on VMR0006 requirements.	PP has changed the methodology from AMS II G to VCS methodology VMR0006 and explain the additionality based on VMR0006 which fulfil the requirement therefore this comment is not valid.
3	How the monitoring survey was carried out is not clearly	In revised PDD and MR	Assessment team

¹ <https://www.ppac.gov.in/WriteReadData/Reports/201710310449342512219PrimarySurveyReportPPAC.pdf>

	mentioned in the project document. PP should clearly describe the monitoring sampling plan along with other relevant information related to monitoring survey and sampling calculations.	PP has included detailed description of monitoring survey and sample calculation method.	confirms that PP has included details of monitoring survey and sample selection in section 5.3 of revised Joint PD and MR. Which is verified by Assessment team through third party survey report and remote user audit.
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4	How fNRB value of 91% is calculated should be provided transparently in the project document along with all the relevant sources.	PP has included fNRB calculation details in ER sheet with reference of source of data, which is cross verified by VVB and found it relevant.	Assessment team verified fNRB calculation and found it relevant after changing some data sources fNRB value as per Tool 30 calculation is 74%.
5	Moreover, Indian prime minister initiatives on free distribution of LPG cook stoves is a huge success which are launched in 2016 and almost each and every households in India are having LPG connections. So the baseline usage of traditional inefficiency cook stove is contradictory.	All the households considered under the project activity are rural households and they didn't get gas connections. They don't have funds to purchase cookstoves or purchase subsidized cylinder which cost INR 700-INR 800. Therefore, PP is distributing these ICS free of costs. Above statement justified from Petroleum Planning & Analysis Cell survey of different states of India who is Ministry of Petroleum and Natural Gas body and work under government of India ². Result of survey confirm that there are multiple barriers with users to adopt LPG connection, High recurring cost of LPG refill (86%) and high initial cost (85%) of	Assessment team confirms that households/users identified in project activity are rural households and they don't have a capacity to purchase/refill LPG cylinders. Assessment team verified this information from government of India published data by Petroleum Planning & Analysis Cell, in Assam high cost of LPG is major reason lower penetration rate of LPG. This is also justified from district wise LPG penetration rate data.

²<https://www.ppac.gov.in/WriteReadData/Reports/201710310449342512219PrimarySurveyReportPPAC.pdf>

		getting a connection (security deposit plus stove) are the top barriers in Assam, followed by long waiting time to get an LPG connection (71%) and LPG refill (70%). Further, addressing barriers related to distance of distributor centres (57%) and tedious process of application (43%) need to be addressed for better LPG penetration in Assam. As project is mainly implemented in 3 districts of Assam, Baksa, Udalguri and Barpeta, survey document Annexure 2 clarified that Baksa has LPG penetration rate 25%, Udalguri has 17% and Barpeta has 48%. Therefore, main fuel of households is firewood they still not shifted to LPG due to higher costs.	
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6	The identification of beneficiaries is not mentioned. What are the selection criteria's for beneficiaries identification/ target users. Whether any survey is conducted in the project area to demonstrate that in the baseline the beneficiaries are using traditional inefficient cook stoves.	Yes, PP did user survey in November & December 2018 with support of local gram panchayat and local village employees to identify the target users those who were using traditional inefficient cookstoves. Based on identified users PP distributed/implemented ICS devices. These local employees prepared a list of households from each village those who were using traditional cookstoves and don't have capacity to purchase new improved cookstoves. This list of households approved by gram panchayat then PP starts distribution of ICS based on list finalized by local employees and gram panchayat.	Assessment team checked that project implementor did some local survey with engagement of local community members and NGOs to identify users who are using traditional inefficient cookstove. And distributed ICS to those users only. During remote audit interview with village head this point verified by assessment team that in Nov and Dec 2018 project implementor did some survey and prepared a list of households those who are using old traditional stove and don't have a financial capacity to purchase improved cookstove.
7	The little information provided in the project document on the project technology description, it has been observed that these type of ICS are in typical use in the project area and also across India, and are having efficiency between 13-18%, so how PP can demonstrate that the efficiency of these new ICS are more than 20%.	PP has included technology specification of ICS in section 1.11 of revised VCS PD and MR. ICS efficiency certified by third party testing lab which is verified by VVB during validation and verification process.	Assessment team confirms that thermal efficiency test report verified by third party government authorized lab. Hence acceptable.

8	The type(single pot or double pot etc), fixed or portable etc / model/ make are not provided clearly in the project document. The efficiency of ICS is missing. Also, PP should provide test certificate from reputed government testing agency for ICS efficiency and life time of ICS.	ICS efficiency and life time included in Join PD and MR, testing certificate certified from third party agency also submitted to VVB during validation and verification process.	Assessment team confirms that thermal efficiency test report and life span of ICS verified by third party government authorized lab. Hence acceptable.
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3.3.5 AFOLU-Specific Safeguards

This is a non-AFOLU project. For non-AFOLU projects, this section is not required.

3.4 Application of Methodology

3.4.1 Title and Reference

Title: Energy efficiency measures in thermal applications of non-renewable biomass

Type: Type II – Energy Efficiency Improved Projects

VMR0006 Methodology for Installation of High Efficiency Firewood Cookstoves, Version 1

Sectoral Scope: 03

Methodological tool: Calculation of the fraction of non-renewable biomass, version 03.0 dated 14-December-2020

The methodology is valid at the time of joint validation and verification of the project activity have been checked and confirmed by the assessment team.

