



**Verified Carbon
Standard**

GLOBAL COOKSTOVE PROGRAM (EKI PHASE 05)



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Summary:

LGAI Technological Center (hereinafter referred to as Applus+ Certification) is contracted by M/s EKI Energy Services Limited to conduct the joint validation and verification of the project “Global Cookstove Program (EKI Phase 05)”, VCS ID 2943¹ against VCS standard version 4.4/^{7(b)}

The project’s design description, baseline, monitoring plan, and compliance with applicable VCS and host party criteria are all confirmed as part of the joint validation and verification process. The monitoring plan of the Joint PD and MR (Project ID 2943) is also implemented, and the monitoring methodology is used in accordance with the VCS methodology VMR0006 “Methodology for Installation of High Efficiency Firewood Cookstoves”, Version 1.1/^{6/} of the methodology. A site visit was performed to confirm the information provide by PP/^{9/}.

The main purpose of the project is the distribution of fuel-efficient improved cook stoves (ICS) in the India, presently distributed in Maharashtra, Chhattisgarh, Gujarat, Rajasthan, Bihar, Uttar Pradesh, Odisha, Dadra & Nagar Haveli and Jharkhand state of India. The Improved cookstove distributed through this project have replaced the low-efficient traditional cookstoves. Through this project, the distribution, and installation of high thermal efficient improved cook stoves (ICS) has been undertaken for households. The ICS burns wood more efficiently thereby improving thermal energy transfer to pots, hence saving fuel wood and greenhouse gases. This will not only lead to reduce deforestation but will also reduce health hazards from indoor air (smoke) pollution, decrease in time spent by women and children for collecting the firewood.

The first crediting period’s expected annual average emission reductions for a seven-year period are 2,269,157 tCO_{2e}/year and 15,884,098 tCO_{2e} will be reduced during the course of the seven years of the crediting period. During the 1st monitoring period from 01-October-2022 to 30-April-2023(inclusive of both the dates), 556,554 tCO_{2e} GHG emissions were reduced.

Applus+ certification now has enough proof to confirm that the stated criteria, as per VCS requirements and applied methodology, have been met after reviewing the joint Project Description and Monitoring report (Joint PD & MR) and additional documents pertaining to baseline and monitoring methodology, as well as after conducting background research, conducting follow-up interviews, and during the on-site visit (OSV) and speaking with stakeholders/^{9/}

In particular, the project’s baseline, monitoring plan, and compliance with pertinent VCS and host party criteria was thoroughly and independently evaluated against the appropriate VCS requirements as part of the validation process. These are verified to ensure that the project design is legitimate, reasonable, and fits the specified requirements. All VCS initiatives must undergo validation, which is regarded vital to assure stakeholders of the project’s quality and the expected generation of emission reductions. The goal of Applus+ certification is to carry out a thorough, impartial evaluation of the project activity’s validation.

A review of the Joint PD & MR that is impartial and unbiased is what is meant by the validation scope. The VCS Program Guide (v4.3), VCS Standard (v4.4), Program Definitions (v4.3), Registration & Issuance Process (v4.3) applicable at the time are compared to the Joint PD & MR to ensure that the project complies with the requirements of the applied baseline and monitoring methodology, namely VMR0006, Version 1.1/^{6/}.

Reviewing the Joint VCS PD & MR for the monitoring results and confirming that the monitoring methodology was applied in accordance with the monitoring plan and monitoring parameters which are the main goals of the verification. After reviewing the ER sheet, it was confirmed that the reductions due to the anthropogenic emissions by sources are sufficient, conclusive, and presented in a clear and understandable way. In order to establish that the project has been implemented in line with design and conservative assumptions, as specified, the monitoring plan, Joint PD & MR, ER sheet, and the project's compliance with relevant VCS, and host party criteria were specifically checked.

Verification of project implementation and operation with regard to the Joint PD & MR, implemented monitoring plan with the Joint PD & MR, and applied baseline & monitoring methodology were all included in the scope of the verification. It was also verified that the actual monitoring systems and procedures are adhered to, as per the monitoring systems and procedures outlined in the monitoring plan. Identification of any substantial inaccuracies in the stated GHG emission reduction estimations and articulating a conclusion with a fair degree of assurance was part of the assessment. It is confirmed by the assessment team that the stated GHG emission data is appropriately supported by evidence.

This joint validation and verification have been carried out using a risk-based methodology. 11 Corrective Action Requests (CARs) and 10 Clarification Requests (CRs) were raised during joint validation and verification and successfully closed. FAR was not raised for the current period.

The project has successfully been validated, verified, and further certified for emission reductions under VCS as it meets the criteria outlined by the Joint PD & MR template version 4.2, the VCS Standard version 4.4, and the applied methodology VMR0006, Version 1.1. The project is recommended for registration and issuance after further confirmation of a combined positive validation and verification opinion showing the project complies with the relevant VCS requirements.

Our view refers to the projects' claimed GHG emissions, GHG emission reductions as a result, and to the project's legitimate baseline, monitoring, and supporting papers. Based on the information viewed and assessed, we confirm that the project activity " Global Cookstove Program (EKI Phase 05)" reduced emissions by 556,554 tCO₂e from 01-October-2022 to 30-April-2023, including both the days.

¹ <https://registry.verra.org/app/projectDetail/VCS/2943>

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1 INTRODUCTION

1.1 Objective

Applus+ Certification has been contracted by M/s EKI Energy Services Limited (project proponent), to undertake the joint validation and verification of the project titled “Global Cookstove Program (EKI Phase 05)”. The assessment team has reviewed the GHG data collected for the monitoring period from 01-October-2022 to 30-April-2023 (both days included) covered in this verification. The objective of the joint 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 VCS requirements. In particular;

- The project's baseline is assessed against “VMR0006 - Methodology for Installation of High Efficiency Firewood Cookstoves, Version 1.1”^{/6/}
- The project’s monitoring plan is assessed against “VMR0006 - Methodology for Installation of High Efficiency Firewood Cookstoves, Version 1.1”^{/6/}
- The project’s additionality justification is assessed against “VMR0006 - Methodology for Installation of High Efficiency Firewood Cookstoves, Version 1.1”^{/6/}
- 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 4.4 ^{/7(b)/}
- VCS standard version 4.4 ^{/7(b)/}
- VCS program guide version 4.3 ^{/7(a)/}

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 1.1)^{6/} which are included in the VCS joint PD & MR^{4/} and other relevant supporting documents. The scope of work covered in the validation is described as below:

- To validate whether the project activity meets the requirements of VCS Standard (v4.4) and VCS program guide (v4.3) 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, CLs & FARs, if any
- Final validation opinion

The information in the VCS joint PD & MR is reviewed against the criteria of VCS Standard (v4.4); the VCS program guide (v4.3).

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 “Global Cookstove Program (EKI Phase 05)”. 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 (v4.3)^{7(a)/}
- VCS Standard (v4.4)^{7(b) /}
- VCS Program Definitions (v4.3)^{7(c)/}
- VCS Registration & Issuance Process (v4.3)^{7(d)/}
- VCS approved methodology VMR0006 (version 1.1, dated 22/07/2021)^{6/}

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 Reasonableness of Assumptions and Level of Assurance

The joint validation and verification report is based on the joint PD & MR, supporting evidences made available to the VVB and information collected through performing interviews and during the On-site visit (OSV).

The validation conclusion is based on reasonableness of the assumptions, limitations, and methods that support the statement about the outcome potentially achieved by the activities during operation and monitoring, provided that they may change during the mentioned stages of the project's development and operations.

The verification has been done with a reasonable level of assurance about whether the reported GHG emissions reduction data is free from material misstatement.

VVB applied a materiality threshold of 5% with respect to omission or misstatements concerning reported quantities as per VCS standard.

The assessment has applied sampling method and randomly selected samples (Total 99, 11 for each state) from samples surveyed by the project proponent random sample data (125 Samples for each state) applied on total households (398,897) (Kindly refer Section 2 of this report for details. Assessment team confirms that the reported emission reductions are free from any type of material errors.


1.4 Summary Description of the Project

The project presently implemented in Maharashtra, Chhattisgarh, Gujarat, Odisha, Rajasthan, Dadra & Nagar Haveli, Bihar, Jharkhand and Uttar Pradesh states of India. As the target populations are unable to afford these stoves (ICS), project promoters have distributed ICS free of cost.

The end-user has been informed in advance that the use of ICS generates carbon finance which in turn is used to cover the price of ICS and for recovering project implementation costs. EKI identified the potential locations where the majority of the population is using the traditional cookstoves, based on previous experiences in other projects, or available information or baseline survey, for the distribution of improved cookstoves. EKI prioritized the appointment of a local implementation partner for the delivery of ICS and local men's and women's teams were deployed and trained for the implementation of ICS. This creates more employment opportunities and increases the income of local agents. Awareness about the implementation of ICS will be provided to the local community through awareness programs

The project locations for initial Project Activity Instances are in Maharashtra, Chhattisgarh, Gujarat, Odisha, Rajasthan, Dadra & Nagar Haveli, Bihar, Jharkhand and Uttar Pradesh states of India and may expand further to other parts of India. EKI has distributed 6,162 ICS in Maharashtra, 3,035 ICS in Chhattisgarh, 54,607 ICS in Gujarat, 29,718 ICS in Odisha, 80,004 ICS in Rajasthan, 151,764 ICS in Bihar, 8,336 ICS in Dadra & Nagar Haveli, 6,715 ICS in Jharkhand and 58,556 ICS in Uttar-Pradesh as confirmed based on the submitted monitoring database.

PP has considered one cookstove as one project activity instance for this grouped project activity. The first project activity instance was implemented on 01-Oct-2022 under this grouped project activity. 398,897 project activity instances (ICS) have been implemented as a part of this project activity.

TECHNICAL DETAILS			
A)	Cook Stove Type/Category	AGNEEKAA ECO MINI STOVE MODEL4 (Manufactured by GHG Reduction Technologies Pvt LTD. an ISO 9001:2015 Certified Organization)	
			
		Natural Draft	
B)	Secondary Air Supply	Through Natural Draft	
C)	Stove Material Used	Body	Galvanized Iron Sheet
		Body Material Thickness	0.6mm
		Combustion Chamber	Stainless Steel SS 202 grade
		Combustion Chamber Material Thickness	1 mm SS 202 grade
		Insulating Material	Thermal Wool
		Insulating Material Thickness	6 to 8mm
		Top Plate	Stainless Steel SS 202 grade
		Top Plate Material Thickness	1 mm
D)	Physical Structure	External Dimension	Length :- 260mm
			Width :- 260mm
			Height :- 248mm
		Combustion Chamber Dimension	Diameter: - 125mm
E)	Grate Thickness	2 mm Material HR sheet	
F)	Wight Of the Stove	3.8 Kg	
G)	Type of Fuel Wood	Firewood 30 to 50 mm diameter	

TECHNICAL DETAILS			
H)	Feeding Process	Continuous Feeding Front Loading	
I)	Expected life of stove	7 Years	
J)	Guarantee /Warranty Period	1 Years	
K)	Box Dimension	Outer Side Box Dimension	Length: - 300mm
			Width: - 300mm
			Height: - 270mm
L)	Thermal Efficiency	36.42% Thermal efficiency is determined by the Indian Institute of Technology Delhi. The thermal efficiency of the implemented cookstove was tested at the manufacturer's end as per BIS protocols IS: 13152: 2013.	

PP may adopt the modified stove models with improves efficiency for future distribution under the current grouped project activity.

Above mentioned technical details are checked with the Manufacturer's Technical specification, and found correct. Same is confirmed during the onsite assessment.

The first crediting period's expected annual average emission reductions over a seven-year period are 2,269,157 tCO₂e per year and 15,884,098 tCO₂e over the course of the seven-year crediting period.

For current first monitoring period from 01-October-2022 to 30-April-2023, the project has reduced 556,554 tCO₂e of GHG emissions.

Based on an examination of the Joint PD & MR^{1/}, ER estimation and verification spreadsheet^{2/}, and ICS database^{3/}, the estimated emission reductions were validated and actual emission reductions were verified.

2 VALIDATION AND VERIFICATION PROCESS

2.1 Method and Criteria

Validation and Verification Scope: The scope is defined as an independent and objective review of the Joint project design document and Monitoring report. The Joint PD and MR is reviewed

against the requirement of VCS standard version 4.4 and guideline version 4.3, including the approved baseline and monitoring methodology VMR0006: Methodology for Installation of High Efficiency Firewood Cookstoves. The validation and verification were based on the requirements in the Validation and Verification Standard for project activities version 03.0, and VCS guideline version 4.3 and standard version 4.4.

The validation and verification are not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the combined project document and the Monitoring report

Validation and Verification Process: The project assessment is based on the Clean Development Mechanism Validation and Verification Standard for project activities version 03.0 and VCS standard version 4.4 and guideline version 4.3 and is conducted using standard auditing techniques to assess the correctness of the information provided by the project participants. Before the assessment begins, members of the team covering the technical scope(s), sectoral scope(s), and relevant host country experience for evaluating the VCS project activity are appointed.

The proposed implementation and operation of the project activity, as well as the measures employed to report emission reductions, must be evaluated and decided to meet with the criteria and pertinent recommendations provided by the VCS. The validation and verification process consists of the following three phases;

- A desk review of the Joint PD and MR.
- A physical site visit and follow-up interviews with project stakeholders.
- Findings were raised and resolved.
- The resolution of outstanding issues and issuance of the final report and opinion.

In order to ensure transparency, assumptions must be clear and stated explicitly and background material must also be referenced. Applus+ Certification has developed a specific checklist customized for the project. The checklist demonstrates, in a transparent manner, the project criteria (requirements), discussion on each criterion by the assessment team, and the results from validating the identified criteria.

Appointment of the assessment team

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 compliance with the contract and Assessment Team appointment rules in the internal Quality Management System of Applus + Certification as well as in compliance with the applicable requirement in the Accreditation Standard.

The composition of the Assessment Team (Applus+ Certification team) has been approved by Applus + Certification during the Contract Review process ensuring that the required skills and capabilities are covered.

The qualification levels for Assessment Team members that are assigned by aforementioned appointment rules are as presented below:

- Lead Auditor (LA).
- Auditor (A)
- Technical Expert (TE)
- Technical Reviewer (TR).
- Any of the above mentioned roles in training (iT,e.g.AiT for auditor in training).

The sectoral scope / technical area knowledge linked to the applied methodology(ies) is covered by the Assessment Team as shown below:.

Name	Role	SS Coverage	TA Coverage	Financial aspect	Host country experience
Mr. Jitendra Mohan Singh	LA/TE	YES	YES	NA	YES
Mr. Amit Rai	AiT	YES	YES	NA	YES
Mr. Simon Shen	TR/TE	YES	YES	NA	YES

The detail regarding the assessment team is provided below in this report as Appendix 3.

Document review

The Joint VCS PD & MR submitted by the Client was reviewed against the approved methodology and other relevant criteria to verify the correctness, credibility, and interpretation of the presented information. Furthermore, a cross-check between information provided and information from other sources has been done. A complete list of all documents and evidence material reviewed is included in this report below in appendix 1.

A physical site visit was conducted by LGAI Technological Center S.A. (Applus+ Certification) assessment team who performed physical inspection of randomly selected samples to confirm selected information and to resolve issues identified in the document review. The detail is provided in this report in the below sections.

Resolution of Clarification and Correction Action Request: -

The objective of this phase of the joint validation and verification was to resolve the requests for corrective actions and clarification and any other outstanding issues which need to be clarified for LGAI Technological Center S.A. (Applus+ Certification) positive conclusion on the project design and Monitoring report. The Corrective Action Requests and Clarification Requests raised by LGAI Technological Center S.A. (Applus+ Certification) were resolved during communications between the Client and Applus+ Certifications to guarantee the transparency of the validation process, the concerns raised and responses given are summarized below in the appendix 2.

The Joint VCS PD & MR Version 06 submitted by project owners on 19-July-2024 (revised as per VERRA PRR) serves as the basis for the final assessment presented. Additional changes to the project during the joint validation and verification process are not considered to be significant

with respect to the main VCS objectives. The VCS main objectives are the reduction of anthropogenic GHG emissions and the contribution of sustainable development to the host country.

Internal quality Control: -

As final step of a joint validation and verification of the final documentation including the final Joint validation and verification report and the checklist have to undergo an internal quality control by the technical review committee, i.e., each report has to be finally approved either by the head of the technical review committee or the deputy. In case one of these two persons is part of the assessment team approval can only be given by the other one to avoid any conflict of Interest.

After confirmation of the project owners, the positive validation/verification opinion and relevant documents are submitted to the VCS secretariat through the VCS web-platform

Since the project requires sampling, based on the provisions of CDM Standard: Sampling and surveys for CDM project activities and programmes of activities, version 9.0/18/, VVB has undertaken the following sampling plan with respect to the project validation and verification.

Para 30 and 31 of the CDM standard states:

In order to determine the sample size, the DOE should specify in advance, using its own professional judgement:

- (a) **Acceptable quality level (AQL) or the level of assurance**, that is the proportion of acceptable discrepancies between the project participants' or the coordinating/managing entity's sample records and the DOE sample records (i.e. DOE field/on-site inspection results) (e.g. 0.5 per cent);
- (b) **Unacceptable quality level (UQL)**, that is the proportion of unacceptable discrepancies between the project participants' or the coordinating/managing entity's sample records and the DOE sample records, e.g. 20 per cent.

Para 31 says, The maximum errors associated with the determination indicated in paragraph 30 above should remain at levels indicated below:

- (a) A 10 per cent chance that the DOE will wrongly reject the project participants' or the coordinating/managing entity's records (i.e. reject a set of records of acceptable quality);
- (b) A 10 per cent chance that the DOE will wrongly accept the project participants' or the coordinating/managing entity's records (i.e. accept a set of records which is unacceptable).

Based on the above allowance given by the sampling standard, VVB selected 11 randomised households from each state (by considering 10 % producer risk & 10 % consumer risk) for acceptance surveying based on PP's database. The households were chosen from the 125 sample households of each of the states (*Maharashtra, Chhattisgarh, Gujarat, Odisha, Rajasthan, Dadra & Nagar Haveli, Bihar, Jharkhand and Uttar Pradesh*) under the current project

activity that were already surveyed by the Project Proponent. The choice of 11 households is the minimum allowed number of samples as per the sampling standard with 0 acceptance number. Since this is an acceptance sampling, no oversampling was attempted by VVB, as it would go against the sampling guidance.

The table from the standard is provided below and the AQL,UQL, producer and consumer risk is highlighted for the present project activity decided by the VVB

Producer Risk			5%	5%		5%		5%	
Consumer Risk			5%	10%		15%		20%	
AQL	UQL	Sample Size (n)	Acceptance Number (c)	Sample Size (n)	Acceptance Number (c)	Sample Size (n)	Acceptance Number (c)	Sample Size (n)	Acceptance Number (c)
0.5%	10%	46	1	38	1	33	1	29	1
0.5%	15%	30	1	25	1	22	1	10	0
0.5%	20%	22	1	18	1	9	0	8	0
1.0%	10%	61	2	52	2	33	1	29	1
1.0%	15%	30	1	25	1	22	1	19	1
1.0%	20%	22	1	18	1	16	1	14	1
Producer Risk			10%	10%		10%		10%	
Consumer Risk			5%	10%		15%		20%	
AQL	UQL	Sample Size (n)	Acceptance Number (c)	Sample Size (n)	Acceptance Number (c)	Sample Size (n)	Acceptance Number (c)	Sample Size (n)	Acceptance Number (c)
0.5%	10%	46	1	38	1	19	0	16	0
0.5%	15%	19	0	15	0	12	0	10	0
0.5%	20%	14	0	11	0	9	0	8	0
1.0%	10%	46	1	38	1	33	1	29	1
1.0%	15%	30	1	25	1	22	1	10	0
1.0%	20%	22	1	18	1	9	0	8	0

The identified beneficiaries based on the above criteria chosen randomly from the beneficiary database is as follows;

Table: List of Beneficiaries randomly selected using random generators and Interviewed on 11 Sample

Name	Village	Tehsil
Gujrat		
RADIYA RAYJUBEN MANABHAI	DHAMNI	DHAMNI
KHANE JANIBEN SHRAVANBHAI	MATUNIYA	DHARAMPUR
ZANZAR CHANCHALBEN JAYESH BHAI	NANI Dholdungari	DHARAMPUR
JANABEN BHAYKUBHAI CHAVADHARI	CHONDHA	BANSDA
PARUBEN MANGALBHAI BHOYA	MOLAAMBA	MOLAAMBA
RAMILABEN KANTILAL MAHALA	PIPALKHED	BANSDA
RASHMIBEN GAMANBHAI VALVI	LIMZAR	BANSDA
BHIKHIBEN DEVALBHA PADIER	GANGPUR	BANSDA
MADHUBEN RAJUBHAI BIRARI	KURELIYA	BANSDA
SARSVATIBEN HIRENBHAI THORAT	MANKHURIYA KHORA	BANSDA
RAJUBHAI SOMABHAI PATEL	ZARI	BANSDA
Chattisgarh		
PRAMILA DEWANGAN	KHAPRA BHATTI AMAPARA	RAIPUR
SONIYA KAUR BHAMRA	HIRAPUR	RAIPUR
KEVAL SONKAR	TATIBANDH	RAIPUR
PUNNI BAI DEWANGAN	SARONA	RAIPUR
ASHA NAYAK	AMAPARA	RAIPUR
SHANTI BAI DEWANGAN	MANGAL BAZAR	RAIPUR
SADHANA DEVI SONI	RAMSAGARPARA	RAIPUR
PUSHPA BAI SAHU	DD NAGAR	RAIPUR
GODAVARI	RAIPUR	RAIPUR
FHARIDA	HIRAPUR	RAIPUR
LALITA THAKUR	KOTA	RAIPUR
Maharashtra		
SHIVANI SURESH SATNURKAR	DIGHORI	NAGPUR RURAL
AMRAPALI CHANDRASHEKHAR CHAVHAN	KUMBHARPURA	KUMBHARPURA
GOVINDA DEBUJI BAGADE	UBALI	UBALI
GITA MAHENDRA WAGHMARE	PULGAON	DEOLI
JAIGHOSH NARAYAN SAKHARE	ASOLA	LAKHANDUR
HIMAKALYAN SHALIKRAM GANVIR	BOTHALI	AMGAON
SEEMABAI LALIT GANVIR	DHAMANGAON	AMGAON

REKHA PUNDALIK JADHAV	RAKHASHABHAVAN	SURGANA
HIRAMAN DEVRAM BABLE	BAMBALEWADI	IGATPURI
SABLE DHONDU GANPAT	TAKED BU	IGATPURI
SAURABH DILIP PARDESHI	TAKED BU	IGATPURI
Rajasthan		
MUMTAJ BANO	TEHLA	TEHLA
BHAGWATI DEVI	DEH	NAGAU
KAMALA DEVI	BERIKHURD	DIDWANA
SONA DEVI	SAWAR	SARDARSAHAR
PANA	BALRASAR ATHOONA	CHURU
DROPATI DEVI	CHALA	NEEM-KA-THANA
AHITA RAM SAINI	GAD HIMAT SINGH	MAHAWA
SONAM	SUNDRAWALI	SUNDRAWALI
PREM CHAND	SEEKRI	NAGAU
BHORI DEVI	KALA KOR	KALA KOR
BHERU TAL	MATOOKI	MATOOKI
Uttar Pradesh		
TARA DEVI	KATARIYA	AKBARPUR
CHANDRABHAN SINGH	KATYA GUNJAN	KATYA GUNJAN
LALDEI	TENDUYA	TANDA
AJAYBHAN	BASKHARI	BASKHARI
MEENA	SEMRA NASEERPUR	ALLAPUR
JIKRULLAH	SAIDPUR	SAIDPUR
LALITA	BASKHARI	TANDA
MO RAJA	DAULATPUR	TANDA
SUNIL CHATUR VEDI	RAJESULTANPUR	ALLAPUR
KAMLA	PRITAMPUR	ALLAPUR
PREMCHAND	KALYANPUR URF PAHITIYAPUR	ALLAPUR
Bihar		
SUKMARI DEVI	JAMUNIYA	BELHAR
AJIMA KHATUN	BASMATA	KATORIA
FULKUMARI DEVI	DOMUHAN	BANKA
LAXMI DEVI	JHIRWA	BANKA
MUSHRRAT NEGAM	KATORIA	AMARPUR
RUBI DEVI	PITONGHIYA	BANKA
BIBI BALJUNA KHATUN	CHUBHIYA	CHUBHIYA
UTTAM DEVI	RAMSARAIY	RAMSARAIY

KUSUMI DEVI	DHABOUNI	DHABOUNI
BIJLI DEVI	PATHALKURIYA	PATHALKURIYA
MAMTA DEVI	BHORABAZAR	BHORABAZAR
Jharkhand		
PARWEEN TOPNO	HUTAR	KHUNTI
RASHIDA KHATUN	MURHI	MURHI
ANITA KERKETA	KURKUTIYA	RANIA
SUSHILADEVI	TUTIKEL	RANIA
MONI DEVI	CHAPI	KHUNTI
ASHA DEVI	CHIUR	KARA
PARWATI DEVI	BASADI H	MANDU
ANITA DEVI	HENDEGARA	MANDU
JHANO DEVI	KOWAD	MANDU
SUMANTI SWANSI	KONKEYA	RANIA
MALO DEVI	HAKAJANG	KARA
Odisha		
ALIBHA PRADHAN	PITAPALI	JATANI
GUNI SHRICHANDAN	MAHUL	JATANI
SUKANTI NAIK	BELPADA	BELPARA
SUCHITRA NAYAK	BADAPADARA	BOLAGARH
PRATAP KUMAR PAIKARAY	BADAPADARA	BOLAGARH
JYOSTNA RANI PAHADASINGH	KURUM	BEGUNIA
JAYANTI SAMANTARAY	GODA	BEGUNIA
SATYABHAMA MAHARANA	NILAKANTHAPUR	BOLAGARH
ROJALIN SAHOO	PARICHHAL	BEGUNIA
SUKANTI BEHERA	THAKURAPADA	KHORDHA
SAROJINI GURU	BADABERENA	BEGUNIA
Dadra and Nagar Haveli		
BHURKUD ASHABEN ANILBHAI	AMBOLI	DADRA & NAGAR HAVELI
MANKI KISNA MOR	KARCHOND	DADRA & NAGAR HAVELI
BHURAKUD SAVALIBEN ABALUBHAI	DUDHANI	DADRA & NAGAR HAVELI
BHIKHALI ASHWIN GORAT	AMBOLI	DADRA & NAGAR HAVELI
AMITA ASHOK TUMADA	VASONA	DADRA & NAGAR HAVELI
AANDER PATUBEN SARAVLABHAI	SAILY	DADRA & NAGAR HAVELI
BHARTIBEN MOHANBHAI AARDODIYA	SAILY	DADRA & NAGAR HAVELI
BHIKHIBEN MANGLABHAI BHOYA	SAILY	DADRA & NAGAR HAVELI
BHAGAT SONMATI JAGDISH	SILVASSA	DADRA & NAGAR HAVELI
ASHA MA HI YA DHANGDA	AGRIWAD	DADRA & NAGAR HAVELI
AGRI VAISHALIBEN HASMUKHBHAI	DOKMORDI	DADRA & NAGAR HAVELI

The on-site interviews were conducted with the end users and following questions were asked to them;

1. General information of households
 - a. Interviewee Name
 - b. ID No.
 - c. Age, Gender
 - d. Household location
2. Old cookstoves situation
 - a. Are you the main user of the Old Cookstove at home?
 - a. How many people are there in your household?
 - b. What type and number of Stoves did you use? Three-stone fire, Self-built low efficient clay stove, Traditional low efficient stove or Others. If others, the type and number of stoves are
 - c. What kind of fuel did you use for the stove(s)? Charcoal, Firewood, or Others. If others, the kind of fuel is
 - d. Do you think the Cookstove will generate smokes and cause respiratory or itching issues?
3. Project cookstoves using situation
 - a. Are you the main user of the Project Cookstove at home?
 - b. When did you buy the Project Cookstove?
 - c. Do you know you have waived ownership of ERs before used the Cookstove?
 - d. What document do you sign or what information do you provide when you were distributed the Project Cookstove?
 - e. When did you start using the Project Cookstove?
 - f. Does your Project Cookstove have unique serial No.? if yes, the No. is
 - g. After using the Project Cookstove, did the distributor come to your home to check the use of the Project Cookstove?
 - h. Please specify the using frequency and cooking times.
 - i. What kind of fuel do you use for project stove? Charcoal, Firewood, or Others. If others, the kind of fuel is
 - j. What type and number of Project Stove are you using? If others, the type and number is
 - k. Are you still using old/other cookstove(s) after buying the Project Cookstove?
 - l. Do you think the Project Cookstove is cleaner than the old stove? If yes, the reason is Less smoke, less respiratory issues, less itching issues or others. If others, please specify.
 - m. Do you think using a Project Cookstove saves money or time compared to using the old stove?
 - n. Are there any difference in usage of project cookstove between dry and wet seasons?.

2.2 Document Review

The joint PD & MR and other related documents were reviewed as a part of the joint validation and verification process, which is described in detail in appendix 1 of this document. A assessment team uses a standard protocol to do the assessment of both validation and verification. The comparison of data from Joint PD & MR with data from additional sources, if available, the team's sectoral or local experience, and, if necessary, independent background investigations.

2.3 Interviews

The assessment team visited the site between 22-May-2023 to 31-May-2023, PP representatives and end users were questioned. The table includes information on the interviewees from PP side. ICS Users interviewed List is mentioned in the section 2.1 of this document.

Sr. No.	Name	Role	Organization
1	Mr. Yogesh Sharma	Stove Distributor	JPS Enterprises
2	Mr. Sandip Chaudhari	Stove Distributor	Rayon Solar Systems Pvt Ltd.
3	Mr. Falguni Rajani	Stove Distributor	Wings Foundation
4	Mr. Bibek Bora	Stove Distributor	Bibisikha LLP
5	Mr. Sayed Navab	Stove Distributor	Quantum Consulting
6	Mr. Aniruddha Chaliha	Stove Distributor	Quick Edge Integrated LLP
7	Mr. Hemant Bhamre	Stove Distributor	Pradnya Consultant
8	Mr. Umakant Dhamakar	Stove Distributor	Mahapreit
9	Mr. Soumitra Kulkarni	Stove Distributor	GHG Reduction Technologies Pvt LTD
10	Suvra Majumdar	Project Consultant	EKI Energy Services Limited
11	Ravi Vishwakarma	Project Consultant	EKI Energy Services Limited
12	Monil Shrivastava	Project consultant	EKI Energy Services Limited
13	Vineet Garg	Project consultant	EKI Energy Services Limited
14	Amit Sharma	Project consultant	EKI Energy Services Limited
15	Aditya Goyal	Project consultant	EKI Energy Services Limited

The topics discussed during the interview range from the project's general characteristics and implementation to its technical details, including design and technical specifications, project implementation status, project start date, location, baseline identification, monitoring survey, data recording and archiving procedures, and baseline stove use. The evaluation was created using the interview input together with the paperwork and observations.

2.4 Site Visits

VVB has applied sampling method for conducting site visit as described above in Section 2.1 .

The assessment team visited the site between 22-May-2023 to 31-May-2023 to perform the following tasks:

- A review of information flows for generating, aggregating, and reporting the monitoring parameters;
- Interviews with relevant personnel to ascertain whether the operational and data collection procedures are carried out in accordance with the monitoring plan in the Joint PD and MR;
- A cross check of the information collected during the above-mentioned processes

- A comparison of the ICS functioning, observations of monitoring practices, applied methodology, including relevant tool(s), and, if appropriate, the applied standardized baseline, to the Joint PD and MR standards;
- A review of the calculations and presumptions used to calculate the GHG data and emission reductions;
- A determination of the quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.
- A check of thermal efficiency test performed by an independent third party.

In order to decrease audit risk to an acceptable low level and to obtain a fair degree of certainty for the Joint Validation and verification, the assessment team has verified adequate appropriate audit evidences.

2.5 Resolution of Findings

The goal of this step is to identify, discuss, and draw conclusions about any problems that may affect the project activity's ability to reduce emissions or have an impact on the recording, monitoring, and reporting of those reductions. These problems may be related to the project description, technical specifications, baseline and additionality, monitoring parameters and monitoring plans, implementation status, or operations of the project activity. Based on the desk review and site evaluation, this was carried out. The assessment team creates and/or maintains a validation and verification procedures (internal document) that documents conformities and non-conformities, which may include the following kinds of issues:

Corrective Action Request (CAR) 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 (CL) is raised if:

Information is insufficient or not clear enough to determine whether the applicable VCS requirements have been met.

Forward Action Requests (FARs) is raised if:

Information is not available during the present validation or verification process, which would need to be verified in subsequent verification or monitoring period.

11 Corrective Action Requests (CARs) and 10 Clarification Requests (CLs) were raised and successfully closed during the current joint validation and verification.

Appendix 3 contains all of the findings that are brought forward and shared with project participants during the assessment. The section also covers the project participants' responses, if any, and the assessment team's evaluation subsequently for any open findings.

2.5.1 Forward Action Requests

The project activity is undergoing Joint Validation and Verification under VCS, and no FAR issues have been raised.

3 VALIDATION FINDINGS

3.1 Project Details

Promoting improved cooking stoves (ICS) to residents of socially disadvantaged communities in India is the main focus of this project activity. In order to replace the traditional cooking stoves in the kitchen with stoves that are more efficient, the initiative aims to provide households with clean cooking alternatives. By substituting traditional cooking stoves with ICS, the project will reduce deforestation through less consumption of firewood. And, family members—particularly women—will be exposed to less indoor air pollution, saving money on health-related expenses.

The project activity started on 01-October-2022, which is also the date that the first beneficiary households sign the end user agreement, marking the beginning of the first batch distribution.

The detail of 1st Instant is as follows:

Date of Distribution	ICS Serial Number	Name of the Beneficiary	State
01-October-2022	GHG-22D/0188720	Vishnu	Rajasthan

The same has been checked with screenshot of mobile app^{25/} employs to record beneficiary data including Cookstove serial numbers, addresses, government IDs, and more, is captured in real-time using the EKI mobile app on the day of distribution of ICS, VVB has also cross checked

the with the Carbon Credit Ownership Agreement (CS Serial No - GHG -22 D/0188720 dated 01-Oct-2022) which confirmed the distribution date 01-Oct-2022. Therefore, the ICS's commissioning occurs when it is delivered to the beneficiary household and put into service (i.e. start cooking). As a result, the project's commercial functioning begins on the same day that ICS is delivered to the beneficiary family.

A 07year crediting period is expected to result in annual emission reductions of 2,269,157 tCO₂e and 15,884,098 tCO₂e over the seven-year crediting period, which runs from 01-October-2022 to 30-September-2029 (inclusive of both the dates).

Assessment team has verified the ownership of the cookstoves with the help of End user agreement and found that it lies with the end-users. More-over Ownerships of carbon rights is with the PP, which was also confirmed with the help of end-users. This was also crosschecked during the onsite assessment interviews with the end users and PP. Same is mentioned in the joint PD and MR, Hence, accepted.

The project will reduce 556,554 tCO₂e GHG emissions during the first monitoring period, which is from 01-October-2022 to 30-April-2023(inclusive of both the dates).

Details of the Project Proponent

Organization name	EKI Energy Services Limited
Contact person	Manish Dabkara
Title	Managing Director & Chief Executive Officer
Address	Office No 201, Plot No 48, Scheme 78, Vijay Nagar Part- II, Indore 452010, India
Telephone	+91 99075 34900
Email	ramkrishna.patil@enkingint.org and registry@enkingint.org

VVB team verified the details about the project proponent form the project web page of the registry and found the data consistent.

Oher entities involved in the project is as follows:

Quantum Consulting, Wings Foundation, Rayon Solar Systems Pvt Ltd, Quick Edge Integrated LLP, Pradnya Consultant, JPS Enterprises and Envro Queen Pvt Ltd. are associated with EKI for ICS distribution and GHG Reduction Technologies Pvt LTD is the manufacturer of the ICS deployed under the project activity to date.