3.4.2 Applicability

The project activity applies VCS methodology; VMR0006, Version 1/06/. The validity of Methodology is from 08/09/2020.

Applicability criteria for the baseline methodology are assessed by the validation team by means of document review and interview. Validation team confirms that the project activity meets the criteria of the applied methodology.

S. N.	VMR0006, Version 1 Requirements	Project activity applicability	Means of verification
1.	Project activities shall be implemented in domestic premises or in community-based kitchen	The proposed project involves deployment of ICS only in households.	This will be verified by the monitoring survey conducted by an independent third party during the annual ICS users' survey/14/
2.	The project stove shall have specified high power thermal efficiency of at least 25% per the manufacturer's specifications and shall exclusively use woody biomass and can be single pot or multi-pot;	Energy Efficient stoves planned to be installed under this project are single pot portable or an in-situ wood cookstoves that have an efficiency of 33.25% as per the manufacturer's specifications.	This will be verified by the stove test certificate issued by credited laboratory and submitted to the DOE for validation.
3.	Non-renewable biomass has been used in the project region since 31 December 1989, using survey methods or referring to published literature, official reports or statistics;	The non-renewable biomass has been used in the country since 31 st Dec 1989. The information was derived from the literature survey.	This will be verified using literature references presented by PP in Joint PD and MR.
4	For the specific case of biomass residues processed as a fuel (e.g. briquettes, wood chips	Not applicable. The ICS is introduced as energy efficiency measure to replace baseline stoves and reduce the use of non-renewable biomass	Not applicable.

S. N.	VMR0006, Version 1 Requirements	Project activity applicability	Means of verification
		for combustion.	
5	Monitoring approaches for $B_{savings,i,j}$ and values for parameters f_{NRB} (when Option (a) in paragraph 48(c) is chosen) and the quantity of woody biomass $B_{old,i,j}$ may be determined	Not applicable. The ICS is introduced as energy efficiency measure to replace baseline stoves and reduce the use of non-renewable biomass for combustion.	Not applicable.

S. N.	AMS II G Version 11.1 Requirements	Project activity applicability	Means of verification
1	The CDM-PDD or CDM-PoA-DD/CPA-DD shall explain the proposed method for distribution of project devices including the method to avoid double counting of emission reductions such as unique identifications of product and end-user locations (e.g. programme logo).	PP is recording following information at the time of distribution of ICS to the user: - Name of the User - Total Family Members - District - Tehsil/village - Date of distribution - Unique ID Name of the user and unique ID of ICS will avoid double accounting.	This information verified from distribution records, ICS database and carbon waiver records.
2	The CDM-PDD or CDM-PoA-DD/CPA-DD shall also explain how the proposed procedures prevent double counting of emission reductions, for example to avoid that project stove manufacturers, wholesale providers or others claim credit for emission reductions from the project devices.	Project implementor (Green Tech Environment) received carbon waiver from ICS users at the time of distribution of ICS devices. Carbon waiver declaration mentioned that Green tech environment can claim emission reduction of ICS devices for the life time of devices and user has no objection.	This information verified from distribution records, ICS database and carbon waiver records.

3.4.3 Project Boundary

As given in applied methodology VMR0006, project boundary must be determined following CDM methodology AMS II G therefore project boundary is defined as:

“The project boundary is the physical, geographical site of the efficient devices that utilize biomass.”

The information regarding the project boundary has been also correctly given in the Joint PD & MR /01/. The project boundary includes the improved cookstove within India. Therefore, the entire India has been considered in the project boundary for the proposed VCS project activity.

The assessment team confirms that the project boundary for the project instances is based on the applied methodologies /06/ and that there are no sources and gases within the boundary.

The physical delineation of the project boundary and the description of the emission sources and GHGs that are included in the boundary are appropriate for the purpose of calculating project and baseline emissions for the project.

3.4.4 Baseline Scenario

The project activity is the green field activity, which involves installation of new Improved cookstove system in the households where prior to the implementation of the project activity more fire wood was in use for thermal energy needs. This was verified during remote visit. The baseline scenario is the use of more fire wood for domestic thermal energy needs. Hence, it complies with the applied methodology.

The actual baseline is the use of non renewable biomass. Methodology VMR0006, Version 1 states that “The baseline scenario is the continued use of non-renewable wood fuel (firewood/charcoal) or fossil fuel (coal/kerosene) by the target population to meet similar thermal energy needs as provided by project cookstoves in absence of project activity”. In absence of the project activities, the intended beneficiaries of the project would continue using the traditional inefficient cooking stoves, consuming high quantity of non-renewable biomass.

Thus, the baseline scenario has been identified in line with the requirements of the applied methodology VMR0006, Version 1 /06/ and is deemed to be appropriate and justified.

3.4.5 Additionality

The additionality of the project is demonstrated by following the criteria outlined in VMR0006, Version 1 /06/.

Activity Method

Step 1: Regulatory Surplus

There is no mandated government programme or policy in the host country of this project ensuring distribution of domestic fuel-efficient cookstoves. The project is not mandated by any law, statute or regulatory framework, or for the UNFCCC non-Annex I countries, any systematically enforced law, statute or other regulatory framework.

Households may only participate voluntarily in this project. It is hereby confirmed that the proposed project is a voluntary coordinated action by Enen Green.

Step 2: Positive List

The applicability conditions of this methodology represent the positive list. The project meets all of the applicability conditions as described in Section 3.2. The project also meets the following conditions:

1. The project implemented or distributes stoves at zero cost to the end-user and has no other source of revenue other than the sale of GHG credits.
2. Project activities are not implemented as part of government schemes nor is the project supported by multilateral funds. The project can therefore be deemed as additional.

From the above information, Validation Team concludes that the information included in joint PD and MR is inline with methodology requirement.

3.4.6 Quantification of GHG Emission Reductions and Removals

The equations and choices provided in the applied methodology VMR0006,Version 1/06/ is correctly quoted in the Joint PD & MR /01/. The emission reductions of the project would be calculated using the formulae mentioned in the applied methodology /06/.

Validation team based on the review of the Joint PD & MR /01/ confirms that the formulae are correctly presented for the determination of emissions reductions. The parameters and equations presented in the Joint PD & MR /01/, as well as other applicable documents, have been compared with the information and requirements presented in the applied methodology/06/. An equation comparison has also been made to ensure consistency between all the formulae presented in the Joint PD & MR/01/ and ER validation spreadsheet /02/ and the applied methodology /06/.

The improved cookstove is introduced as energy efficiency measure in the project, therefore equations 1 and 2 of the methodology will be applied to calculate the net GHG emission reductions.

$$ER_y = \sum_i \sum_j ER_{y,i,j}$$

Equation (1)

Where:

i = Indices for the situation where more than one type/model of improved cookstove is introduced to replace there stone fire

j = Indices for the situation where there is more than one batch of improved cookstove of type i

ER_y = Emission reductions during year y in tCO_{2e}

$ER_{y,i,j}$ = Emission reductions by improved cookstove of type i and batch j during year y in tCO₂e

$$ER_{y,i,j} = B_{y,savings,i,j} \times NCV_{wood\ fuel} \times f_{NRB,y} \times (EF_{wf,CO_2} + EF_{wf,non\ CO_2}) \times N_{y,i,j} \times 0.95 \quad \text{Equation (2)}$$

Where:

$B_{y,savings,i,j}$	=	Quantity of woody biomass that is saved in tonnes per improved cookstove of type i and batch j during year y
$f_{NRB,y}$	=	Fraction of woody biomass that can be established as non-renewable biomass (f_{NRB})
$NCV_{wood\ fuel}$	=	Net calorific value of the non-renewable woody biomass that is substituted or reduced (IPCC default for wood fuel, 0.0156 TJ/tonne, based on the gross weight of the wood that is 'air-dried')
EF_{wf,CO_2}	=	CO ₂ emission factor for the use of wood fuel in baseline scenario (IPCC default for wood fuel, 112 tCO ₂ /TJ)
$EF_{wf,non\ CO_2}$	=	Non-CO ₂ emission factor for the use of wood fuel in baseline scenario (IPCC default for wood fuel, 26.23 tCO ₂ /TJ)
$N_{y,i,j}$	=	Number of improved cookstoves of type i and batch j operating during year y
0.95	=	Discount factor to account for leakage

Determination of $B_{y,savings,i,j}$

The quantify of woody biomass saved due to implementation of improved cookstoves to be estimated using equation below:

$$B_{y,savings,i,j} = B_{old} \times \left(1 - \frac{\eta_{old}}{\eta_{new,i,j}} \right)$$

Where,

B_{old}	=	Annual quantity of woody biomass that would have been used in the absence of the
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		project activity (in tonnes per device) to generate useful thermal energy equivalent to that provided by the improved cook stove. The value of Bold can be sourced from historical data or baseline surveys. Alternatively, a default value of 0.5t/capita/year may be used.
η_{old}	=	Efficiency of baseline cookstove
$\eta_{new,i,j}$	=	Efficiency of the improved cookstove type i and batch j determined through water boiling test (WBT) during year y Alternatively, efficiency may be determined using Equation 4.

$$\eta_{new,y,i,j} = \eta_p \times (DF_n)^{y-1} \times 0.94 \quad \text{Equation (4)}$$

Where,

η_p	=	Efficiency of project stove (fraction) at the start of project activity.
$(DF_n)^{y-1}$	=	Discount factor to account for efficiency loss of project cookstove per year of operation (fraction). This value may be based on actual monitoring or based on manufacturer's declaration on expected loss in efficiency or through publicly available literature on relevant industry standards. Alternatively default value of 0.99 efficiency loss per year can be considered.
0.94	=	Adjustment factor to account for uncertainty related to project cookstove efficiency test.

Where the project households continue to use baseline cookstoves along with improved cookstoves, B_{old} shall be adjusted ex-post based on the percentage of project households found to continue such practice according to Equation 6. For such cases, the quantity of woody biomass saved $B_{y,saving}$ due to implementation of improved cook stoves shall be calculated using an adjusted value to account for ex-post use of baseline stoves in addition to improved cookstove.

$$B_{old,adjusted} = B_{old} \times (1 - \mu_y) \quad \text{Equation (6)}$$

Where:

$B_{old,adjusted}$ = Adjust Bold to account the ex post usage of firewood in baseline cookstove(s) by project households in addition to improved cookstove (in tonnes per device)

μ_y = Baseline stove usage factor to account for use of baseline cookstoves along with improved cookstoves.

As per methodology quantity of firewood consumed in absence of project activity (*Bold*) shall be determined using a default value of 0.5 ton/capita/year. Household size shall be determined using credible references/literature or target population specific surveys.