Organization name	Quantum Consulting
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Role in the project	Distributor
Contact person	Syed Nayab
Title	Owner/ Partner
Address	Office 101, Opp Alfarooque Ambedkar Nagar UP 224139
Telephone	+91-9889217574
Email	Syed.nayab@quantco.co.in

Organization name	Wings Foundation
Role in the project	Distributor
Contact person	Falguni Rajani
Title	Owner/ Partner
Address	103, Ganpat Niwas , Vishwakarma Nagar, Ambadi road, Palghar -401202
Telephone	+91-7719033222
Email	support@ngowings.org

Organization name	Rayon Solar Systems Pvt Ltd.
Role in the project	Distributor
Contact person	Sandip Chaudhari
Title	Owner/ Partner
Address	Ambaji Nagar Amrutdham, Nashik - 422001
Telephone	+91-9021258181
Email	rayonsolarsolution@gmail.com

Organization name	Quick Edge Integrated LLP
Role in the project	Distributor
Contact person	Aniruddha Chaliha
Title	Owner/ Partner
Address	DPS Road Guwahati 781035, Assam
Telephone	+91-9957199028
Email	qedgeint@gmail.com

Organization name	Pradnya Consultant
Role in the project	Distributor
Contact person	Hemant Bhamre
Title	Owner/ Partner
Address	Gujrat- Valsad, Dadar & Nagar Haveli
Telephone	+91-9822277246
Email	h1bhamre@gmail.com / acc.pradnya@gmail.com

Organization name	JPS Enterprises
Role in the project	Distributor
Contact person	Yogesh Sharma
Title	Owner/ Partner
Address	Rajasthan- Bharatpur, Karoli, Dausa, Churu, Nagour, Bhilwada, Sikar, Pratapgarh, Tonk

Telephone	+91-9057244624
Email	jpsenterprises111@gmail.com

Organization name	Bibshikha LLP/Sewa
Role in the project	Distributor
Contact person	Bibek Bora
Title	Owner/ Partner
Address	Assam- Udalguri
Telephone	+91- 7002513935
Email	bibek@bibsikha.in

Organization name	Mahapreit
Role in the project	Distributor
Contact person	Umakant Dhamakar
Title	Owner/ Partner
Address	Beed Maharashtra
Telephone	+91- 98208 64203/ 85919 22605
Email	cgm.etap@mahapreit.in

Organization name	GHG Reduction Technologies Pvt LTD
Role in the project	Manufacturing
Contact person	Mr. Soumitra Kulkarni

Title	Director
Address	A-11/2/3, Nagargoje Industries PVT LTD, SUMmet Compound Ambad, Nashik Maharashtra - 422010
Telephone	+91 982287213
Email	Soumitra.kulkarni@enkingint.org

VVB team verified the details of the other entities with the help of the Agreement between Project proponent & other entities involved in the distribution of the ICS which was submitted by the PP and found to be error free and Hence, accepted by VVB team.

Assessment team has verified the ownership of the cookstoves with the help of the End user agreement and found that it lies with the end users. Moreover, Ownerships of carbon rights is with the PP (EKI energy Services Ltd. which was also confirmed with the help of end user agreements. This was also crosschecked during the onsite assessment interviews with the end users and PP. Same is mentioned in the joint PD and MR, Hence, accepted.

Each ICS will save quantity of biomass by approximately 3.39 tonnes annually in Bihar, 3.08 tonnes in Chhattisgarh, 3.48 tonnes in Uttar Pradesh, 3.24 tonnes in Maharashtra, 3.39 tonnes in Gujarat, 2.01 tonnes in Rajasthan, 3.56 tonnes in Dadra & Nagar Haveli, 2.97 tonnes in Jharkhand, 3.09 tonnes in Odisha (based on total emissions projected by the total number of cookstoves), according to the computation in the section (net of leakage and continued use of the baseline stoves). The project proponent has commissioned 398,897 ICS during current monitoring period as confirmed based on ICS database.

The current initiative is a voluntary endeavour by the project proponent because there is no mandatory rule or regulation in the host country – India mandating the implementation of ICS. The project complies with all applicable statutes, laws, and regulatory frameworks. No Indian regulations, ordinances, or other regulatory frameworks are violated by the project.

Baseline scenario:

The baseline scenario that existed prior to the implementation of the project activity instances involves the use of conventional biomass fuel and inefficient cook stoves which use more firewood and are with poor ventilation, which causes excessive indoor air pollution (IAP) and poses a serious health risk to women and children who spend a lot of time in the kitchen.

The baseline for this project is located in the same area where a similar project has already been implemented. Accordingly, the baseline for this project is the ongoing use of non-renewable wood fuel in traditional cookstoves or three-stone fire stove within a specific region. Based on the initial monitoring survey it is confirmed that a traditional cookstoves or three-stone fire stove is being used in project location.

As per applied methodology, 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.

As confirmed by the assessment team, in the absence of project activity the baseline scenario would have been continued use of non-renewable wood fuel – firewood by the end users to meet similar thermal energy needs and hence, it adheres to the applied methodology.

Assessment team further confirmed that;

Project activities are implemented in domestic premises;

The project stoves have high-power thermal efficiency of 36.42% as confirmed based on the manufacturer’s specifications provided ICS exclusively use woody biomass (fuel wood) and are single pot;

Since 31/12/1989, non-renewable biomass has been used in India, according to secondary research^{/22/} that is noted by PP in the joint PD and MR;

The project has been implemented, in order to generate less GHG emissions from the baseline for later removal, reduction, or destruction.

The application for VCS registration by the project or any of its components has been confirmed in the Joint PD & MR ^{/1/} and up to this point, it has not been registered under any GHG programme.

The assessment team affirms that the description provided in the Joint PD & MR ^{/1/} is accurate, complete, and provides an understanding of the nature of the project based on its evaluation through review of pertinent documentation (as cited above), and the project has been implemented as described in the Joint PD & MR ^{/1/}

For the inclusion of new project activity instances i.e., ICS, the project proponent ensures that it meets the eligibility criteria below:

No.	Criterion	How the new project activity instances comply	VVB assessment
1	Meet the applicability conditions set out in the methodology applied to the project	New project activity instances (Energy Efficient Cook Stoves) will meet the applicability conditions set out in Section 3.6.16 of VCS project standard Version 4.4 ^{/7(b)/} , where the target of the end-user is household and the ICS deployed is at least 25% of thermal efficiency.	PP has distributed ICS with an efficiency of 36.42% and since each ICS is treated as a new instance. Hence applicable and accepted
2	Use the technologies or measures specified in the project description.	The technology used for the project activity is energy-efficient cookstoves. Only energy efficient cook stoves are to be adopted in the project by replacing traditional cookstoves in households.	PP has distributed only one model of ICS which is energy efficient (verified from 3 rd party testing report)

			Hence applicable and accepted.
3	Apply the technologies or measures in the same manner as specified in the project description.	Only energy efficient cook stoves are to be adopted in the project by replacing traditional cook stoves in households. and same will be provided at free of cost.	PP has distributed only one model of ICS which is energy efficient (verified from 3 rd party testing report) and also during the on-site interviews with beneficiary it was confirmed that, no any amount has been taken/charged while distribution of the cookstoves. Hence applicable and accepted.
4	Are subject to the baseline scenario determined in the project description for the specified project activity and geographic area.	The new project activity instances will be installed within India subject to the same baseline scenario determined with reference to clause 3.5.3 of VCS standard, version 4.4/7(b).	All the cookstoves are distributed within India. Hence applicable and accepted.
5	Have characteristics with respect to additionality that are consistent with the initial instances for the specified project activity and geographic area.	<p>All new project activity instances will use the activity method for demonstration of additionality.</p> <p>Step 1: Regulatory Surplus There is no mandated government programme or policy in the host country of this project ensuring the distribution of new energy efficient cook stoves for each project activity instance.</p> <p>Step 2: Positive List The inclusion of new project activity instances will comply with the positive list as it satisfies criterion 1 where it meets all the applicability conditions of the methodology.</p>	<p>Since each instance is within India and the is no mandated government programme in host country for distribution of cookstove. Hence accepted and Applicable.</p> <p>The inclusion of new project activity instances complies with the positive list as it satisfies criterion 1 where it meets all the applicability conditions of the methodology.</p>

<p>6</p>	<p>Where a capacity limit applies to a project activity included in the project, no project activity instance shall exceed such limit. Further, no single cluster of project activity instances shall exceed the capacity limit, determined as follows: Each project activity instance that exceeds one percent of the capacity limit shall be identified. Such instances shall be divided into clusters, whereby each cluster is comprised of any system of instances such that each instance is within one kilometer of at least one other instance in the cluster. Instances that are not within one kilometer of any other instance shall not be assigned to clusters. None of the clusters shall exceed the capacity limit and no further project activity instances shall be added to the project that would cause any of the clusters to exceed the capacity limit.</p>	<p>No project activity instance shall exceed the applicable limit, which is 180 GWh_{th}/y.</p> <p>Since the project activity instances installed to date and proposed to be installed have/will have the same model, hence expected annual energy saving for each instance is less than 0.0142 GWh_{th}/y which is less than 0.01% of the threshold limit.</p> <p>As the annual energy saving is below 1% of the limit, therefore no project activity instance is identified and divided into clusters.</p>	<p>Since the project activity instances I have the same model and expected annual energy saving for each instance is less than 0.0142 GWh_{th}/y which is less than 0.01% of the threshold limit.</p> <p>As the annual energy saving is below 1% of the limit, therefore no project activity instance is identified and divided into clusters hence verified and accepted.</p>
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3.2 Participation under Other GHG Programs

In order to receive carbon benefits during the project activity's crediting period, EKI Energy Services Limited has not registered for, nor is it pursuing registration under, any other GHG emission programme. This was confirmed by looking over the undertaking letter/^{4/} and by checking other GHG project registries like CDM², GS³, GCC⁴ etc. and found that the project is not claiming any other form of environmental form of credit during then current monitoring period. Thereafter, assessment team concluded that project activity is eligible to participate under the VCS Program..

3.3 Safeguards

3.3.1 No Net Harm

The proposed project activity has not noted any potential detrimental effects on the environment or society. Because clean technology of cook stoves is installed and used,, which supports socio-economic and environmental well-being.

The assessment team has determined that this complies with the standards of the VCS Standard (version 4.4)^{7(b)/} and is therefore acceptable.

3.3.2 Local Stakeholder Consultation

Stakeholders were defined as individuals who are impacted by project activities and those whose actions directly or indirectly affect the project.

The stakeholder consultation meeting details are as follows:

The dates of the Stakeholder Meetings are as follows:

Date of invitation	Date of the Meeting	Location	District	State
25-July-2022	22-August-2022	Bari Jana Begusarai	Begusarai	Bihar
06-April-2022	11-June-2022	Savana	Raipur	Chhattisgarh
31-Oct.-2022	07-November-2022	Morkhal	Silvassa	Dadra and Nagar Haveli,

² <https://cdm.unfccc.int/contest/Projects/projsearch.html>

³ <https://registry.goldstandard.org/projects?q=&page=1>

⁴ <https://projects.globalcarboncouncil.com/>

11-January-2023	21-January-2023	Pipalkhed	Navsari	Gujarat,
10-August-2022	12-Sept.-2022	Karsa	Khunti	Jharkhand,
09-December-2022	08-January-2023	udgir	Latur	Maharashtra,
09-December2022	09-January-2023	Chamai	Beed	Maharashtra,
14-December-2022	08-January-2023	Sarua	Khordha	Odisha,
25-June-2022	20-July-2022	Sewar	Bharatpur	Rajasthan
20-June-2022	21-July-2022	Lalsot	Dausa	Rajasthan
16-June-2022	21-July-2022	Bhopar	Karoli	Rajasthan
25-August-2022	30-September-2022	Nawabganj	Gonda	Uttar Pradesh

School teachers, vendors, farmers, representatives from neighbourhood NGOs, and locals all showed up to the meeting. The purpose of the meeting was to explore any concerns that the stakeholders may have had about the project's environmental and social implications. Throughout the stakeholders meeting, opinions and recommendations were welcomed.

The assessment team conducted stakeholder interviews on-site^{9/}. The assessment team confirmed by the stakeholder's responses that the stakeholder consultation process had been carried out in accordance with the joint PD & MR^{14/}. The stakeholder acknowledged that they received an invitation to attend the meeting via inviting letters, public notices and through telephonic conversations. The stakeholders were also intimated about the carbon mechanism & its requirement for the current project. After the detailed introductory brief, the session was open for questions from stakeholders. Most of the question from the stakeholders were related to improved cookstoves usage, its impact, benefits from the project to villagers, and other development activities and there were no negative comments and feedback registered during the stakeholder's consultation. There no comments/ suggestion/ recommendations from the stakeholders during the consultation regarding the project design, technology or any other aspects related to the project activity. The question & answer evidences for each state during the stakeholder's consultation meeting is submitted by the project proponent which is verified by the assessment team.

The questions raised by the villagers in Bihar are summarized below:

District- Begisarai – State – Bihar

Question – Can we boil big vessel on the cookstoves

Response- Yes you can boil big vessel

Question – Can we use big wood in the cookstoves

Response- No you cannot use big wood, you need to cut it into small pieces

Question – How can we clean it

Response- You need to clean it with dry cloths, don't use wet cloths

The questions raised by the villagers in Chhattisgarh are summarized below:

District- Raipur – State – Chhattisgarh

Question – Why are you providing cookstoves to us

Response- With the objective of promoting clean cooking in the area

Question –Do you charge any amount for the cookstoves

Response- The cookstoves is provided at free of cost

Question – Why have we to use wooden shreds but not wood logs

Response- Wood shreds provides better combustion

Question – Can we clean with water

Response- No you have to clean with dry cloths

Question –What are benefit of using cookstoves

Response- Its produces less smoke and requires less wood in compared to traditional cookstoves

The questions raised by the villagers in Dadra and Nagar Haveli are summarized below:

District- Silvassa – State – Dadra and Nagar Haveli

Question – Is the cookstoves available for free?

Response- Yes the cookstoves available for free

Question – Is the cookstoves operates in electricity

Response- No the cookstoves operates with wood only

Question – What is the use of this cookstoves

Response- The cookstoves is to be used for cooking

Question – Do the cookstoves emit smoke

Response- No smoke is not emitted from the cookstoves

Question – Can we clean with water

Response- No you have to clean with dry cloths

The questions raised by the villagers in Gujarat are summarized below:**District- Navsari – State – Gujarat**

Question – Do the cookstoves emit smoke

Response- No smoke is not emitted from the cookstoves

Question – Can we clean with water

Response- No you have to clean with dry cloths

Question – Is the cookstoves available for free?

Response- Yes the cookstoves available for free

Question – Why this cookstoves don't emit smoke

Response- The cookstoves ensure complete combustion by ensuring availability of oxygen therefore does not emit smoke

Question – What is the amount of wood required in this cookstoves

Response- This cookstoves nearly requires 60% less wood than the traditional cookstoves

Question – Is the cookstoves operates in electricity

Response- No the cookstoves operates with wood only

The questions raised by the villagers in Jharkhand are summarized below:**District- Khunti – State – Jharkhand**

Question – How much weight it can sustain

Response- 80 kg

Question – How can we clean

Response- You can clean with dry cloths

Question – Should we blow external air to burn properly

Response- No

Question – Can we buy the stove

Response- No , the stove is provided for free of cost

Question – Can we use dry leaves

Response- No

Question – When can we get the cookstoves

Response- After 10-15 days

The questions raised by the villagers in Maharashtra are summarized below:

District- Beed – State – Maharashtra

Question – What is the use of cookstoves compared to traditional cookstoves

Response- It results in lower wood consumption due to higher efficiency

Question – Can we get more cookstoves per family

Response- No

Question – Can we use other source of fuel for cooking purpose

Response- No you can only use wood for the purpose of cooking

Question – Can we use water for cleaning purpose

Response- No you can use only dry cloths for cleaning purpose

Question – Does it for only small cooking purpose

Response- No the cookstoves is for all meals

The questions raised by the villagers in Odisha are summarized below:**District- Khordha – State – Odisha**

Question – How does this cookstoves operates

Response- This cookstoves operates using small wood pieces/ shreds

Question – Do you need to pay for the cookstoves

Response- No

Question – Ho can we clean the cookstoves

Response- You can clean the cookstoves with dry cloths

Question – Can we use water for cleaning purpose

Response- No you can use only dry cloths for cleaning purpose

Question – What will we do if the cookstoves mal functions

Response- Whenever there is any problem with cookstoves you need to call the helpline number

The questions raised by the villagers in Rajasthan are summarized below:**District- Bharatpur– State – Rajasthan**

Question – Can we fix the cookstoves with mud

Response – No

Question – What are the benefits of using cookstoves

Response- Less wood consumption, time saving in terms of wood collection, sustain more wight and low smokes will result in following health benefits like – lungs issues, eyes issues,

The questions raised by the villagers in Rajasthan are summarized below:

District- Dausa– State – Rajasthan

Question – Do you need to pay for the cookstoves

Response- No

Question – Do we have to wash it

Response- No just clean it with dry cloths

Question – Can we use plastic to burn the starting

Response – No you should not use plastic

Question – What are the benefits of using cookstoves

Response- Less wood consumption, time saving in terms of wood collection, sustain more wight and low smokes will result in following health benefits like – lungs issues, eyes issues,

The questions raised by the villagers in Uttar Pradesh are summarized below:

District- Gonda – State – Uttar Pradesh

Question – Do you provide more than one cookstove per family

Response – No

Question – Can we use other fuel for cooking

Response- No you need to use wood for cooking only

Question – What are the benefits of using cookstoves

Response- Less wood consumption, time saving in terms of wood collection, sustain more wight and low smokes will result in following health benefits like – lungs issues, eyes issues,

Question – Can we use water for cleaning purpose

Response- No you can use only dry cloths for cleaning purpose

Question – How much quantity of food can be cooked in this cookstoves

Response - You can prepare up-to 50 kg in this cookstoves

The invitation procedure specified in the joint PD & MR/^{4/} was determined to be consistent with this claim. When the assessment team asked stakeholders about the grievance reporting mechanism, they confirmed that they had been informed during the stakeholder consultation process. A copy of the grievance register/^{15/} confirms that there were no comments/ grievance was received during the operation of the project activity in course of the current monitoring period till the point of submission of the project activity for validation/verification.

3.3.3 Environmental Impact

The validation team confirms that EIA is not mandatory as per the legal requirements due to the scale and distribution nature, and hence is not applicable for the present project activity. No negative environmental impacts have been identified from the project. Project activity supports various positive environmental impacts such as -

- Improves the local environment by reducing the rate of degradation of forests and deforestation in the project area.
- Reduce indoor pollution – ICS emits less smoke and reduces morbidity from respiratory diseases and other health hazards.
- Reduce global and local environmental pollution and environmental degradation by a reduction in the use of non-renewable biomass thus leading to a reduction in GHG emissions.

Less water and effort are needed for cleaning vessels as the cooking process is relatively smoke-free.

3.3.4 Public Comments

The project was open for public comments from 15-April-2022 to 15-May-2022⁵. During the time for public comment, no comments were received.

3.3.5 AFOLU-Specific Safeguards

This project is not an AFOLU project. This section is not required for non-AFOLU project.

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

VCS Methodology: VMR0006: Methodology for Installation of High Efficiency Firewood Cookstoves, Version 1.1

Sectoral scope 3

<https://verra.org/wp-content/uploads/2021/07/VMR0006-Methodology-for-Installation-of-High-Efficiency-Firewood-Cookstoves-v1.1.pdf>

This methodology also refers to the latest version of AMS II.G version 13 - Energy efficiency measures in thermal applications of non-renewable biomass

<https://cdm.unfccc.int/methodologies/DB/GNFWB3Y6GM4WPXFRR2SXKS9XR908IO>

For the calculation of the fraction of non-renewable biomass, the below tool is used “TOOL30 version 4.0: Calculation of the fraction of non-renewable biomass”

<https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-30-v4.0.pdf>

⁵ <https://registry.verra.org/app/projectDetail/VCS/2943>

3.4.2 Applicability

The project activity uses VMR0006, Version 1.1/^{6/}, of the VCS methodology^{6/}.

The assessment team evaluated the applicability criteria for the baseline methodology through document review and interview. The project activity's compliance with the methodology's requirements is attested to by the assessment team.

S. N.	VMR0006, Version 1.1 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 was verified by the monitoring survey conducted by an independent third party during the annual ICS users' survey/ ^{13/}
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 (fuel wood) and can be single pot or multi-pot;	Energy Efficient stoves planned to be installed under this project are single-pot portable cook stoves that have an efficiency of more than 25%. For all project activity instances, ICS with an efficiency of 36.42% is planned to be installed. For future project activity instances, the manufacturer may change, and the cook stove efficiency that should be more than 25% as mentioned in the methodology based on manufacturer specification.	This was verified by the stove test certificate issued by credited laboratory (IIT Delhi) and submitted to the VVB for validation/ ^{5/}

^{6/}<https://verra.org/wp-content/uploads/2021/07/VMR0006-Methodology-for-Installation-of-High-Efficiency-Firewood-Cookstoves-v1.1.pdf>

S. N.	VMR0006, Version 1.1 Requirements	Project activity applicability	Means of verification
	Both 'Projects' and 'Large Projects' can use the methodology	Estimated average annual emission reductions for the grouped project activity are greater than 300,000 tonnes of CO ₂ e per year. Therefore, the proposed project qualifies for the "Large Projects" criteria.	Same is verified by the assessment team from the emission reduction sheet and Joint PD and MR which is found correct Hence accepted.
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 was 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) (a) It is produced using exclusively renewable biomass (more than one type of biomass may be used). (b) The consumption of the fuel should be monitored during the crediting period and (c) Energy use for renewable biomass processing (e.g. shredding and compacting in the case of briquetting) may be considered as equivalent to the upstream emissions associated with the processing of the	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.	VMR0006, Version 1.1 Requirements	Project activity applicability	Means of verification
	displaced fossil fuel and hence disregarded.		
5	Monitoring approaches for $B_{\text{savings},i,j}$ and values for parameters f_{NRB} (when Option (a) in paragraph 48(c) is chosen) and the quantity of woody biomass (fuel wood) $B_{\text{old},i,j}$ 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 13.0 Requirements	Project activity applicability	Means of verification
1	The VCS PD 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).	Each ICS in this project can be identified by a unique combination of customer name and geographical location, as well as a serial number. The serial number is a unique number which allows for a clear distinction between the stoves. No individual serial number can be repeated within the project, thus ensuring that each stove is counted only once in the proposed project. In addition, the project has been cross-checked against other CDM project activity operating in the country using the UNFCCC, the Gold Standard, and other relevant voluntary carbon schemes to ensure that the ICS is not included in any	This information verified from distribution records, ICS database and carbon waiver records.

S. N.	AMS II G Version 13.0 Requirements	Project activity applicability	Means of verification
		other CDM project activity or voluntary project activity	
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.	Manufacturers/ cook stove distributors undertaking is provided that EKI is the owner of that carbon credits and Manufacturers/ cook stove distributors will not claim any credits for such cook stoves	This information verified from declaration for the carbon waiver.

Applicability of Tool 30 :

Applicability criterion	How the project complies
This tool may be used by: (a) DNAs to submit region- or country-specific default f_{NRB} values, following the procedures for development, revision, clarification and update of standardized baselines (SB procedures); or (b) project participants to calculate project- or PoA-specific f_{NRB} values	The project participant has used this Tool to calculate project-specific f_{NRB} values.

3.4.3 Project Boundary

The project boundary is specified as "the physical, geographical site of the efficient devices that utilise biomass" in accordance with the applicable methodology VMRO006 version 1.1 and CDM methodology AMS II G, version 13.

The Joint PD & MR ^{/1/} accurately stated the information pertaining to the project boundary. PP has distributed cook stove in various parts of India. As a result, the project boundary for the proposed VCS project activity has taken into account the entirety of India.

The assessment team certifies that there are no sources of gases inside the project boundary for the project instances, which is based on the applied methodology^{/6/}.

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

3.4.4 Baseline Scenario

The project activity, known as the green field activity, entails installing new, improved cookstove systems in homes where, before the project activity was implemented, firewood was used for thermal energy requirements. During the on-site visit^{/9/}, this was verified. The default scenario calls for increased use of firewood for home thermal energy requirements viz., for cooking purposes. As a result, it adheres to the requirements of the methodology.

The utilisation of non-renewable biomass serves as the actual baseline. According to Methodology VMR0006, Version 1.1, "The baseline scenario is the continuous use of non-renewable wood fuel by the target community to meet identical thermal energy needs as provided by project cookstoves in the absence of project activity" (firewood/charcoal/kerosene).

The initiative's targeted beneficiaries would continue using outdated, inefficient cooking stoves that used a lot of non-renewable biomasses if project activities weren't carried out.

As a result, the baseline scenario has been determined in accordance with the demands of the used methodology VMR0006, Version 1.1^{/6/}, and it is accepted to be reasonable and justifiable.

The baseline for this project is located in the same area where a similar project has already been implemented. Accordingly, the baseline for this project is the ongoing use of non-renewable wood fuel in traditional cookstoves or three-stone fire stove within a specific region.

Based on the sample survey in the first year of the implementation of the project activity, it is confirmed by the PP and verified by the VVB during the onsite assessment interviews with the end users that the traditional cookstoves or three-stone fire stove were being used in project location.

The Start and End dates of Monitoring Survey (first year of the implementation of project activity) location wise is given below:

- Chhattisgarh - Start date – 02-May-2023, End date - 16-May-2023.
- Rajasthan - Start date – 08-May-2023, End date – 18-May-2023.
- Gujarat - Start date – 03-May-2023, End date – 13-May-2023.
- Bihar - Start date – 03-May-2023, End date - 16-May-2023.
- Maharashtra - Start date – 03-May-2023, End date – 13-May-2023.
- Odisha - Start date – 03-May-2023, End Date – 16-May-2023.
- Uttar Pradesh - Start date – 08-May-2023, End Date – 18-May-2023.

- Dadra & Nagar Haveli - Start date – 07-May-2023, End Date – 13-May-2023.
- Jharkhand - Start date – 03-May-2023, End Date – 14-May-2023.

3.4.5 Additionality

The project's additionality is shown by how well it adheres to the standards established in VMR0006, Version 1.1^{/6/}.

Activity Approach

Step 01: Regulatory excess

The distribution of residential fuel-efficient cookstoves is not mandated by any government programme or policy in the country where this project is being implemented. The project is not required by any legislation, statute, regulatory framework, or for UNFCCC non-Annex I nations, any law, statute, or other regulatory structure that is consistently applied.

Only voluntary participation is allowed from households in this study. EKI Energy Services Limited declaration of the voluntary participation of the planned project was verified and found to be appropriate^{/19/}.

Step 02: Positive List

The positive list is represented by the application requirements of this methodology. The project satisfies each of the requirements for applicability listed in Section 3.2. The project also follows the conditions stated below:

1. The project distributes or installs stoves at no cost to the end user and derives all of its funding from the sale of GHG credits.
2. Neither the initiative nor its activities are funded by multilateral agencies or government programmes. Therefore, the project is additional and voluntary.

Verification team checked the end user agreements and also confirmed from the end users during the on-site audit that the ICS were distributed at free of cost. Team also checked the national and the sated governments' schemes portal to verify that the project is not implemented as a part of any government scheme. Based on the aforementioned data, the Validation Team draws the conclusion that the data in the joint PD and MR complies with methodology requirements.

3.4.6 Quantification of GHG Emission Reductions and Removals

In the Joint PD & MR ^{/1/}, the equations and choices specified in the applied methodology VMR0006, Version 1.1^{/6/}, are accurately cited. The formulas listed in the applied methodology (06) are used to calculate the project's emission reductions.

The validation team certifies that the formulas are accurately stated for the determination of emissions reductions based on their review of the Joint PD & MR ^{/1/}. The facts and requirements supplied in the applied methodology^{/6/} have been compared with the parameters and equations presented in the Joint PD & MR ^{/1/} and other pertinent papers. In order to establish compatibility between all the formulas contained in the Joint PD & MR^{/1/} and ER validation spreadsheet ^{/2/} and the applied methodology ^{/6/}, an equation comparison has also been done.

PP has applied a value of η_{old} which is 0.1 for this project based on the usage of old traditional cookstoves in the baseline scenario as observed in similar projects of the PP. Also based on the survey it is confirmed that a traditional cookstoves or three-stone fire stove is being used in project location. This value corresponds with the guidelines stated in VMR0006 Version 1.1, which stipulates that a default value of 0.1 should be used for baseline devices that are either three-stone fires utilizing firewood (not charcoal), or conventional devices lacking an improved combustion air supply or flue gas ventilation and without a grate or chimney. Same has been assessed and found correct and conservative by the assessment team.

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.

$$ER_y = \sum_i \sum_j ER_{y,i,j} \quad \text{Equation (1)}$$

Where:

i = Indices for the situation where more than one type/model of improved cookstove is introduced to replace three-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 tCO₂e

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

$$ER_{y,i,j} = B_{y,savings,i,j} * NCV_{woodfuel} * f_{NRB,y} * (EF_{wf,CO2} + EF_{wf,nonCO2}) * N_{y,i,j} * 0.95$$

Equation (2)

Where

$B_{y,savings,i,j}$	=	Quantity of woody biomass (fuel wood) that is saved in tonnes per improved cookstove of type i and batch j during year y
$f_{NRB,y}$	=	Fraction of woody biomass (fuel wood) that can be established as non-renewable biomass (f_{NRB})

$NCV_{\text{wood fuel}}$	=	Net calorific value of the non-renewable woody biomass (fuel wood) 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')
$EF_{\text{wf,CO}_2}$	=	CO ₂ emission factor for the use of wood fuel in baseline scenario (IPCC default for wood fuel, 112 tCO ₂ /TJ)
$EF_{\text{wf,non CO}_2}$	=	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>i</i> and batch <i>j</i> operating during year <i>y</i>
0.95	=	Discount factor to account for leakage

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

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

$$B_{y,savings,i,j} = B_{y=1,new,i,survey} \times \left(\frac{\eta_{new,y,i,j}}{\eta_{old}} - 1 \right) \quad \text{Equation (3)}$$

Where

η_{old} = Efficiency of baseline cookstove

$\eta_{new,y,i,j}$ = 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.

$B_{y=1,new,i,j,survey}$ = Annual quantity of woody biomass (fuel wood) used by improved cookstoves in tonnes per device of type *i* and batch *j*, determined in the first year of the implementation of the project through a sample survey.

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

For ex-ante calculation purpose, the assumption below is applied:

- 1) Installed 398,897 ICSs.
- 2) The date of installation of project activity instance is considered as operational date of that project activity instance

- 3) The life span of each ICS is 7 years; thus, the operational lifetime of each project activity instance is taken as 7 years.
- 4) The expected operational lifetime of each project activity instance will determine based on end date of commissioning of last ICS. If project activity includes, project activity instance wise installation, then ER should be estimated project activity instance wise. The ex-ante calculation will be performed for first project activity instances
- 5) Annual Cook stove loss will be based on survey results.

$B_{y=1, new, i, survey}$, is assumed as

	No of ICS in operation	Average Daily Wood Consumption	Average Annual Wood Consumption
		kg	tons
Bihar	151,764	3.83	1.39795
Chhattisgarh	3,035	3.48	1.2702
Dadra & Nagar Haveli	8,336	4.02	1.4673
Gujarat	54,607	3.83	1.39795
Jharkhand	6,715	3.36	1.2264
Maharashtra	6,162	3.66	1.3359
Odisha	29,718	3.49	1.27385
Rajasthan	80,004	2.27	0.82855
Uttar-Pradesh	58,556	3.93	1.43445
Total	398,897		

This value has been determined during the first monitoring period, based on survey results.

An example of ER calculation of one ICS in one state is described below:

State: Bihar

Date of installation: 11-October-2022

Location: Bihar

For the monitoring period, vintage for the stove: Vintage 1

No. of days for vintage: 201 (11-October-2022to 30-April-2023)

Year fraction: $201/365 = 0.553$

Determination of efficiency of ICS during 1st year

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

Where

$$\eta_p = 36.42\%$$

$$DF_n = 0.99$$

Example of calculation:

If $y = 1$

$$\eta_{new,y,i,j} = 36.42\% \times (0.99)^{1-1} \times 0.94$$

34.23%

Hence the efficiency of ICS during year y is as below:

Year (y)	$\eta_{new,y,i,j}$
1	34.23%
2	33.89%
3	33.55%
4	33.22%
5	32.89%
6	32.56%
7	32.23%

Determination of the quantity of firewood that is saved in tonnes per ICS during 1st year

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

Determination of the quantity of firewood that is saved in tonnes per ICS during 1st year

For Bihar state

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

$$B_{y=1,ew,i,j,survey} = 1.40 \text{ tonnes/device/year}$$

$$B_{y,savings,i,j} = 1.40 \times [(0.3423/0.1) - 1]$$

$$= 3.39 \text{ tonnes/device/year}$$

Estimation of quantity of biomass saved for each project activity instances / single ICS

For the state of **Bihar**

Year (y)	$B_{y=1,new,i,survey}$	$\eta_{new,y,i,j}$	η_{old}	$B_{y,savings,i,j}$
	Tons			Tons
1	1.40	34.23%	0.1	3.39
2	1.40	33.89%	0.1	3.34
3	1.40	33.55%	0.1	3.29
4	1.40	33.22%	0.1	3.25
5	1.40	32.89%	0.1	3.20
6	1.40	32.56%	0.1	3.15
7	1.40	32.23%	0.1	3.11

For the state of **Chhattisgarh**

Year (y)	$B_{y=1,new,i,survey}$	$\eta_{new,y,i,j}$	η_{old}	$B_{y,savings,i,j}$
	Tons			Tons
1	1.27	34.23%	0.1	3.08
2	1.27	33.89%	0.1	3.03
3	1.27	33.55%	0.1	2.99
4	1.27	33.22%	0.1	2.95
5	1.27	32.89%	0.1	2.91
6	1.27	32.56%	0.1	2.87
7	1.27	32.23%	0.1	2.82

For the state of **Dadra & Nagar Haveli**

Year (y)	$B_{y=1,new,i,survey}$	$\eta_{new,y,i,j}$	η_{old}	$B_{y,savings,i,j}$
	Tons			Tons
1	1.47	34.23%	0.1	3.56
2	1.47	33.89%	0.1	3.51
3	1.47	33.55%	0.1	3.46
4	1.47	33.22%	0.1	3.41

5	1.47	32.89%	0.1	3.36
6	1.47	32.56%	0.1	3.31
7	1.47	32.23%	0.1	3.26

For the state of **Gujarat**

Year (y)	$B_{y=1,new,i,survey}$	$\eta_{new,y,i,j}$	η_{old}	$B_{y,savings,i,j}$
	Tons			Tons
1	1.40	34.23%	0.1	3.39
2	1.40	33.89%	0.1	3.34
3	1.40	33.55%	0.1	3.29
4	1.40	33.22%	0.1	3.25
5	1.40	32.89%	0.1	3.20
6	1.40	32.56%	0.1	3.15
7	1.40	32.23%	0.1	3.11

For the state of **Jharkhand**

Year (y)	$B_{y=1,new,i,survey}$	$\eta_{new,y,i,j}$	η_{old}	$B_{y,savings,i,j}$
	Tons			Tons
1	1.23	34.23%	0.1	2.97
2	1.23	33.89%	0.1	2.93
3	1.23	33.55%	0.1	2.89
4	1.23	33.22%	0.1	2.85
5	1.23	32.89%	0.1	2.81
6	1.23	32.56%	0.1	2.77
7	1.23	32.23%	0.1	2.73

For the state of **Maharashtra**

Year (y)	$B_{y=1,new,i,survey}$	$\eta_{new,y,i,j}$	η_{old}	$B_{y,savings,i,j}$
	Tons			Tons

1	1.34	34.23%	0.1	3.24
2	1.34	33.89%	0.1	3.19
3	1.34	33.55%	0.1	3.15
4	1.34	33.22%	0.1	3.10
5	1.34	32.89%	0.1	3.06
6	1.34	32.56%	0.1	3.01
7	1.34	32.23%	0.1	2.97

For the state of **Odisha**

Year (y)	$B_{y=1,new,i,survey}$	$\eta_{new,y,i,j}$	η_{old}	$B_{y,savings,i,j}$
	Tons			Tons
1	1.27	34.23%	0.1	3.09
2	1.27	33.89%	0.1	3.04
3	1.27	33.55%	0.1	3.00
4	1.27	33.22%	0.1	2.96
5	1.27	32.89%	0.1	2.92
6	1.27	32.56%	0.1	2.87
7	1.27	32.23%	0.1	2.83

For the state of **Rajasthan**

Year (y)	$B_{y=1,new,i,survey}$	$\eta_{new,y,i,j}$	η_{old}	$B_{y,savings,i,j}$
	Tons			Tons
1	0.83	34.23%	0.1	2.01
2	0.83	33.89%	0.1	1.98
3	0.83	33.55%	0.1	1.95
4	0.83	33.22%	0.1	1.92
5	0.83	32.89%	0.1	1.90
6	0.83	32.56%	0.1	1.87

7	0.83	32.23%	0.1	1.84
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For the state of **Uttar-Pradesh**

Year (y)	$B_{y=1,new,i,survey}$	$\eta_{new,y,i,j}$	η_{old}	$B_{y,savings,i,j}$
	Tons			Tons
1	1.43	34.23%	0.1	3.48
2	1.43	33.89%	0.1	3.43
3	1.43	33.55%	0.1	3.38
4	1.43	33.22%	0.1	3.33
5	1.43	32.89%	0.1	3.28
6	1.43	32.56%	0.1	3.24
7	1.43	32.23%	0.1	3.19

Determination of f_{NRB} value:

The fraction of woody biomass (fuel wood) that can be established as non-renewable is given by:

$$f_{NRB} = \frac{NRB}{NRB + RB}$$

Where:

f_{NRB} = Fraction of non-renewable biomass in the applicable area in the relevant period (fraction or %)

NRB = Quantity of non-renewable biomass consumed in the applicable area in the relevant period (tonnes)

RB = Quantity of renewable biomass that is available on a sustainable basis in the applicable area in the relevant period (tonnes)