In order to address the potential source of leakage which can be attributed to diversion of non-renewable biomass saved by project devices to non-project households which previously used renewable biomass; a net to gross adjustment factor of 0.95 is applied to $ER_{y,ij}$.

The equations below shall be used for calculating biomass consumed in absence of project activity in case more than one project stove is used in household

$$B_{old, HH} = B_{old, p} \times N_{p, HH}$$

Where

$B_{old, HH}$ = Annual quantity of woody biomass that would have been used in the household in the absence of the project activity to generate useful thermal energy equivalent to that provided by the project devices (tonnes/household/yea

$N_{d, HH}$ = Number of project devices per household

$B_{old, p}$ = Annual quantity of woody biomass that would have been used per person in the household in the absence of the project activity to generate useful thermal energy equivalent to that provided by the project devices (tonnes/person/year)

$N_{p, HH}$ = Average number of households

Determination of the Share of Non-Renewable Biomass:

As per para 49 of the methodology, the value of f_{NRB} can be calculated by using one of the two options as follows: (a) Conduct local studies to determine the local f_{NRB} value (sub national values) as per the "TOOL30: Calculation of the fraction of non-renewable biomass"; or (b) Use default national values approved by the Board. The choice of which option to use shall be made ex ante.

As already prescribed under the point 10 of the applicability criteria of the methodology, the option (a) above has been adopted by PP to calculate f_{NRB} value.

Thus, according to methodological tool 30: "Calculation of the fraction of non-renewable biomass" version 03.0, shall be used to calculate f_{NRB} :

$$f_{NRB} = NRB / (NRB + RB)$$

Where,

NRB = Quantity of non-renewable biomass (t/yr) determined as per paragraphs 11 and 12 of the tool.

RB = Quantity of renewable biomass determined as per section 3.2 (t/yr) of the tool.

Fraction of non-renewable biomass is calculated as per the fNRB calculation TOOL30: Calculation of the fraction of non-renewable biomass/15/ in ER sheet tab "fNRB" /2/. Further data source used in fNRB calculation in ER sheet ; have been verified from weblinks provided in ER sheet/2/ and found to be correct and made publically available source/16/.

The parameters NRB & RB are also referred under the "Default fNRB guideline" which is based on this particular Tool30/15/. Calculated fNRB value for India is 74%.

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e) (Rounddown values)
2019 (From 28/06/2019 to 31/12/2019)	33,382	0	1669.08	31,712
2020	63,121	0	3156.03	59,964
2021	62,713	0	3135.67	59,577
2022	62,713	0	3135.67	59,577
2023	62,306	0	3115.31	59,190
2024	61,899	0	3094.94	58,803
2025	61,492	0	3074.58	58,417
2026	61,492	0	3074.58	58,417
2027	61,084	0	3054.22	58,030
2028	60,677	0	3033.86	57,643
2029 (From 01/01/2029 to 17/04/2029)	29,591	0	1479.53	28,111

9)				
Total	620,469	0	31,023	589,441

The assessment team confirms that the applied methodology and the referenced tools have been applied correctly to calculate baseline emissions and net GHG emission reductions the project crediting period.

3.4.7 Methodology Deviations

Not applicable

3.4.8 Monitoring Plan

The project employs VCS methodology namely VMR0006, Version 1 and in accordance with the same, the parameters to be monitored ex-post are given below:

Parameters to be monitored:

Parameter (s)	Units	Description	Source of monitoring data
$N_{y,i,j}$	Number	Number of project devices of type i and age a that are operating in year y	Annual ICS users' survey report issued by third party Hitech Services
$\eta_{new,y,i,j}$	Fraction	Efficiency of the improved cookstove type i and batch j determined through water boiling test (WBT) during year y	Water Boiling Test report conducted by an independent third party during the monitoring period
μ_y	Fraction	Adjustment to account for any continued use of pre-project devices during the year y	Monitoring survey conducted by Hitech Services
Life Span	Number of years	The operating lifetime of the project device. The life span should be reported if the methodology equation 5 is adopted to determine the project stove efficiency	Manufacturer's specification certified by third party

Thus, the parameter to be monitored ex-post involves monitoring of number of project devices operating and efficiency of the device deployed in project activity.

As mentioned in the Joint PD & MR, annual ICS survey will serve as source of annual values of monitoring parameter. The operating devices data recorded through annual survey shall form the basis of the emission reductions calculations. The assessment team shall review the same for verification of emission reduction results.

Based on the review of the Joint PD & MR/01/, the assessment team confirms that detailed monitoring procedures, monitoring structure, management team, monitoring items and functions have been clearly demonstrated.

All data will be archived electronically and further maintained for the entire crediting period plus two years.

Based on the above assessment the validation team concludes that the PP is capable to implement the monitoring plan and hence confirms compliance of VCS guidelines/07/ and the applied methodology /06/.

3.5 Non-Permanence Risk Analysis

Not applicable

4 VERIFICATION FINDINGS

4.1 Accuracy of GHG Emission Reduction and Removal Calculations

The data and parameters used to calculate the GHG emission reductions and removals have been listed below:

Parameters with Default Values (ex-ante parameters):

Parameter	Description	Value	Unit	Source
B_{oldp}	Annual quantity of woody biomass that would have been used per person in the household in the absence of the project activity to generate useful thermal energy equivalent to that provided by the project devices	0.5	Tonne/person/year	Methodology default value
$N_{p,HH}$	Average number of person per Household	4.6	No of persons/HH	Literature survey Latest National family Health Survey (NFHS-4) 2015-16 (https://dhsprogram.com/pubs/pdf/FR339/FR339.pdf) (Page 17)
$f_{NRB,y}$	Fraction of woody biomass saved by the project activity during year y that can be established as non-renewable biomass	74%	Percentage	Fraction of non-renewable biomass is calculated as per the f_{NRB} calculation TOOL30: Calculation of the fraction of non-renewable biomass/15/ in ER sheet tab “ f_{NRB} ” /2/. Further source used in f_{NRB} in ER sheet that have been verified from weblinks provided in ER sheet/2/ and found to be correct and made publically available source/16/.
η_{old}	Efficiency of baseline cookstove	0.1	Fraction	Methodology default value
$NCV_{wood\ fuel}$	Net calorific value of the non-renewable woody biomass that is substituted	0.0156	TJ/tonne	2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 2 Energy, Chapter 1 Introduction

EF_{wf,CO_2}	CO ₂ emission factor for the use of wood fuel in baseline scenario	112	tCO ₂ /TJ	2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 2 Energy, Chapter 2 Stationary Combustion
$EF_{wf,non\ CO_2}$	Non-CO ₂ emission factor for the use of wood fuel in baseline scenario	26.23	tCO ₂ /TJ	2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 2 Energy, Chapter 2 Stationary Combustion
η_p	Efficiency of the project stove at the start of project activity	0.3325	Fraction	Manufacturer's specification, third party verified

Parameter(s) monitored ex-post:

Parameter	N _{y,i,j} (Number of project devices of type i and age a that are operating in year y)	
Means of verification	Criteria/Requirements	Assessment/Observation
	Measuring /Reading /Recording frequency	Annual
	Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. The reporting frequency is in line with the monitoring plan as outlined in the Joint PD & MR/01/ and monitoring methodology/06/. This parameter is monitored Annually through ICS survey.
	Monitoring equipment	Annual User survey
	Value applied	17,379
	How were the values in the monitoring report verified?	Measured directly or based on a 123 representative sample. Sampling standard has been

		used for determining the sample size to achieve 90/10 confidence precision. A discount shall be applied based on the percentage of devices operational as determined by the sample survey. From each district, PP has randomly selected the ICS applying random sampling function in excel and accordingly the target ICS sample is determined for survey. Data collected: Questionnaire survey form used by third party surveyor and a detailed survey report has been provided. Since the relative margin of error obtained is less than 10% for the monitored parameter, relative precision of the data is statistically acceptable and deemed representative of the population.
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Remote site assessment of the project activity confirms that the necessary QA/QC procedures are in place and the data management system is effective and reliable. Validation team verified operational ICS during the remote site visit from ICS survey report.
Findings	CL #1 raised and closed successfully	
Conclusion	The parameter has been monitored appropriately, in accordance with the monitoring plan (as per measurement methods and procedures to be applied) and applied methodology. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan.	

Parameter	$\eta_{new,y,i,j}$ (Efficiency of the improved cookstove type i and batch j determined through water boiling test (WBT) during year y)
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Means of verification	Criteria/Requirements		Assessment/Observation	
	Measuring /Reading /Recording frequency		Annual.	
	Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)		Yes. The reporting frequency is in line with the monitoring plan as outlined in the Joint PD & MR/01/ and monitoring methodology/06/. This parameter is monitored Annually through ICS survey.	
	Monitoring equipment		Annual User survey	
	Value applied	Year 1	33.25%	
		Year 2	30.94%	
		Year 3	30.63%	
		Year 4	30.33%	
		Year 5	30.02%	
		Year 6	29.72%	
Year 7		29.43%		
Year 8		29.13%		
Year 9		28.84%		
Year 10		28.55%		
How were the values in the monitoring report verified?		Efficiency test carried out by third party who is authorized by government. Efficiency of the improved cookstoves to be estimated using equation 5 of the applied methodology where loss in efficiency per year is calculated, and therefore this parameter does not need to be		

	monitored"
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place? Remote site assessment of the project activity confirms that the necessary QA/QC procedures are in place and the data management system is effective and reliable.
Findings	CAR#2 raised and resolved successfully
Conclusion	The parameter has been monitored appropriately, in accordance with the monitoring plan (as per measurement methods and procedures to be applied) and applied methodology. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan.

Parameter	μ_y (Adjustment to account for any continued use of pre-project devices during the year y)	
Means of verification	Criteria/Requirements	Assessment/Observation
	Measuring /Reading /Recording frequency	Once every 2 years
	Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. The reporting frequency is in line with the monitoring plan as outlined in the Joint PD & MR/01/ and monitoring methodology/06/. This parameter is monitored Annually through ICS survey.
	Monitoring equipment	Annual User survey
	Value applied	0
	How were the values in the monitoring report verified?	This parameter verified from third party annual survey and confirm that no baseline stove identified during monitoring survey.

	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Remote site assessment of the project activity confirms that the necessary QA/QC procedures are in place and the data management system is effective and reliable.
Findings	CAR#3 raised and resolved successfully	
Conclusion	The parameter has been monitored appropriately, in accordance with the monitoring plan (as per measurement methods and procedures to be applied) and applied methodology. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan.	