Commercial use of woody biomass (fuel wood) for non-energy purposes (such as building or furniture) that is derived from forests or other land areas in the relevant area (tonnes)

$$NRB = H - RB$$

Where:

H = Total consumption of woody biomass (fuel wood) in the applicable area in the relevant period (tonnes)

The following equation accounts for all consumption within the relevant area to determine the overall consumption of woody biomass (fuel wood) (H).

$$H = HW \times N + CE + NE$$

Where:

HW = Average consumption of wood fuel per household, including fuelwood and charcoal, in the applicable area in the relevant period (tonnes//household)

N = Number of households consuming wood fuel within the applicable area in the relevant period (number)

CE = Commercial woody biomass (fuel wood) consumption for energy applications (e.g. commercial, industrial or institutional uses of woody biomass (fuel wood) in ovens, boilers etc.) that are extracted from forests or other land areas in the applicable area in the relevant period (tonnes)

NE = Commercial woody biomass (fuel wood) consumption for non-energy applications (e.g. construction, furniture) that are extracted from forests or other land areas in the applicable area in the relevant period (tonnes)

Procedure to estimate the quantity of renewable biomass available (RB):

$$RB = \sum (MAI_{forest,i} \times (F_{forest,i} - P_{forest,i})) + \sum (MAI_{other,i} \times (F_{other,i} - P_{other,i}))$$

Where:

$MAI_{forest,i}$	Mean Annual Increment of woody biomass growth per hectare in subcategory i of forest areas in the relevant period (tonnes/ha/yr)
$F_{forest,i}$	Extent of forest in sub-category i in the relevant period (ha)
$P_{forest,i}$	Extent of non-accessible area (e.g. protected area where extraction of wood is prohibited, geographically remote area) within forest areas (in subcategory i) in the relevant period (ha)

$MAI_{other,i}$	Mean Annual Increment of woody biomass growth per hectare in subcategory i of other land areas in the relevant period (tonnes/ha/yr)
$F_{other,i}$	Extent of other land in sub-category i in the relevant period (ha)
$P_{other,i}$	Extent of non-accessible area (e.g. protected area where extraction of wood is prohibited, geographically remote area) within other land areas (in sub-category i) in the relevant period (ha) i = Sub-category i of forest areas and other land areas

Input values used for state wise estimation of fuel wood consumption

Estimation of total consumption of woody biomass (H)

Fuel Wood Consumption based on secondary literature ⁷	https://fsi.nic.in/cover_2011/chapter7.pdf
<p>In accordance to paragraph 13 of Tool 30 household fuel wood consumption can be considered based total household wood fuel consumption based on official statistics in case disaggregated values for <i>HW</i> (Average consumption of wood fuel per household) and <i>N</i> (Number of households consuming wood fuel within the applicable area) separately. State of Forest Report 2011 published by Forest survey of India (a subsidiary of MoEFCC, GoI) is the latest published literature outlining the said information in regard to fuel wood demand, therefore the said value is considered for estimation of fNRB in accordance to paragraph 10 of the Tool that allows different vintage in case of unavailability of data/information.</p> <p>Although disaggregated data of <i>HW</i> and <i>N</i> were not available separately, but “Number of households consuming wood fuel within the applicable area” were estimated from different secondary literature source and methodology default of per capita firewood consumption were used to estimate the total fuel wood demand. Since the estimated value of fire wood/ firewood consumption of the states were found to be higher than the wood consumption figure represented in the secondary literature the value obtained from the secondary statistics is being conservatively considered.</p>	
Commercial wood consumption ⁸	https://fsi.nic.in/cover_2011/chapter7.pdf
<p>In accordance to paragraph 13 of Tool 30 commercial wood demand is obtained from State of Forest Report 2011 published by Forest survey of India (a subsidiary of MoEFCC, GoI). Since the said version/volume of the report is the latest published literature outlining the said information in regard to commercial fuel wood demand therefore the said value is considered for estimation of fNRB in accordance to paragraph 10 of the Tool that allows different vintage in case of unavailability of data/information.</p>	

⁷ Household firewood consumption were also estimated based on the percentage of population using fire wood, total number of rural households and methodology default of per capita firewood consumption. Since the estimated value of fire wood/ firewood consumption of 19.72 million tonnes/yr is higher than the wood consumption figure represented in the secondary literature the same is being conservatively considered.

⁸ Details of category wise commercial wood consumption is presented in the fNRB estimation sheet.

Consumption of small timber and bamboo	https://fsi.nic.in/isfr19/vol1/chapter10.pdf
<p>In accordance to paragraph 13 of Tool 30 the value of consumption of small timber and bamboo (commercial wood demand) is obtained from State of Forest Report 2019 published by Forest survey of India (a subsidiary of MoEFCC, GoI). Since the said version/volume of the report is the latest published literature outlining the said information in regard to commercial fuel wood demand therefore the said value is considered for estimation of fNRB in accordance to paragraph 10 of the Tool that allows different vintage in case of unavailability of data/information.</p>	

Input Value for estimation of Renewable biomass

Parameters	Source
Mean Annual Increment of above ground biomass of Indian Forest	<p>The mean annual increment of India Forest as published by Government of Tamil Nadu/29/ (which also outlines the average value for India forest is considered. Since the value considered is the publicly available national statistics the same is considered for estimation of fNRB. The conservativeness of the data is crosschecked from the reference literature/29/ by “Asia Pacific Forestry Sector Outlook Study-II” The Ministry of Environment and Forests Government of India also outlines the mean annual increment (MAI) of India’s forests is assessed to be less than 0.5 m³/hectare/year. PP has also adhered to a QA/QC procedure in line with Table 5 of TOOL 30. A comparison of values with FAO and IPCC defaults was attempted, but the following observations were made:</p> <p>The Global Forest Resources Assessment 2000 by FAO (Table 149) lists only the percentage distribution of forest types by country and does not provide sufficient data for effective conclusions about MAI, making it unsuitable for</p>

⁹ [FAO Global Forest Resources Assessment 2000 by the FAO for “Distribution of total forest area by ecological zone” \(Table 14\)](#)

	comparison. The MAI values listed for above-ground biomass growth rates in the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories ¹⁰ (Above-ground biomass growth rates for different ecological zones) pertain to the Asia region as a whole, rather than specifically to India. Hence, a direct comparison with Indian government data was not possible
Density	Sourced from FAO
Mean Annual Increment of woody biomass growth per hectare in subcategory i of forest areas in the relevant period	Calculated
Mean Annual Increment of woody biomass growth per hectare in subcategory i of other land areas in the relevant period	Calculated
Recorded Forest Area ¹¹	State of Forest Report 2021 (most recent publication)
Reserved Forest ¹²	State of Forest Report 2021 (most recent publication)
Protected Forest ¹³	State of Forest Report 2021 (most recent publication)
% of Recorded Forest Area under Reserved Forest	Calculated
% of Recorded Forest Area under Protected Forest	Calculated
Extent of forest ¹⁴	State of Forest Report 2021 (most recent publication)

¹⁰ https://www.ipcc-nggip.iges.or.jp/public/2019rf/pdf/4_Volume4/19R_V4_Ch04_Forest%20Land.pdf

¹¹ <https://fsi.nic.in/isfr-2021/chapter-1.pdf>

¹² <https://fsi.nic.in/isfr-2021/chapter-1.pdf>

¹³ <https://fsi.nic.in/isfr-2021/chapter-1.pdf>

¹⁴ <https://fsi.nic.in/isfr-2021/chapter-13.pdf>

Area under open forest ¹⁵¹⁶	State of Forest Report 2021 (most recent publication)
Extent of Non-Accessible Forest ¹⁷	State of Forest Report 2021 (most recent publication)
<i>Extent of other land</i>	State of Forest Report 2021 (most recent publication)
<i>Extent of non-accessible area</i>	

As there are no other publicly available literature outlining the value of fNRB for the states of Bihar, Chhattisgarh, Dadra & Nagar Haveli, Gujarat, Jharkhand, Maharashtra, Odisha, Rajasthan and Uttar Pradesh. PP has made comparison of fNRB with the ICS registered projects under VERRA. Thus, acceptable to VVB. The same are given below

State wise fNRB estimated in accordance to version 4 of Tool 30: Calculation of the fraction of non-renewable Biomass is presented in the table below:

Sr.	State	fNRB
1	Bihar	97.32%
2	Chhattisgarh	72.38%
3	Dadra & Nagar Haveli	89.62%
4	Gujarat	95.24%
5	Jharkhand	84.70%
6	Maharashtra	90.05%
7	Odisha	86.58%
8	Rajasthan	96.14%
9	Uttar Pradesh	97.42%

Comparison of the calculated value against scientific literature

Delineation of project boundary for fNRB estimation

¹⁵ <https://fsi.nic.in/isfr-2021/chapter-13.pdf>

¹⁶ Although open forest area is classified under Recorded Forest of which 65.36% are reserve forest and 32.84% are protected forest but considering the canopy density of open forest between 10-40% it is considered that open forest is subjected to anthropogenic deforestation and therefore not considered as inaccessible

¹⁷ <https://fsi.nic.in/isfr-2021/chapter-13.pdf>

Fraction of woody biomass established as non-renewable is estimated in accordance with guidance stipulated under Tool 30. The basis of estimation of the fraction of non-renewable biomass includes estimation of the proportion of the biomass consumed that have not been sustainably extracted/harvested. It's worthwhile to note that fuel wood consumption (*Bošković, Chakravorty, Pelli, & Risch, January 2023*) are the major drivers of deforestation in India and are result of unsustainable extraction/harvest. The consideration of the subnational/ state boundary for estimation of f_{NRB} is based on the delineation of forest boundary by Government of India for the purpose of regulation and conservation of the forest. In addition, following justification are also outlined to establish the consideration of subnational boundary for estimation of f_{NRB} .

1. The ecological conditions differ at the subnational level in India resulting in difference in the mean-annual increment/ growth of wood biomass within and outside forest area resulting in the difference of the sustainably extraction potential of woody biomass across a defined geography. This is also justified by the fact the availability of the land area under forest and for trees outside forest differs across state resulting in the difference of the sustainably extraction potential of woody biomass to cater the local demand of wood.
2. The “forest” although on Concurrent list of Indian Constitutions its delineation/ boundary is defined at a subnational level. As the regulatory provision of Forest Conservation Act 1980 and Forest Conservation Rules 2003 allowing wood harvest are supervised by the State Forest Department, it does not allow cross boundary wood extraction/harvest and therefore the state boundary is considered for estimation of the supply provision.
3. The regulatory provision as stipulated under “The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006” allows collection of NTFP including firewood for traditional forest dwellers only , thereby restricting the forest rights locally without provision of cross boundary collection.
4. Since most of the woody biomass used as fuel wood (mostly at the village and peri urban area) are collected locally therefore the state/subnational boundary is most appropriate for estimation of fuel wood demand and supply.

Also, in accordance with the para 6 b of tool 30, the selection of project area is allowed (the country/region or the project area (hereinafter referred as the applicable area)), thus consideration of state for calculation of f_{NRB} is found to be appropriate.

Comparison of the calculated value against scientific literature

f_{NRB} is estimated as ratio of the Quantity of non-renewable biomass (NRB) consumed in the applicable area and summation of the quantity of non-renewable biomass (NRB) and quantity of renewable biomass (RB). NRB as specified under the tool is estimated as difference of total consumption of woody biomass (H) and quantity of renewable biomass. In accordance to paragraph 6 of tool 30 the section below compares and analyse the calculated values against the values for f_{NRB} reported in relevant scientific literature and justify the differences

1. Total Wood Consumption

- a. The entire rationale of f_{NRB} is developed around the unsustainable extraction/ harvest of wood for fuels and for commercial applications. As per the relevant scientific literature (Bailis, Drigo, & Ghilardi, 2015) referred to under Tool 30, the f_{NRB} or rather NRB (as stated in the report) is estimated based on the **wood fuel demand** (only) considering 2009 as base year¹⁸. In accordance

¹⁸ Pg 2 of the relevant literature

to equation 3 of Tool 30 the total wood demand is to be estimated as sum of average consumption of wood fuel per household, including fuelwood and charcoal, commercial woody biomass consumption for energy applications and commercial woody biomass consumption for non-energy applications and not only the demand of wood fuel as has been considered in the literature. Since estimate of f_{NRB} is directly proportional to quantity of wood consumed the consideration of wood fuel only might have resulted in lower f_{NRB} value presented in the literature in compared to that have been estimated for the purpose of estimation of GHG emission avoidance. The table below presents wood consumption in the state of Bihar based on secondary information.

Consumer type	Bihar		Chhattisgarh		Dadra & Nagar Haveli	
	Cumulative Consumption	Percentage of total consumption	Cumulative Consumption	Percentage of total consumption	Cumulative Consumption	Percentage of total consumption
Domestic	11.48 million Tonnes ¹⁹	94.55%	4.37 million Tonnes ²⁰	86.98%	0.05 million Tonnes ²¹	84.86%
Commercial Wood Consumption	0.66 million Tonnes ²²	5.45%	0.65 million Tonnes ²³	13.02%	0 million Tonnes	0 %
Small timber by Forest Infringe	-	-	-	-	0.006 million Tonnes ²⁴	9.87%
Bamboo collection by million tonnes	-	-	-	-	0.003 million Tonnes ²⁵	5.26%

¹⁹ https://fsi.nic.in/cover_2011/chapter7.pdf

²⁰ https://fsi.nic.in/cover_2011/chapter7.pdf

²¹ Estimated based on Tool 30

²² https://fsi.nic.in/cover_2011/chapter7.pdf

²³ https://fsi.nic.in/cover_2011/chapter7.pdf

²⁴ Estimated based on the small timber consumption value obtained from <https://fsi.nic.in/isfr19/vol1/chapter10.pdf> and wood density of specific species sourced from <https://www.fao.org/3/w4095e/w4095e0c.htm#TopOfPage>

²⁵ <https://fsi.nic.in/isfr19/vol1/chapter10.pdf>

Consumer type	Gujarat		Jharkhand		Maharashtra	
	Cumulative Consumption	Percentage of total consumption	Cumulative Consumption	Percentage of total consumption	Cumulative Consumption	Percentage of total consumption
Domestic	9.73 million Tonnes ²⁶	88.13%	4.84 million Tonnes ²⁷	94.44%	9.51 million Tonnes ²⁸	75.22%
Commercial Wood Consumption	1.31 million Tonnes ²⁹	11.87%	0.28 million Tonnes ³⁰	45.56%	3.13 million Tonnes ³¹	24.78%

Consumer type	Odisha		Rajasthan		Uttarpradesh	
	Cumulative Consumption	Percentage of total consumption	Cumulative Consumption	Percentage of total consumption	Cumulative Consumption	Percentage of total consumption
Domestic	8.89 million Tonnes ³²	95.77%	18.78 million Tonnes ³³	97.08%	19.06 million Tonnes ³⁴	85.82%
Commercial Wood Consumption	0.39 million Tonnes ³⁵	4.23%	0.68 million Tonnes ³⁶	3.54%	3.14 million Tonnes ³⁷	14.18%

²⁶ https://fsi.nic.in/cover_2011/chapter7.pdf

²⁷ https://fsi.nic.in/cover_2011/chapter7.pdf

²⁸ https://fsi.nic.in/cover_2011/chapter7.pdf

²⁹ https://fsi.nic.in/cover_2011/chapter7.pdf

³⁰ https://fsi.nic.in/cover_2011/chapter7.pdf

³¹ https://fsi.nic.in/cover_2011/chapter7.pdf

³² https://fsi.nic.in/cover_2011/chapter7.pdf

³³ https://fsi.nic.in/cover_2011/chapter7.pdf

³⁴ https://fsi.nic.in/cover_2011/chapter7.pdf

³⁵ https://fsi.nic.in/cover_2011/chapter7.pdf

³⁶ https://fsi.nic.in/cover_2011/chapter7.pdf

³⁷ https://fsi.nic.in/cover_2011/chapter7.pdf

- b. The total consumption of woody biomass in the states of Bihar, Chhattisgarh, Dadra & Nagar Haveli, Gujarat, Jharkhand, Maharashtra, Odisha, Rajasthan and Uttar Pradesh is conservatively considered from report published by MoEFCC (Ministry of Environment, forest and Climate Change, Government of India) in 2011³⁸ (MoEFCC, 2011) is more recent data in compared to that used in the referred literature (2009 data³⁹ extracted from wood fuel demand available from national and sub-national studies supplemented by data from the Food and Agriculture Organization (FAO), International Energy Agency (IEA), and United Nations (UN)). Since the publication of the wood demand by MoEFCC (Official statistics) is line with the provision of Data / Parameter table 1 of Tool 30. Therefore, consideration of the information related to wood consumption is deemed to be appropriate.
- c. Moreover, cross verification has been made to assess the wood fuel demand (83% of the cumulative wood demand)⁴⁰ states of Bihar, Chhattisgarh, Dadra & Nagar Haveli, Gujarat, Jharkhand, Maharashtra, Odisha, Rajasthan and Uttar Pradesh using alternate approach as specified under Equation 3 of the Tool 30 and the MoEFCC estimated value of fuel wood demand for the states of Bihar, Chhattisgarh, Dadra & Nagar Haveli, Gujarat, Jharkhand, Maharashtra, Odisha, Rajasthan and Uttar Pradesh are found to be more conservative and used for the estimation of the total consumption of woody biomass.

State of Bihar

Parameters	Value	Unit	Source	
Total Population	10409 9452		Census 2011	<a href="https://censusindia.gov.in/census.website/d
ata/census-tables">https://censusindia.gov.in/census.website/d ata/census-tables
Rural Population	92341 436		Census 2011	<a href="https://censusindia.gov.in/census.website/d
ata/census-tables">https://censusindia.gov.in/census.website/d ata/census-tables
Total Household	18913 565		Census 2011	<a href="https://censusindia.gov.in/census.website/d
ata/census-tables">https://censusindia.gov.in/census.website/d ata/census-tables
Rural Household	16862 940		Census 2011	<a href="https://censusindia.gov.in/census.website/d
ata/census-tables">https://censusindia.gov.in/census.website/d ata/census-tables
Persons/household (Rural)	5.48			
Rural Household using firewood	71.1%			NSS Report No. 558: Household Consumption of Various Goods and Services in India, 2011- 12 <a href="https://www.mospi.gov.in/sites/default/files/
publication_reports/Report_no558_rou68_30
june14.pdf">https://www.mospi.gov.in/sites/default/files/ publication_reports/Report_no558_rou68_30 june14.pdf
Default per- capita firewood usage	0.4	ton/capita		Tools for FNRB calculation

³⁸ India State of Forest Report. https://fsi.nic.in/cover_2011/chapter7.pdf.