Parameter	Life Span (The operating lifetime of the project device)	
Means of verification	Criteria/Requirements	Assessment/Observation
	Measuring /Reading /Recording frequency	Once at the time of project stove installation
	Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. The reporting frequency is in line with the monitoring plan as outlined in the Joint PD & MR/01/ and monitoring methodology/06/. This parameter is monitored Annually through ICS survey.
	Monitoring equipment	Manufacturer specification
	Value applied	5
	How were the values in the monitoring report verified?	This parameter verified from third party certificate who is authorized by government.

	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Remote site assessment of the project activity confirms that the necessary QA/QC procedures are in place and the data management system is effective and reliable.
Findings	CL#1 raised and resolved successfully	
Conclusion	The parameter has been monitored appropriately, in accordance with the monitoring plan (as per measurement methods and procedures to be applied) and applied methodology. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan.	

The equations for calculation of emission reduction as provided in the Joint PD & MR /01/ and confirmed with the applied methodology VMR0006 Version 1 /06/ have been checked and found to be correct. The values as provided in the Joint PD & MR /01/ have been compared with ER verification sheet /02/. Moreover, the formulae applied in the ER spreadsheet /02/ were also reviewed and found to be consistent with the applied methodology. The verification team confirms that all parameters are used correctly in the calculations, all results are verifiable and transparent, all assumptions are described and based on verifiable evidence and calculations are done in accordance with the formulae laid out in the applied methodology VMR0006 Version 1/06/ and requirements of the monitoring plan.

The total number of emission reductions for the monitoring period from 28/06/2019 to 27/06/2020 is 33,439 tCO₂e. The calculation of emission was checked in ER sheet and found to be correct, hence accepted.

Comparison of actual GHG emission reductions or net anthropogenic GHG removals by sinks with estimates in PD:

Based on review of ER sheet/02/, it confirms that the comparison between actual GHG emission reductions with estimated in PD:

Period	No of days	Estimated emission reduction (tCO ₂ e)	Actual Emission Reduction considering leakage (tCO ₂ e)
28th June 2019 - 31st Dec 2019	187	31,496.9	12,767
1st Jan 2020 – 27 th June 2020	179	30,149.5	20,672
Total		61,646.4	33,439

There is around 45.76 % lesser emission reduction achieved during the current monitoring period as compared to the projected ERs of equivalent period because project was under implantation during the monitoring period.

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
2019 (28th June 2019 - 31st Dec 2019)	12,767	0	12,767
2020 (1st Jan 2020 – 27 th June 2020)	20,672	0	20,672
Total	33,439	0	33,439

4.2 Quality of Evidence to Determine GHG Emission Reductions and Removals

The quality of supporting documents that are provided by the PP as evidence is adequate. ICS distribution records/03/ and ICS survey report /14/ are provided, which tallies with the data provided in the ER verification spreadsheet /02/.

Competent employees are recruited for the management and operation of the project. The quality of supporting evidences submitted to DOE for verification is adequate and found to be verifiable. ICS distribution records/03/ and ICS survey report /14/ were checked by the assessment team to confirm the authenticity of the documents and to check the correctness of the calculations. The verification team for the records and future reference also obtains copies of these documents. The detailed information flow with the roles and responsibilities of the individuals and the monitoring system have been discussed and found to be appropriate.

Based on the above, the assessment team confirms the sufficiency and appropriateness of the quality of evidence provided by the PP to determine the GHG reductions and further deems them to be acceptable.

5 VALIDATION AND VERIFICATION CONCLUSION

LGAI Technological Center, S.A. (also referred to as Applus+ Certification), contracted by Enen Green Services Private Limited, to perform a joint validation and verification of the VCS project activity “Energy Efficient Cook Stove Implementation in India”.

The joint validation and verification process were performed on the basis of all guidance and criteria as provided in VCS Standard (version 4.1), VCS Program Guide (version 4) and Registration & Issuance Process (version 4) /07/.

The conclusions of validation and verification process can be individually summarized as follows:

Validation Conclusion:

The project activity provides the information in Joint PD & MR /01/ as required by VCS Standard, version 4.1 /07/ and in Applus+ Certification's opinion meets the requirements of the applied baseline and monitoring methodology, VMR0006, Version1/06/. The validity of Methodology version 1 is valid from 08/09/2020. The validation has been performed using a risk-based approach, as described above. The expected emission reductions from the project activity during the course of its crediting period (ten years) will be 589,441 tCO₂e.

Applus+ Certification concludes the validation with a positive opinion and confirms that the VCS Project Activity "Energy Efficient Cook Stove Implementation in India", as described in the Joint PD & MR /01/ meets all applicable VCS requirements, including those specified in the CDM Project Standard /10/, relevant methodologies, tools and guidelines.

The selected baseline and monitoring methodology VMR0006, Version 1/06/ is applicable to the project and correctly applied. Applus+ Certification therefore requests the registration of the project as a VCS project activity.

Verification Conclusion:

Applus+ Certification verification approach is based on the understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these. Applus+ Certification planned and performed the verification by obtaining evidence and other information and explanations that Applus+ Certification considered necessary to give reasonable assurance that reported GHG emission reductions are fairly stated.

In our opinion the GHG emissions reductions reported for the project activity for the period 28/06/2019 to 27/06/2020 are fairly stated in the joint PD and MR/01/. The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology and the VCS standard.