³⁹ Pg 2 of the referred literature

⁴⁰ Against wood fuel demand specified in the MoEFCC report

Parameters	Value	Unit	Source	
Rural Household firewood usage	2.190	tonne/annum		
Total Firewood usage (rural)	26.26	million tonne		
Total Firewood usage	26.26	million tonne		
Fuel Wood Consumption based on MoEFCC Source (and considered for estimation of fNRB) as the value of fuel wood consumption from MoEFCC source is more conservative	11.48	million tonne	FSI 2011 report, Chapter 7, Table 7.4.7	https://fsi.nic.in/cover_2011/chapter7.pdf

State of Dadra & Nagar Haveli

Parameters	Value	Unit	Source	
Total Population	343709		Census 2011	https://censusindia.gov.in/census.website/dadra/census-tables
Rural Population	183114		Census 2011	https://censusindia.gov.in/census.website/dadra/census-tables
Total Household	76458		Census 2011	https://censusindia.gov.in/census.website/dadra/census-tables
Rural Household	36094		Census 2011	https://censusindia.gov.in/census.website/dadra/census-tables
Persons/household (Rural)	5.07			
Rural Household using firewood	74.9%			NSS Report No. 558: Household Consumption of Various Goods and Services in India, 2011-12 https://www.mospi.gov.in/sites/default/files/publication_reports/Report_no558_rou68_30june14.pdf
Default per -capita firewood usage	0.4	ton/capita	Tools for FNRB calculation	
Rural Household firewood usage	2.029	tonne/annum		

Total Firewood usage (rural)	0.05	million tonne		
Total Firewood usage	0.05	million tonne		
Fuel Wood Consumption	0.05	million tonne	Since MoEFCC value of Fire wood consumption is not available therefore estimated value of firewood consumption is considered for fNRB estimation	

State of Gujarat

Parameters	Value	Unit	Source	
Total Population	60439 692		Census 2011	https://censusindia.gov.in/census.website/data/census-tables
Rural Population	34694 609		Census 2011	https://censusindia.gov.in/census.website/data/census-tables
Total Household	12248 428		Census 2011	https://censusindia.gov.in/census.website/data/census-tables
Rural Household	67735 58		Census 2011	https://censusindia.gov.in/census.website/data/census-tables
Persons/household (Rural)	5.12			
Rural Household using firewood	89.0%			NSS Report No. 558: Household Consumption of Various Goods and Services in India, 2011-12 https://www.mospi.gov.in/sites/default/files/publication_reports/Report_no558_rou68_30june14.pdf
Default per- capita firewood usage	0.4	ton/capita		Tools for FNRB calculation
Rural Household firewood usage	2.049	tonne/annum		
Total Firewood usage (rural)	12.35	million tonne		
Total Firewood usage	12.35	million tonne		
Fuel Wood Consumption based on MoEFCC Source (and considered for estimation of fNRB) as the value of fuel wood consumption from MoEFCC source is more conservative	9.73	million tonne	FSI 2011 report, Chapter 7, Table 7.4.7	https://fsi.nic.in/cover_2011/chapter7.pdf

State of Chhattisgarh

Parameters	Value	Unit	Source	
Total Population	25545198		Census 2011	https://censusindia.gov.in/census.website/data/census-tables
Rural Population	19607961		Census 2011	https://censusindia.gov.in/census.website/data/census-tables
Total Household	5650724		Census 2011	https://censusindia.gov.in/census.website/data/census-tables
Rural Household	4365568		Census 2011	https://censusindia.gov.in/census.website/data/census-tables
Persons/household (Rural)	4.49			
Rural Household using firewood	96.9%			NSS Report No. 558: Household Consumption of Various Goods and Services in India, 2011-12 https://www.mospi.gov.in/sites/default/files/publication_reports/Report_no558_rou68_30june14.pdf
Default per- capita firewood usage	0.4	ton/capita	Tools for FNRB calculation	
Rural Household firewood usage	1.797	tonne/annum		
Total Firewood usage (rural)	7.60	million tonne		
Total Firewood usage	7.60	million tonne		
Fuel Wood Consumption based on MoEFCC Source (and considered for estimation of fNRB) as the value of fuel wood consumption from MoEFCC source is more conservative	4.37	million tonne	FSI 2011 report, Chapter 7, Table 7.4.7	https://fsi.nic.in/cover_2011/chapter7.pdf

State of Jharkhand

Parameters	Value	Unit	Source	
Total Population	32988134		Census 2011	https://censusindia.gov.in/census.website/data/census-tables
Rural Population	25055073		Census 2011	https://censusindia.gov.in/census.website/data/census-tables
Total Household	6254781		Census 2011	https://censusindia.gov.in/census.website/data/census-tables
Rural Household	4729369		Census 2011	https://censusindia.gov.in/census.website/data/census-tables
Persons/household (Rural)	5.30			
Rural Household using firewood	88.9%			NSS Report No. 558: Household Consumption of Various Goods and Services in India, 2011-12- https://www.mospi.gov.in/sites/default/files/publication_reports/Report_no558_ro_u68_30june14.pdf
Default per- capita firewood usage	0.4	ton/capita		Tools for FNRB calculation
Rural Household firewood usage	2.119	tonne/annum		
Total Firewood usage (rural)	8.91	million tonne		
Total Firewood usage	8.91	million tonne		
Fuel Wood Consumption based on MoEFCC Source (and considered for estimation of fNRB) as the value of fuel wood consumption from MoEFCC source is more conservative	4.84	million tonne	FSI 2011 report, Chapter 7, Table 7.4.7	https://fsi.nic.in/cover_2011/chapter7.pdf

State of Maharashtra

Parameters	Value	Unit	Source	
Total Population	112374333		Census 2011	https://censusindia.gov.in/census.website/data/census-tables
Rural Population	61556074		Census 2011	https://censusindia.gov.in/census.website/data/census-tables

Total Household	24421519		Census 2011	https://censusindia.gov.in/census.website/data/census-tables
Rural Household	13214738		Census 2011	https://censusindia.gov.in/census.website/data/census-tables
Persons/household (Rural)	4.66			
Rural Household using firewood	77.9%			NSS Report No. 558: Household Consumption of Various Goods and Services in India, 2011-12- https://www.mospi.gov.in/sites/default/files/publication_reports/Report_no558_rou68_30june14.pdf
Default per - capita firewood usage	0.4	ton/capita		Tools for FNRB calculation
Rural Household firewood usage	1.863	tonne/annum		
Total Firewood usage (rural)	19.18	million tonne		
Total Firewood usage	19.18	million tonne		
Fuel Wood Consumption based on MoEFCC Source (and considered for estimation of fNRB) as the value of fuel wood consumption from MoEFCC source is more conservative	9.51	million tonne	FSI 2011 report, Chapter 7, Table 7.4.7	https://fsi.nic.in/cover_2011/chapter7.pdf

State of Odisha

Parameters	Value	Unit	Source	
Total Population	41974218		Census 2011	https://censusindia.gov.in/census.website/data/census-tables
Rural Population	34970562		Census 2011	https://censusindia.gov.in/census.website/data/census-tables
Total Household	9637820		Census 2011	https://censusindia.gov.in/census.website/data/census-tables
Rural Household	8089987		Census 2011	https://censusindia.gov.in/census.website/data/census-tables
Persons/household (Rural)	4.32			

Parameters	Value	Unit	Source	
Rural Household using firewood	92.0%			NSS Report No. 558: Household Consumption of Various Goods and Services in India, 2011-12- https://www.mospi.gov.in/sites/default/files/publication_reports/Report_no_558_rou68_30june14.pdf
Default per- capita firewood usage	0.4	ton/capita		Tools for FNRB calculation
Rural Household firewood usage	1.729	tonne/annum		
Total Firewood usage (rural)	12.87	million tonne		
Total Firewood usage	12.87	million tonne		
Fuel Wood Consumption based on MoEFCC Source (and considered for estimation of fNRB) as the value of fuel wood consumption from MoEFCC source is more conservative	8.89	million tonne	FSI 2011 report, Chapter 7, Table 7.4.7	https://fsi.nic.in/cover_2011/chapter_7.pdf

State of Rajasthan

Parameters	Value	Unit	Source	
Total Population	68548437		Census 2011	https://censusindia.gov.in/census.website/data/census-tables
Rural Population	51500352		Census 2011	https://censusindia.gov.in/census.website/data/census-tables
Total Household	12711146		Census 2011	https://censusindia.gov.in/census.website/data/census-tables
Rural Household	9494903		Census 2011	https://censusindia.gov.in/census.website/data/census-tables
Persons/household (Rural)	5.42			
Rural Household using firewood	93.4%			NSS Report No. 558: Household Consumption of Various Goods and Services in India, 2011-12

Parameters	Value	Unit	Source	
				https://www.mospi.gov.in/sites/default/files/publication_reports/Report_no_558_rou68_30june14.pdf
Default per- capita firewood usage	0.4	ton/capita		Tools for FNRB calculation
Rural Household firewood usage	2.170	tonne/annum		
Total Firewood usage (rural)	19.24	million tonne		
Total Firewood usage	19.24	million tonne		
Fuel Wood Consumption based on MoEFCC Source (and considered for estimation of fNRB) as the value of fuel wood consumption from MoEFCC source is more conservative	18.78	million tonne	FSI 2011 report, Chapter 7, Table 7.4.7	https://fsi.nic.in/cover_2011/chapter_7.pdf

State of Uttar Pradesh

Parameters	Value	Unit	Source	
Total Population	199812341		Census 2011	https://censusindia.gov.in/census.website/data/census-tables
Rural Population	155317278		Census 2011	https://censusindia.gov.in/census.website/data/census-tables
Total Household	33448035		Census 2011	https://censusindia.gov.in/census.website/data/census-tables
Rural Household	25685942		Census 2011	https://censusindia.gov.in/census.website/data/census-tables
Persons/household (Rural)	6.05			
Rural Household using firewood	87.1%			NSS Report No. 558: Household Consumption of Various Goods and Services in India, 2011-12 https://www.mospi.gov.in/sites/default/files/publication_reports/Report_no_558_rou68_30june14.pdf

Parameters	Value	Unit	Source	
Default per- capita firewood usage	0.4	ton/capit a		Tools for FNRB calculation
Rural Household firewood usage	2.419	tonne/an num		
Total Firewood usage (rural)	54.11	million tonne		
Total Firewood usage	54.11	million tonne		
Fuel Wood Consumption based on MoEFCC Source (and considered for estimation of fNRB) as the value of fuel wood consumption from MoEFCC source is more conservative	19.06	million tonne	FSI 2011 report, Chapter 7, Table 7.4.7	https://fsi.nic.in/cover_2011/chapter_7.pdf

Therefore, assessment team confirms that the wood consumption considered for estimation of fNRB are more recent, conservative and authentic as published by Govt of India entitled agency available in public domain.

2. Renewable Biomass

In accordance to Paragraph 19, Equation 4 of Tool 30 renewable biomass (RB) available in the applicable area is estimated as factor of annual Increment of woody biomass in forest and non-forest area. The Renewable biomass component as estimated under the project activity considers plantation across both forest and non -forest area published by MoEFCC in 2021 and mean annual increment of different Indian forest type published for national level. On the other hand, the renewable biomass component as estimated in the referred literature is based on the satellite image of a particular locations during 2009.

The quantum of renewable biomass available in a particular geography is a factor of deforestation. The status of deforestation in India as articulated below through review of secondary literature is in contradiction to referred literature (Bailis, Drigo, & Ghilardi, 2015) that highlight the afforestation aspects of state forest in India.

In accordance to Global Forest Watch⁴¹, India lost 393 kha of humid primary forest between 2002-2022 making up 18% of its total tree cover loss in the same time period and equivalent to decrease in total area of humid primary forest in India by 3.9%. Project Participant has also presented year wise deforestation on page 64 of Joint PD & MR.

The deforestation also includes loss of 2.19 Mha of tree cover, equivalent to a 5.6% decrease in tree cover since 2000. The deforestation in the country is also confirmed by report published by “Down to

⁴¹ <https://www.globalforestwatch.org/dashboards/country/IND/?category=undefined>

Earth” which outlines a deforestation of 668,400 hectares (ha), between 2015 to 2020 (2nd country after Brazil)⁴²⁴³. The deforestation is inordinately high when compared to the 384,000 ha of forests between 1990 and 2000.

3. Difference in AGB

AGB/ Above Ground Biomass is the key component for estimation of Renewable biomass in the referred literature and clearly articulate the difference with the nationally published statistics

Referred Literature	India State of forest Report 2021
15067 million tones	2319 million tonnes

Since RB is inversely proportional to fNRB estimate therefore higher RB is resulting in lower fNRB as depicted in the referred literature.

4. Approach of Estimating fNRB

In accordance to the referred literature recent maps of land cover and ecological zones are being assigned an AGB stock using three types of sources 1) AGB distribution maps, 2) geo-referenced field plots, and 3) forest inventories from known locations for specific forest types where AGB distribution was derived from different datasets. To accommodate disagreements in the datasets, woody components not typically used for wood fuels (twigs, leaves, and stumps), to build a map of “Dendro-energy” biomass (DEB) stock are subtracted. The wood fuel supply is then estimated as the “mean annual increment” (MAI) of DEB, which is modeled via a functional relationship between ~2,800 spatially explicit field observations of MAI and corresponding AGB. Land cover change is accommodated by estimating the amount of DEB produced by deforestation and afforestation processes based on data from FAO using data from Forest Monitoring for Action (FORMA). Such approach although a peer-reviewed is not in line with paragraph 19 that outlines the approach for estimation of quantity of renewable biomass.

Conclusion

VVB concludes that the above justification clearly articulates the appropriateness of the fNRB estimate in line with the Tool 30. PP has used most recent data available for calculation of fNRB which is in line with para 10 of tool 30 which says “10. In the case of ex ante calculation of fNRB, the parameter fNRB shall be estimated using the most recent historical year for which data is available”

State wise AGB⁴⁴(Source: Chapter 13, State of Forest Report 2021, by the Forest Survey of India, an organisation under the Ministry of Environment, Forest and Climate Change (MoEFCC), Govt of India)

⁴² <https://www.downtoearth.org.in/news/wildlife-biodiversity/india-lost-668-400-ha-forests-in-5-years-2nd-highest-globally-report-88337>

⁴³ <https://indiacr.in/india-has-lost-around-668400-hectares-of-forestry-to-deforestation-2nd-highest-in-the-world/>

⁴⁴ Above Ground Biomass

State/UT	AGB (million Tonnes)
Andhra Pradesh	63.951
Arunachal	340.351
Assam	87.07
Bihar	14.743
Chhattisgarh	152.714
Delhi	0.263
Goa	8.863
Gujrat	28.602
Haryana	2.326
Himachal Pradesh	114.269
Jharkhand	51.017
Karnataka	122.741
Kerala	61.802
Madhya Pradesh	171.587
Maharashtra	137.831
Manipur	47.59
Meghalaya	55.241
Mizoram	48.157
Nagaland	39.339
Odisha	131.015
Punjab	3.42
Rajasthan	26.714
Sikkim	18.024
Tamil Nadu	60.459
Telangana	44.413
Tripura	24.349

State/UT	AGB (million Tonnes)
UP	32.543
Uttarakhand	159.674
WB	45.365
Andaman	47.56
Chandigarh	0.047
Dadra NH	0.558
J&K	163.897
Ladakh	13.293
Lakshadweep	0.046
Puducherry	0.076
-	2319.91

VVB has also cross checked the analysis with other scientific literature related to the same type of project activities registered under VERRA the states where this project activity has been implemented. The same is given below.

Project Reference	State	fNRB
Project ID- 3240	Odisha	87.14%
	Jharkhand	91.30%
Project ID- 3160	Jharkhand	95.00%
	Uttar Pradesh	95.00%
	Odisha	91.00%
Project ID- 3158	Chhastisgarh	92.00%
	Bihar	99.00%
	Odisha	91.00%
Project ID- 3007	Maharashtra	91.30%

The value of fNRB in the registered project activities are higher than/comparable with the estimated fNRB value for this project activity, Thus, in the VVB opinion, making comparison with the similar registered projects are appropriate and acceptable to VVB.