Verification period: From 28/06/2019 to 27/06/2020 (including both days)

Verified GHG emission reductions and removals in the above verification period:

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
2019 (28th June 2019 - 31st Dec 2019)	12,767	0	12,767	12,767
2020 (1st Jan 2020 – 27 th June 2020)	20,672	0	20,672	20,672
Total	33,439	0	0	33,439

Applus+ Certification confirms a positive verification opinion confirming that the project complies with the applicable VCS requirements, thus recommending the project for issuance.

APPENDIX 1: DOCUMENT REFERENCES

S. No	Title of Document	Version	Date
1.	Joint PD & MR (Final)	6	26/11/2021
2.	Emission reduction spreadsheet (Final)	4	26/11/2021
3.	ICS Distribution data and carbon waiver records of ICS	-	From 28/06/2019 to 10/01/2020
4.	Declaration(s) from Project proponent on double accounting	-	27/07/2020
5.	Efficiency certificate of ICS issued by Pollution free Environment Consultants	-	15/07/2020
6.	VMR0006 Methodology for Installation of High Efficiency Firewood Cookstoves, Version 1	1	08/09/2020
7.	VCS Requirements: - Verified Carbon Standard Program Guide, v4; - Verified Carbon Standard, v4.1; - VCS Program Definitions, Ver. 4.1 - VCS Registration and Issuance Process, v4 - VCS Joint Project Description & Monitoring Report Template, v4 - VCS Joint Validation & Verification Report Template, v4	-	-
8.	Life span certificate	-	20/09/2020
9.	Remote site assessment –interviews of staff personnel, photographs, physical inspection of monitoring system	-	26/02/2021 & 27/02/2021
10.	CDM Validation and Verification Standard for PA and CDM Project Standard for PA	02.0	-
11.	Local Stakeholder Meeting records	-	28/10/2020
12.	Joint PD & MR (Intermediate version of document)	01	16/09/2020
		02	30/05/2021
		03	05/06/2021
		04	10/06/2021
		05	01/09/2021
		06	26/11/2021
13.	Emission reduction spreadsheet(Intermediate version of document)	01	16/09/2020
		02	30/05/2021
		03	05/06/2021
		04	26/11/2021
14.	ICS Survey Report by Hitech Services	01	24/07/2020
15.	Methodological Tool: Calculation of the fraction of non-renewable biomass	03	14/12/2020
16.	fNRB calculation data source used in ER sheet: http://fsi.nic.in/cover_2011/chapter7.pdf https://www.forestresearch.gov.uk/tools-and-resources/statistics/forestry-statistics/forestry-statistics-2016-introduction/sources/timber/conversion-factors/ https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_04_Ch4_Forest	-	-

	<u>Land.pdf</u> https://fsi.nic.in/isfr19/vol1/executive-summary.pdf http://www.wiienviis.nic.in/Database/Protected_Area_854.aspx http://www.wiienviis.nic.in/Database/Protected_Area_854.aspx Source: Global Forest Resources Assessment 2000 by the FAO for “Distribution of total forest area by ecological zone” (Table 14) Source: IPCC 2006, Chapter 4, Table 4.9		
17.	Photo of grievance register		
18.	Sample copy of carbon waiver records		

APPENDIX 2: ABBREVIATIONS

Abbreviations	Full texts
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CDM PCP	Clean Development Mechanism Project Cycle Procedure
CDM PS	Clean Development Mechanism Project Standard
CDM VVS	Clean Development Mechanism Validation and Verification Standard
EB	Executive Board
ER	Emission Reductions
CER	Certified Emission Reduction
CR	Clarification Request
DOE	Designated Operational Entity
DNA	Designated National Authority
FAR	Forward Action Request
GHG	Greenhouse Gas(es)
IPCC	Intergovernmental Panel on Climate Change
MCR	Monthly Credit Reports
MP	Monitoring Plan
MR	Monitoring Report
MWh	Megawatt hour
PD	Project Description
PP	Project Proponent
PS	Project Standard
TR	Technical Review
UNFCCC	United Nations Framework Convention on Climate Change
VVS	Validation and Verification Standard

APPENDIX 3: Findings Overview

Table 1. CR from this joint validation and verification

CR ID	01	Section no.	Joint PD and MR	Date: 31/05/2021
Description of CR				
The PP need to submit following supporting documents:				
1. Monitoring survey report 2. WBT result report 3. Declaration from PP on double accounting 4. Life span of ICS certificate				
Project participant response				Date :05/06/2021
PP has submitted following document				
- Monitoring survey report dated 24th July, prepared by Hitech Services - As per methodology requirement PP has adopted equation 4, discount factor to account for efficiency, it's not required by project activity to do WBT test - Declaration from PP on double accounting dated 27/07/2020 - Life span certificate issued by government approved chartered engineer				
Documentation provided by project participant				
- Monitoring survey report - Declaration from PP - Life span certificate				
DOE assessment				Date:07/06/2021
The PP has provided required documents. Therefore, CL#1 satisfactorily closed				

CR ID	02	Section no.	Joint PD and MR	Date : 31/05/2021
Description of CR				
PP is requested to clarify how emission reduction calculation did on the basis of assumption all ICS implemented on 28 th June 2019 which is not a case. PP is requested to revise the ER calculation based implementation date of ICSs.				
Project participant response				Date :05/06/2021
PP revised the ER calculation based on implementation date of ICS and taken emission reduction from date of implementation to 27 th June 2020.				
Documentation provided by project participant				
Revised Joint PD and MR version 3 dated 05/06/2021				
Revised ER sheet version 3 dated 05/06/2021				
DOE assessment				Date:07/06/2021
Assessment team confirm that PP has revised the ER calculation and calculated ER based per ICS from date of implementation of ICS. Hence accepted team accepted revised ER sheet and Joint PD & MR. Therefore, CL#2 satisfactorily closed				

Table 2. CAR from this joint validation and verification

CAR ID	01	Section no.	Section 1.1	Date: 31/05/2021
Description of CAR				
As per project database some ICS are distributed in 2020 as well, please check and correct				
Project participant response				Date :05/06/2021
Some ICS are distributed in Jan 2020 as well therefore corrected same in revised monitoring report.				
Documentation provided by project participant				
Revised Joint PD and MR version 3 dated 05/06/2021				

DOE assessment	Date:07/06/2021
Assessment team confirm that PP has updated ICS distribution date in revised Joint PD and MR. Hence accepted. CAR#1 Closed	

CAR ID	02	Section no.	Section 3.2	Date : 31/05/2021
Description of CAR				
PP is required to check thermal efficiency of ICS it's not inline with third party certificate submitted by PP.				
Project participant response				Date : 05/06/2021
PP has corrected thermal efficiency of ICS as 33.25% inline with third party certificate.				
Documentation provided by project participant				
- Efficiency certificate - Revised Joint PD and MR version 3 dated 05/06/2021				
DOE assessment				Date:07/06/2021
Assessment team confirm that PP has corrected thermal efficiency value in revised joint PD and MR and same in ER sheet. Hence accepted. CAR#2 Closed				

CAR ID	03	Section no.	Section 6.5	Date : 31/05/2021
Description of CAR				
PP is requested to account Baseline stove usage factor to account for use of baseline cookstoves along with improved cookstoves.				
Project participant response				Date : 05/06/2021
PP has included baseline stove usage factor in revised Joint PD and MR.				
Documentation provided by project participant				
Revised Joint PD and MR version 3 dated 05/06/2021				
DOE assessment				Date:07/06/2021
Assessment team confirm that PP has included baseline stove usage factor in revised joint PD and MR as per methodology VMR0006 requirement. Same has been added in monitoring parameter. Hence accepted. CAR#3 Closed				

CAR ID	04	Section no.	MR	Date : 10/06/2021
Description of CAR				
The start date of the project activity is not same as the start date of the 1 st monitoring period. Please clarify?				
Project participant response				Date : 10/06/2021
PP has corrected the start date of the project activity in revised MR section 4.4.				
Documentation provided by project participant				
Revised Joint PD and MR version 04 dated 10/06/2021				
DOE assessment				Date: 11/06/2021
Assessment team confirm that PP has corrected start date on section 4.4 of Joint PD and MR. hence accepted. CAR#4 Closed				

Table3. FAR from this joint validation and verification

FAR ID	N/A	Section No.	N/A	Date : N/A
Description of FAR				

No FAR raised	
Project participant response	Date : N/A
N/A	
Documentation provided by project participant	
N/A	
DOE assessment	Date: N/A
N/A	

APPENDIX 4: Competency Statements

According to the sectoral scope / technical area and experience in the sectoral or national business environment, Applus+ Certification has composed a project assessment team in accordance with the appointment rules in the internal Quality Management System of Applus+ Certification.

The composition of audit team shall be approved by the Applus+ Certification ensuring that the required skills are covered by the team.

The four qualification levels for team members that are assigned by formal appointment rules are as presented below:

- Lead Auditor (LA).
- Auditor (A) / Auditor in Training (AiT).
- Technical Expert (TE).
- Technical Reviewer (TR).

The sectoral scope / technical area knowledge linked to the applied methodology/ies shall be covered by the assessment team.

Name	Qualification	Coverage of scope	Coverage of technical Area	Financial aspect	Host country Experience	Attendance to the Assessment (remote)
Vivek Kumar Ahirwar	Lead Auditor (LA)	Yes (3)	Yes (3.1)	N/A	Yes	Yes
Vivek Kumar Ahirwar	Technical Expert (TE)	Yes (3)	Yes (3.1)	N/A	Yes	Yes
Simon Shen	Technical Reviewer (TR)	Yes (3)	Yes (3.1)	N/A	N/A	N/A

The curricula vitae of the DOE's team members are provided below:

Vivek Kumar Ahirwar is a BEE-Certified Energy Auditor by Govt of India with over eight years of relevant experience in energy efficiency, energy audit, thermal and electrical energy generation technology from renewable source and energy conservation in energy intensive industries, designated consumers and commercial buildings, implementation of energy conservation building codes, research, process and green building projects. He is a certified lead auditor for ISO 14001 EMS and 14064. He has experience under various categories of projects stating from renewable to waste to supercritical projects and WCD. He has successfully audited more than 100 GHG (CDM/VCS/GS) projects in different states across the India. He has done Mater in Technology (Energy Management) from a premier institute, School of Energy & Environmental Studies, DAVV, Indore (M.P.), India and Bachelor of Engineering (Mechanical Engineering) from Govt. Engineering college, Rewa, RGPV, India.

Simon Shen (master degree in thermal energy engineering, bachelor degree in environmental engineering) is a lead auditor appointed by Applus+ certification for the GHG project assessment. He is based in Shanghai. He has several years of work experience in environmental protection field. Before he joined Applus+ certification, he had been worked for TÜV SÜD as a GHG validator/verifier and ISO 9001/14001 lead auditor for 3.5years.

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