Further, the resulting fNRB values compared with with those registered in project VCS 2942 and conservatively adopted the fNRB values from VCS 2942 for the states of Bihar, Chhattisgarh, Gujarat, and Rajasthan. Revised fNRB values were used for the remaining states (Maharashtra, Dadra NH, Jharkhand, and Uttar Pradesh). Consequently, the Joint PD& MR, estimated ER sheet, and actual ER sheet were revised. The comparison with VCS 2942 and the final fNRB values are provided below:

State	Recalculated fNRB	fNRB values from VCS 2942	Conservative fNRB
Dadra NH	89.62%	-	89.62%
Jharkhand	84.70%	-	84.70%
UP	97.42%	-	97.42%
Bihar	97.32%	95.85%	95.85%
Chhattisgarh	72.38%	67.30%	67.30%
Gujarat	95.24%	92.31%	92.31%
Maharashtra	90.05%	90.38%	90.05%
Odissa	86.58%	-	86.58%
Rajasthan	96.14%	91.38%	91.38%

Determination of emission reductions by ICS of year1 during year y

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

Where:

$$NCV_{wood\ fuel} = 0.0156 \text{ TJ/tonne}$$

$$f_{NRB,y} \text{ state wise vlaue estimated baove}$$

$$EF_{wf,CO_2} + EF_{wf,non\ CO_2} = 112 + 26.23 = 138.23 \text{ tCO}_2/\text{TJ}$$

Estimation of quantity of biomass saved for each project activity instances / single ICS

For the state of Bihar

Year (y)	$B_{y,savings,i,j}$	$NCV_{wood\ fuel}$	$f_{NRB,y}$	$EF_{wf,CO_2} + EF_{wf,non\ CO_2}$	$N_{y,i,j}$	$ER_{y,i,j}$
	Tons					Tons
1	3.39	0.0156	95.85%	138.23	151,764	1,009,584
2	3.34	0.0156	95.85%	138.23	151,764	995,322
3	3.29	0.0156	95.85%	138.23	151,764	981,203
4	3.25	0.0156	95.85%	138.23	151,764	967,225
5	3.20	0.0156	95.85%	138.23	151,764	953,387

6	3.15	0.0156	95.85%	138.23	151,764	939,687
7	3.11	0.0156	95.85%	138.23	151,764	926,124

For the state of **Chhattisgarh**

Year (y)	$B_{y,savings,i,j}$	$NCV_{wood\ fuel}$	$f_{NRB,y}$	$EF_{wf,CO2} + EF_{wf,non\ CO2}$	$N_{y,i,j}$	$ER_{y,i,j}$
	Tons					Tons
1	3.08	0.0156	67.30%	138.23	3,035	12,880
2	3.03	0.0156	67.30%	138.23	3,035	12,698
3	2.99	0.0156	67.30%	138.23	3,035	12,518
4	2.95	0.0156	67.30%	138.23	3,035	12,340
5	2.91	0.0156	67.30%	138.23	3,035	12,163
6	2.87	0.0156	67.30%	138.23	3,035	11,988
7	2.82	0.0156	67.30%	138.23	3,035	11,815

For the state of **Dadra & Nagar Haveli**

Year (y)	$B_{y,savings,i,j}$	$NCV_{wood\ fuel}$	$f_{NRB,y}$	$EF_{wf,CO2} + EF_{wf,non\ CO2}$	$N_{y,i,j}$	$ER_{y,i,j}$
	Tons					Tons
1	3.56	0.0156	89.62%	138.23	8,336	54,420
2	3.51	0.0156	89.62%	138.23	8,336	53,651
3	3.46	0.0156	89.62%	138.23	8,336	52,890
4	3.41	0.0156	89.62%	138.23	8,336	52,136
5	3.36	0.0156	89.62%	138.23	8,336	51,390
6	3.31	0.0156	89.62%	138.23	8,336	50,652
7	3.26	0.0156	89.62%	138.23	8,336	49,921

For the state of **Gujarat**

Year (y)	$B_{y,savings,i,j}$	$NCV_{wood\ fuel}$	$f_{NRB,y}$	$EF_{wf,CO2} + EF_{wf,non\ CO2}$	$N_{y,i,j}$	$ER_{y,i,j}$
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	Tons					Tons
1	3.39	0.0156	92.31%	138.23	54,607	349,847
2	3.34	0.0156	92.31%	138.23	54,607	344,905
3	3.29	0.0156	92.31%	138.23	54,607	340,012
4	3.25	0.0156	92.31%	138.23	54,607	335,169
5	3.20	0.0156	92.31%	138.23	54,607	330,373
6	3.15	0.0156	92.31%	138.23	54,607	325,626
7	3.11	0.0156	92.31%	138.23	54,607	320,926

For the state of **Jharkhand**

Year (y)	$B_{y,savings,i,j}$	$NCV_{wood\ fuel}$	$f_{NRB,y}$	$EF_{wf,CO2}$ + $EF_{wf,non\ CO2}$	$N_{y,i,j}$	$ER_{y,i,j}$
	Tons					Tons
1	2.97	0.0156	84.70%	138.23	6,715	34,629
2	2.93	0.0156	84.70%	138.23	6,715	34,139
3	2.89	0.0156	84.70%	138.23	6,715	33,655
4	2.85	0.0156	84.70%	138.23	6,715	33,176
5	2.81	0.0156	84.70%	138.23	6,715	32,701
6	2.77	0.0156	84.70%	138.23	6,715	32,231
7	2.73	0.0156	84.70%	138.23	6,715	31,766

For the state of **Maharashtra**

Year (y)	$B_{y,savings,i,j}$	$NCV_{wood\ fuel}$	$f_{NRB,y}$	$EF_{wf,CO2}$ + $EF_{wf,non\ CO2}$	$N_{y,i,j}$	$ER_{y,i,j}$
	Tons					Tons
1	3.24	0.0156	90.05%	138.23	6,162	36,801
2	3.19	0.0156	90.05%	138.23	6,162	36,281
3	3.15	0.0156	90.05%	138.23	6,162	35,767
4	3.10	0.0156	90.05%	138.23	6,162	35,257

5	3.06	0.0156	90.05%	138.23	6,162	35,257
6	3.01	0.0156	90.05%	138.23	6,162	34,253
7	2.97	0.0156	90.05%	138.23	6,162	33,759

For the state of Odisha

Year (y)	$B_{y,savings,i,j}$	$NCV_{wood\ fuel}$	$f_{NRB,y}$	$EF_{wf,CO2} + EF_{wf,non\ CO2}$	$N_{y,i,j}$	$ER_{y,i,j}$
	Tons					Tons
1	3.09	0.0156	86.58%	138.23	29,718	162,716
2	3.04	0.0156	86.58%	138.23	29,718	160,418
3	3.00	0.0156	86.58%	138.23	29,718	158,142
4	2.96	0.0156	86.58%	138.23	29,718	155,889
5	2.92	0.0156	86.58%	138.23	29,718	153,659
6	2.87	0.0156	86.58%	138.23	29,718	151,451
7	2.83	0.0156	86.58%	138.23	29,718	149,265

For the state of Rajasthan

Year (y)	$B_{y,savings,i,j}$	$NCV_{wood\ fuel}$	$f_{NRB,y}$	$EF_{wf,CO2} + EF_{wf,non\ CO2}$	$N_{y,i,j}$	$ER_{y,i,j}$
	Tons					Tons
1	2.01	0.0156	91.38%	138.23	80,004	300,726
2	1.98	0.0156	91.38%	138.23	80,004	296,478
3	1.95	0.0156	91.38%	138.23	80,004	292,272
4	1.92	0.0156	91.38%	138.23	80,004	288,108
5	1.90	0.0156	91.38%	138.23	80,004	283,986
6	1.87	0.0156	91.38%	138.23	80,004	279,906
7	1.84	0.0156	91.38%	138.23	80,004	275,866

For the state of Uttar Pradesh

Year (y)	$B_{y,savings,i,j}$	$NCV_{wood\ fuel}$	$f_{NRB,y}$	$EF_{wf,CO2} + EF_{wf,non\ CO2}$	$N_{y,i,j}$	$ER_{y,i,j}$
	Tons					Tons
1	3.48	0.0156	97.42%	138.23	58,556	406,246
2	3.43	0.0156	97.42%	138.23	58,556	400,507
3	3.38	0.0156	97.42%	138.23	58,556	394,826
4	3.33	0.0156	97.42%	138.23	58,556	389,201
5	3.28	0.0156	97.42%	138.23	58,556	383,633
6	3.24	0.0156	97.42%	138.23	58,556	378,120
7	3.19	0.0156	97.42%	138.23	58,556	372,663

Year	Estimated baseline emissions or removals (tCO _{2e})	Estimated project emissions or removals (tCO _{2e})	Estimated leakage emissions (tCO _{2e})	Estimated net GHG emission reductions or removals (tCO _{2e})
Year 2022-23(1-October-2022-30-September-2023)	2,367,849	0	0	2,367,849
Year 2023-24 (1-October-2023-30-September-2024)	2,334,399	0	0	2,334,399
Year 2024-25 (1-October-2024-30-September-2025)	2,301,285	0	0	2,301,285
Year 2025-26 (1-October-2025-30-September-2026)	2,268,501	0	0	2,268,501
Year 2026-27 (1-October-2026-30-September-2027)	2,236,045	0	0	2,236,045
Year 2027-28 (1-October-2027-30-September-2028)	2,203,914	0	0	2,203,914
Year 2028-29 (1-October-2028-30-September-2029)	2,172,105	0	0	2,172,105
Total estimated ERs	15,884,098	0	0	15,884,098
Total number of crediting years	7			
Average annual ERs	2,269,157	0	0	2,269,157

The assessment team certifies that the relevant tools and the applied methodology were used correctly to determine baseline emissions and net GHG emission reductions during the project crediting period.

3.4.7 Methodology Deviations

Not Applicable.

3.4.8 Monitoring Plan

The project uses VCS methodology, specifically VMR0006, Version 1.1, and in accordance with that approach, the following parameters will be monitored ex-post:

Parameters to be monitored are:

Parameter (s)	Units	Frequency	Description	Source of monitoring data
$N_{y,i,j}$	Proportion	Biennially (at least once in two years)	Number of project devices of type i and batch j operating during year y	Survey of a representative sample.
$B_{y=1,new,I,j,survey}$	Tonnes	Biennially (at least once in two years)	Number of project devices of type i and batch j operating during year y	Based on the monitoring survey,

The annual ICS survey shall be the source of the annual values of the monitoring parameter, as indicated in the Joint PD & MR. The annual survey data on functioning devices will be the foundation for the calculations of emission reductions. The evaluation team will examine it to confirm the results of the emission decrease.

The evaluation team affirms that thorough monitoring procedures, monitoring structure, management team, monitoring items, and monitoring functions have been amply proven based on the review of the Joint PD & MR^{1/}

All data will be electronically archived and maintained for 2 years post issuance.

3.5 Non-Permanence Risk Analysis

Since the present project activity is a non-AFLOU project, this section is not applicable as per the guidance of Verra.

4 VERIFICATION FINDINGS

4.1 Accuracy of GHG Emission Reduction and Removal Calculations

The following list includes the information and factors used to determine the removal and reduction of GHG emissions:

Ex-ante parameters (parameters having default values):

SI No	Parameter	Description	Value		Unit	Source
1.	f _{NRB,y}	Fraction of woody biomass (fuel wood) saved by the project activity during year y, that can be established as non-renewable biomass	State	fNRB	%	Fraction of non-renewable biomass is calculated as per the fNRB calculation TOOL30: Calculation of the fraction of non-renewable biomass ^{14/} in ER sheet tab "fNRB" ^{2/} . Further sources used to calculate fNRB in ER sheet have been verified from weblinks provided in the sheet and the evidences submitted. PP has referred State of Forest report (Forest Survey of India Ministry of Environment, Forest & Climate Change, GoI, 2019) ^{19/} . Assessment team found that the report is publicly available and the reference have been checked and found correct. Hence accepted.
			Bihar	95.85%		
			Chhattisgarh	67.30%		
			Dadra & Nagar Haveli	89.62%		
			Gujarat	92.31%		
			Jharkhand	84.70%%		
			Maharashtra	90.05%		
			Odisha	86.58%%		
			Rajasthan	91.38%		
			Uttar-Pradesh	97.42%		
2.	NCV _{wood fuel}	Net calorific value of the non-renewable woody biomass (fuel wood) that is substituted or reduced	0.0156		TJ/tonne	2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 2 Energy, Chapter 1 Introduction
3.	EF _{wf,CO2}	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
4.	EF _{wf,non CO2}	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 ^{20/}
5.	$\eta_{old,ij}$	The efficiency of baseline cookstove	0.1	Fraction	Methodology default value
6.	η_p	The efficiency of the project stove at the start of project activity	0.3642	Fraction	Manufacturer's specification, third party verified
7.	DF_n	Discount factor to account for efficiency loss of project cookstove per year of operation (fraction).	0.99	Fraction	Methodology default value
8.	Leakage factor	Discount factor to account for leakage	0.95	Fraction	In-line with the applied methodology VMR0006, ver. 1.1 Section 8.3.
9.	Life Span	Operating lifetime of project device for projects opting Equation 5 for determining project stove efficiency	7	Years	Manufacturer's specification. Which is verified by the technical specification certificates submitted by the PP and found correct.

As a part of monitoring plan, the assessment team found, checked and confirmed that following sustainable development goals are considered which are appropriate and are measurable

Sr. No.	SDG Target	SDG Indicator	Current Project contribution
1.	1.1	1.1.1 Proportion of the population living below the international poverty line by sex, age, employment status and geographic location (urban/rural)	The project has employed 184 persons (male and female) in the stove manufacturing company and created employment generation of 426 persons (male and female) in the ICS distribution & monitoring agency. Total daily income to INR 12000 - 35000 per month, bringing them above the international poverty line.
2.	3.9	Project-specific indicator: Number of households experiencing reduction in particulate matter.	398,897 households experiencing reduction in particulate matter emitted during cooking thereby improving overall health outcomes and reducing burdens of disease.
3.	4.7	Project-specific indicator: Number of house-hold get awareness education for sustainable development.	Increase awareness among the 398,897 households associated impact of use of traditional cookstoves on human health, environment and gender equality, sustainable development and sustainable lifestyle.

4.	5.4	Project-Specific indicator: Number of house-hold experiencing reduction in time for collecting fuelwood and cooking.	398,897 households experiencing reduction in time spent to collect fuelwood and cooking under the project activity thereby improving the shared responsibility under the household and the family as national appropriate.
5.	7.1	7.1.2 Proportion of population with primary reliance on clean fuels and technology	Increase access to clean cooking technology with ICS installations in 398,897 households under the project activity,
6.	8.5	Project specific indicator: Total Number of jobs created.	Project activity created 184 jobs for both male and female in the stove manufacturing company and employment of 426 persons (male and female) in the ICS distribution & monitoring agency.
7.	9.3	9.3.1 Proportion of small-scale industries in total industry value added	Project activity supported the small-scale industries by sourcing procurement of equipment and distribution activities (For 398,897 Cookstoves) executed by the same.
8.	13.2	Tonnes of greenhouse gas emissions avoided or removed	Contribute to greenhouse gas emission reduction of 556,554 tCO _{2e}
9.	15.2	15.3.1 Proportion of land that is degraded over total land area	Contribute to the reduction of deforestation of 290,403 tonne's of fuel wood from forests surrounding the communities and reducing pressure on forest reserves

Parameter(s) monitored ex-post

Parameter	N _{y,i,j} (Number of project devices of type i and batch j are operating in year y)	
Means of verification	Criteria/Requirements	Assessment/Observation
	Measuring /Reading /Recording frequency	At least once every two years. For current monitoring period it is measured through survey which is checked and confirmed.
	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 and monitoring methodology. This parameter is monitored once every two years through ICS survey.
	Monitoring equipment	Sample survey
	Value applied	398,897 The value is checked and confirmed based on sample survey submitted. The value is based on 100% proportion of ICS operational.
	How were the values in the monitoring report verified?	Measured directly or In accordance to section 8.4 of the methodology, since the population size is more than 1000 therefore the sample size of minimum 100 population/beneficiary is opted for. From each state, 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. The submitted survey was checked and confirmed.
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	On-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. Assessment team verified operational ICS during the on-site visit from ICS survey report.
Findings	CAR – 10 was raised & closed successfully. Kindly refer appendix 1 for more details	
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	By=1,new,I,j,survey Annual quantity of woody biomass (fuel wood) used by improved cook stoves in tonnes per device of type i and batch j, determined in the first year of the implementation of the project through a sample survey									
Means of verification	<table border="1"> <thead> <tr> <th>Criteria/Requirements</th> <th>Assessment/Observation</th> </tr> </thead> <tbody> <tr> <td>Measuring /Reading /Recording frequency</td> <td>Determined in the first year of project implementation through monitoring survey which is submitted, checked and confirmed.</td> </tr> <tr> <td>Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)</td> <td>Yes. The reporting frequency is in line with the monitoring plan as outlined in the Joint PD & MR and monitoring methodology. This parameter is determined in the first year of project implementation.</td> </tr> <tr> <td>Monitoring equipment</td> <td>Weighing Scale. Project proponent has provided, survey team a pre-calibrated weighing scale for weighing the fuelwood.</td> </tr> </tbody> </table>		Criteria/Requirements	Assessment/Observation	Measuring /Reading /Recording frequency	Determined in the first year of project implementation through monitoring survey which is submitted, checked and confirmed.	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 and monitoring methodology. This parameter is determined in the first year of project implementation.	Monitoring equipment	Weighing Scale. Project proponent has provided, survey team a pre-calibrated weighing scale for weighing the fuelwood.
Criteria/Requirements	Assessment/Observation									
Measuring /Reading /Recording frequency	Determined in the first year of project implementation through monitoring survey which is submitted, checked and confirmed.									
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 and monitoring methodology. This parameter is determined in the first year of project implementation.									
Monitoring equipment	Weighing Scale. Project proponent has provided, survey team a pre-calibrated weighing scale for weighing the fuelwood.									

		Refer appendix 5 for detailed calibration weighing scale used for each state.																						
	Value applied	<table border="1"> <thead> <tr> <th></th> <th>Average daily wood consumption</th> </tr> <tr> <th></th> <th>kg</th> </tr> </thead> <tbody> <tr> <td>Bihar</td> <td>3.83</td> </tr> <tr> <td>Chhattisgarh</td> <td>3.48</td> </tr> <tr> <td>Dadra & Nagar Haveli</td> <td>4.02</td> </tr> <tr> <td>Gujarat</td> <td>3.83</td> </tr> <tr> <td>Jharkhand</td> <td>3.36</td> </tr> <tr> <td>Maharashtra</td> <td>3.66</td> </tr> <tr> <td>Odisha</td> <td>3.49</td> </tr> <tr> <td>Rajasthan</td> <td>2.27</td> </tr> <tr> <td>Uttar-Pradesh</td> <td>3.93</td> </tr> </tbody> </table>		Average daily wood consumption		kg	Bihar	3.83	Chhattisgarh	3.48	Dadra & Nagar Haveli	4.02	Gujarat	3.83	Jharkhand	3.36	Maharashtra	3.66	Odisha	3.49	Rajasthan	2.27	Uttar-Pradesh	3.93
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Odisha	3.49																							
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Uttar-Pradesh	3.93																							
How were the values in the monitoring report verified?	<p>PD has decided to conduct monitoring survey and the sample size was selected in line with the guidelines provided in methodology Section 8.4 option (b).</p> <p>Determined in the first year of the introduction of the devices (e.g., during the first year of the crediting period, y=1) through measurement campaigns at representative households and/or sample surveys. Measurement of fuel wood consumption was carried out by</p>																							

		<p>the PP across all randomly selected samples surveyed during the 1st monitoring period. The quantum of daily wood consumed by the households for all beneficiaries are averaged to estimate the daily fire wood consumption. Since all the household were assessed to be using ICS for all meals throughout therefore the average daily consumption of firewood is used to estimate the annual firewood consumption. The conducted surveys were submitted and checked by the assessment team and found correct.</p>
	<p>Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?</p>	<p>On-site 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.</p>
Findings	<p>CAR – 10 was raised & closed successfully. Kindly refer appendix 1 for more details</p>	
Conclusion	<p>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.</p>	

The Joint PD & MR formulae for calculating emission reductions, as certified by the used methodology VMRO006 Version 1.1 have been examined and deemed to be accurate. The Joint PD & MR values and the ER verification sheet values have been compared. Additionally, the formulas used in the ER spreadsheet were examined and confirmed to be in line. The assessment team certifies that all calculations are performed in accordance with the formulae specified in the applied methodology VMRO006 Version 1.1 and the monitoring plan requirements, that all parameters are used correctly, that all results are transparent and verifiable, and that all assumptions are described and supported by verifiable evidence.

For the monitoring period from 01-October-2022 to 30-April-2023(inclusive of both the dates), project activity has achieved to reduce 556,554 tCO₂e GHG emissions. The ER sheet was used to verify the emission calculation, which was confirmed to be accurate and accepted.

Ex-ante emissions reductions/removals	Achieved emissions reductions/removals	Percent difference	Justification for the difference
1,375,299	556,554	- 59.53%	<p>All the project ICS were not installed on the one date of crediting period.</p> <p>Additionally, the project proponent has considered 5.48% (20 days/365 days = 5.48%) voluntarily reduction in the number of days of ICS operation for all ICS distributed/project activity instances across all states for the current monitoring period and associated emission reductions as a conservative approach during the current monitoring period.</p>

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)
01-October-2022 to 31-December-2022	24,175	0	0	24,175
01-January-2023 to 30-April-2030	532,379	0	0	532,379
Total	556,554	0	0	556,554

4.2 Quality of Evidence to Determine GHG Emission Reductions and Removals

Review of ER sheet reveals that the comparison of actual GHG emission reductions with those in PD estimates:

Year	Ex-ante emissions reductions /removals	Achieved emissions reductions /removals	Percent difference	Justification for the difference
Year 2022(01-October-2022 –31-December-2022)	596,828	24,175	-95.95%	All the project ICS were not installed/commissioned on one date i.e on the first date of crediting period hence the emission reduction achieved during the monitoring period is lower than the emission reduction estimated ex-ante for the same period. Moreover, Project proponent has voluntarily considered 5.48% reduction in the number of operational days of ICS for current monitoring period ⁴⁵
Year 2023 (01-January-2023-30 April-2023)	778,471	532,379	-31.61%	
Total	1,375,299	556,554	-59.53%	As above

Details and steps taken by the assessment team related to the sufficiency of quantity, and appropriateness of quality, of the evidences to verify the monitoring parameters are mentioned under section 4.1 of this report. Assessment team has checked the calculation for the determination of the emission reductions and found them correct and accurate and assessment team confirms the sufficiency of quantity, and appropriateness of quality, of the evidence used to determine the GHG reductions and removals for this verification period.

VVB team verified that, all the necessary documentations are collected, referenced and aggregated, which is easily accessible in hard-copy, measurements are performed by pre-calibrated equipment, and the key data can also be cross-checked via other sources, such as records, receipts. No assumptions are used that have any material influence on reported emission reductions. VVB team concludes that during this monitoring period, the evidences for determination of emission reductions are sufficient and reasonable, and the calculation of emission reductions is reliable.

⁴⁵ 100% of the stoves were assessed/surveyed to be operating during the 1st monitoring survey along with usage of ICS for all 365 days for the purpose of cooking. However, based on the findings for a single beneficiary (in one of the nine state) of 15-20 days of non-usage of ICS as the family visits the relatives or other occasion during the year, for a family function or some festival, the project proponent has decided to voluntarily consider a 5.48% (20 days/365 days = 5.48%) reduction in the number of days of ICS operation for all ICS distributed/project activity instances across all states for the current monitoring period and associated emission reductions.

5 VALIDATION AND VERIFICATION OPINION

EKI Energy Services Limited hired LGAI Technological Center, S.A. (also known as Applus+ Certification), to carry out a joint validation and verification of the VCS project activity "Global Cookstove Program (EKI Phase 05)."

The VCS Standard (version 4.4), VCS Program Guide (version 4.3), and Registration & Issuance Process (version 4.3)^{07/} were all used as the foundation for the joint validation and verification process.

The findings of the joint validation and verification process can each be summed up as follows:

The project activity complies with the requirements of the applied baseline & monitoring methodology, VMR0006, Version 1.1^{6/}, and according to Applus+ Certification, delivers the information in Joint PD & MR as needed by VCS Standard, version 4.4^{7(b) /}. As previously mentioned, the validation was carried out utilising a risk-based methodology. The project activity is anticipated to reduce emissions by 15,884,098 tCO_{2e} over the length of its crediting period (seven years).

As stated in the Joint PD & MR ^{1/}, Applus+ Certification concludes the validation with a positive opinion and affirms that the VCS Project Activity "Global Cookstove Program (EKI Phase 05)" complies with all applicable VCS requirements, including those outlined in the CDM Project Standard, version 3.0, methodologies, tools, and guidelines.

The VVB can conclude that the project is likely to achieve estimated GHG emission reduction or removals based on a positive conclusion of the reasonableness of assumptions, limitations and methods that support the estimations of the future activities, provided that actual results may vary since the estimates are based on assumptions that are subject to potential changes during the implementation and monitoring of the project.

Verification Analysis: The verification strategy used by Applus+ Certification is based on an understanding of the risks involved in reporting GHG emission data and the mitigation measures put in place. In order to provide a reasonable level of assurance that reported GHG emission reductions are accurately stated, Applus+ Certification prepared and carried out the verification by gathering documentation, additional information, and justifications.

The joint validation & verification is based on the VCS Joint PD MR, additional documents related to baseline and monitoring methodology; the subsequent background investigation, on-site visit and supporting documents made available to the assessment team by project proponent.

The management of the 'EKI ENERGY SERVICES LIMITED.' is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions on the basis set out within the project's final Joint PD Monitoring Report. The calculation and determination of GHG emission

reductions from the project is the responsibility of the management of the 'EKI ENERGY SERVICES LIMITED'. The development and maintenance of records and reporting procedures are in accordance with the final Joint PD Monitoring Report.

In our opinion, the joint PD and MR^{/01/} accurately states the GHG emissions reductions reported for the project activities for the time period of 01-October-2022 to 30-April-2023 (inclusive of both the dates). Based on the approved baseline & monitoring methodology, as well as the VCS standard, the GHG emission reductions were computed accurately.

Estimated Emission reduction over the crediting period are:

Year	Estimated baseline emissions or removals (tCO ₂ e)
Year 2022-23(1-October-2022-30-September-2023)	2,367,849
Year 2023-24 (1-October-2023-30-September-2024)	2,334,399
Year 2024-25 (1-October-2024-30-September-2025)	2,301,285
Year 2025-26 (1-October-2025-30-September-2026)	2,268,501
Year 2026-27 (1-October-2026-30-September-2027)	2,236,045
Year 2027-28 (1-October-2027-30-September-2028)	2,203,914
Year 2028-29 (1-October-2028-30-September-2029)	2,172,105
Total estimated ERs	15,884,098
Total number of crediting years	7
Average annual ERs	2,269,157

Period of verification: from 01-October-2022 to 30-April-2023(including both days). Verified reduction to and removals from GHG emissions over the aforementioned 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)
01-October-2022 to 31-December-2022	24,175	-	-	24,175
01-January-2023 to 30-April-2023-	532,379	-	-	532,379

Total	556,554	-	-	556,554
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Year	Ex-ante emissions reductions/r emovals	Achieved emissions reductions /removals	Percent difference	Justification for the difference
01-October-2022 -- 31-December-2022)	596,828	24,175	- 95.95 %	All the project ICS were not installed on the one date of crediting period.
01-January-2023 to 30-April 2023	778,471	532,379	- 31.61%	Additionally, Project proponent has considered 5.48% reduction in the number of operational days of ICS for current monitoring period.
Total	1,375,299	556,554	- 59.53%	

APPENDIX 1: DOCUMENT REFERENCES

No.	Author	Title	References to the document	Provider
1.	PP	Joint PD & MR (Initial) Joint PD & MR (Final)	Version 01 dated 13-April-2022 Version 06 dated 19-July-2024	PP
2.	PP	Emission reduction spreadsheet (Initial). Estimated Emission reduction spreadsheet (Final) Ex-post Emission reduction spreadsheet	Version 01 dated 13-April-2022 Version 04 dated 19-July-2024 Version 06 dated 19-July-2024	PP
3.	NA	Distribution database and carbon waiver records of ICS	-	PP
4.	PP	Declaration(s) from Project proponent on double accounting	27-March-2023	PP
5.	NA	Efficiency certificate of ICS issued by IIT Delhi	09-July-2022	PP
6.	NA	VMR0006 Methodology for Installation of High Efficiency Firewood Cookstoves, V1.1	https://verra.org/methodologies/vmr0006-methodology-for-installation-of-high-efficiency-firewood-cookstoves/	VERRA
7.	NA	VCS Requirements: a) Verified Carbon Standard Program Guide, version 4.3; b) Verified Carbon Standard, version 4.4; c) VCS Program Definitions, version 4.3 d) VCS Registration and Issuance Process, version 4.3 e) VCS Joint Project Description & Monitoring Report Template, version 4.2 f) VCS Joint Validation & Verification Report Template, version 4.1	-	VERRA
8.	NA	Life span certificate	-	PP
9.	NA	Site assessment –interviews of staff personnel, photographs, physical inspection of monitoring system	-	PP
10.	PP	Employment records	-	PP

No.	Author	Title	References to the document	Provider
11.	PP	Skilled training records	-	PP
12.	PP	Local Stakeholder Meeting records	-	PP
13.	PP	ICS Survey Report	-	PP
14.	UNFCCC	Methodological Tool: Calculation of the fraction of non-renewable biomass, version 4.0	https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-30-v4.0.pdf	UNFCCC CDM page
15.	PP	Photos of grievance register	-	PP
16.	PP	Sample copy of carbon waiver records	-	PP
17.	-	Technical Specifications of the ICS	-	PP
18.	UNFCCC	Sampling and surveys for CDM project activities and programmes of activities, version 9.	https://cdm.unfccc.int/filestorage/e/x/t/extfile-20210531160756474-Meth_Stan05.pdf/Meth_Stan05.pdf?t=a0h8cmdjY2hufDB3trwzZ7tid7m_L2VQBOSR	UNFCCC CDM page
19.	Forest Survey of India	State of Forest report (Forest Survey of India Ministry of Environment, Forest & Climate Change, Gol, 2019).	https://fsi.nic.in/forest-report-2019	FSI
20.	IPCC	2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 2 Energy, Chapter 2 Stationary Combustion	https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume_2/V2_1_Ch1_Introduction.pdf https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume_2/V2_2_Ch2_Stationary_Combustion.pdf	IPCC
21.	FAO	Regional Wood Energy Development Programme In Asia GCP/RAS/154/NET, RWEDP Report No49, The Wood Fuel Scenario and Policy issues in India. Published by the FAO Regional Wood Energy Development Programme in Asia, Bangkok, Thailand	https://wgbis.ces.iisc.ac.in/energy/HC270799/RWEDP/acrobat/fd49.pdf	FAO
22.	MoEF, Govt. of India UN Data	<ul style="list-style-type: none"> State of Forest Report 1987 Used Non-renewable biomass has been used since 31 December 1989 	https://fsi.nic.in/documents/sfr_1987_hindi.pdf http://data.un.org/Data.aspx?d=EDATA&f=cmID%3aFW	FSI

No.	Author	Title	References to the document	Provider
23.	TERI	Rural Energy data sources and estimations in India - TERI	https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.581.9840&rep=rep1&type=pdf	
24.	FSI	State of Forest Report 2011	https://fsi.nic.in/cover_2011/chapter7.pdf	FSI
25.	PP	<ul style="list-style-type: none"> • Screenshots - EKI Energy Services Limited Mobile App & DBMS • Carbon Credit Ownership Agreement 	CS Serial No - GHG -22 D/0188720 dated 01-Oct.-2022	PP
26.	PP	fNRB calculation	-	PP
27.	TNAU	MAI Source file: Developing Yield Table for few Tree Species Grown in Farm Setting	-	PP
28.	Ecological Indicators	Spatial distribution of forest biomass carbon (Above and below ground) in Indian forests	Dated 22 November 2017	PP
29.	MoEF, Govt. of India	<ul style="list-style-type: none"> • Asia Pacific Forestry Sector Outlook Study-II 	-	PP
	Government of Tamil Nadu	<ul style="list-style-type: none"> • Mean Annual increment of India 	-	PP

APPENDIX 2: ABBREVIATIONS

Abbreviations	Full texts
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CDM VVS	Clean Development Mechanism Validation and Verification Standard
ER	Emission Reductions
CL	Clarification Request
DOE	Designated Operational Entity
DNA	Designated National Authority
FAR	Forward Action Request
GHG	Greenhouse Gas(es)
IPCC	Intergovernmental Panel on Climate Change
Joint PD & MR	Joint project description and monitoring report
MP	Monitoring Plan
MR	Monitoring Report
PD	Project Description
PP	Project Proponent
PS	Project Standard
TR	Technical Review
UNFCCC	United Nations Framework Convention on Climate Change
VVB	Validation and Verification Body
VVS	Validation and Verification Standard

APPENDIX 3: FINDINGS OVERVIEW

Table 1. CL from this validation and verification

CL ID	01	Section no.	1.4	Date: 06-June-2023
Description of CL				
<p><i>Project Owner to clarify and justify with the evidence:</i></p> <ul style="list-style-type: none"> <i>Under Section 1.1 of submitted Joint PD Monitoring Report, the total distribution of ICS has been mentioned as 10,000 only however as per furnished ICS synopsis 400,309 number of ICS has been distributed under the current project activity.</i> 				
Project participant response				Date: 08-June-2023
<p><i>The project activity includes distribution of 398,897 numbers of Improved cook stoves across nine states of India including Bihar, Chhattisgarh, Dadra and Nagar Haveli, Gujarat, Jharkhand, Maharashtra, Odisha, Rajasthan and Uttar Pradesh in India. Revised version of Joint PD- Monitoring Report updated based on number of ICS distributed under the project activity. Revised database along with wise distribution submitted.</i></p>				
Documentation provided by project participant				
<ol style="list-style-type: none"> <i>Revised joint PD-MR</i> <i>Revised Database</i> 				
DOE assessment				Date: 10-June-2023
<p><i>Under section 1.1 of the revised Joint PD Monitoring Report, details pertaining to the project location and total number of distributed ICS's has now been included, which is further checked and verified by the assessment team & found acceptable. Therefore, this observation is closed now.</i></p> <p>Hence, finding (CL-01) is closed now.</p>				
CL ID	02	Section no.	3.1	Date: 06-June-2023
Description of CL				
<p><i>Project Owner to clarify and justify with the evidence:</i></p> <ul style="list-style-type: none"> <i>Under Section 1.3 of submitted Joint PD Monitoring Report, PP shall clarify, how the applicability of VCS standard Version 4.1 is valid for current project activity. (As latest version 4.4 of VCS standard is available).</i> 				
Project participant response				Date: 08-June-2023
<p><i>Section 1.3 of the Joint PD Monitoring Report revised to Version 4.4 of the VCS standard. The eligibility of the project is established based on section 2.1.3 of the VCS standard 4.4.</i></p>				
Documentation provided by project participant				
<p><i>Revised joint PD-MR</i></p>				

DOE assessment	Date: 10-June-2023
<p>Reference of VCS standard has now been revised to version 4.4, for section 1.3 of the updated Joint PD Monitoring Report. Further, verification team checked the “Project Eligibility” and found consistent with para 2.1.3 of the VCS standard 4.4. Thus, this observation is closed now.</p> <p>Hence, finding (CL – 02) is closed.</p>	

CL ID	03	Section no.	3.1	Date: 06-June-2023
Description of CL				
<p>Under Section 1.10 of submitted Joint PD Monitoring Report</p> <ul style="list-style-type: none"> “Conservative 5 % annual loss or non – operation of ICS consumption”, has been taken, Therefore, PP shall clarify, how this can be concluded that only 5 %. Supportive document shall be required along with justification. 				
Project participant response				Date: 08-June-2023
<p>Estimation of emission reduction is carried out in accordance to equation 2, paragraph 8.4 of the approved methodology VMR0006 Methodology for Installation of High Efficiency Firewood Cookstoves, v1.1 which accounts for number of ICS in operation. Since all the ICS were expected to be in operation in course of the crediting period therefore the annual cook stove loss is not considered as part of Ex-ante ER estimation. Statement under section 1.10 of the joint PD-MR revised accordingly.</p>				
Documentation provided by project participant				
Revised joint PD-MR				
DOE assessment				Date: 10-June-2023
<p>Justification provided by the project proponent has been accepted by the assessment team and further Cross-checked section 1.10 of the updated Joint PD Monitoring Report which is found to be consistent with equation 2, of para 8.4 of applied methodology VMR0006.</p> <p>Hence, finding (CL-03) is closed now.</p>				

CL ID	04	Section no.	3.1	Date: 06-June-2023
Description of CL				
<p>Under Section 1.11 of submitted Joint PD Monitoring Report, PP has to clarify, which type of ICS used for current project activity.</p> <p>If Multiple, then how only single thermal efficiency value mentioned under the above table (Point No. L of Technical Specification Table). Clarification required along with supportive evidences.</p>				
Project participant response				Date: 08-June-2023
<p>The Project activity instances (398,897 numbers of ICS) considered as part of the current Project activity includes distribution of single ICS model i.e AGNEEKAA ECO MINI STOVE MODEL4 manufactured by GHG Reduction Technologies Pvt LTD. No other ICS model is distributed under the current project activity instances. Therefore, single thermal efficiency value is considered. The thermal efficiency value is revised to 36.42% based on the test certificate by Indian Institute of Technology Delhi. The thermal efficiency of the implemented cookstove was tested at the manufacturer’s end as per BIS protocols IS: 13152: 2013. Updated information is included in the revised version of the joint PD-MR</p>				

Documentation provided by project participant	
1. Revised joint PD-MR 2. ICS Test Certificate 3. ICS manufacturer specification	
DOE assessment	Date: 10-June-2023
The technical specification of distributed ICSs, having model name AGNEEKA ECO MINI STOVE MODEL 4 provided by GHG Reduction Technologies Pvt. Ltd along with ICS Test Certificate issued by IIT Delhi, dated 09-July-2022 for applied thermal efficiency 36.42% has been checked by the assessment team and further found details consistent with section 1.11 of updated Joint PD Monitoring Report. Thus, this observation is closed now.	
Hence, finding (CL – 04) is closed.	

CL ID	05	Section no.	3.1	Date: 06-June-2023
Description of CL				
Under Section 1.12 of submitted Joint PD Monitoring Report, “Project Location”, the physical location mentioned under the section observed to be inconsistent, state “Assam” has been mentioned. Therefore, further PP shall clarify the same along with evidences. KML file for physical location covered under the whole country shall be required for further assessment.				
Project participant response				Date: 08-June-2023
The Project location under section 1.12 of the joint PD-MR is modified to the Indian states of Bihar, Chhattisgarh, Dadra and Nagar Haveli, Gujarat, Jharkhand, Maharashtra, Odisha, Rajasthan and Uttar Pradesh. The submitted beneficiary database includes geo-coordinates of the beneficiary. KML files of the states where the ICS is being distributed is submitted.				
Documentation provided by project participant				
1. Revised joint PD-MR 2. Kml file of the states				
DOE assessment				Date: 10-June-2023
Section 1.12 pertaining details for project location of Joint PD & Monitoring Report has now been updated which is further checked by the assessment team with furnished kml file of states & submitted project database incorporating individual location of users. Therefore, this observation is closed now.				
Hence, finding (CL – 05) is closed now.				

CL ID	06	Section no.	3.4.1	Date: 06-June-2023
Description of CL				

<ul style="list-style-type: none"> Under Section 3.1 of submitted Joint PD Monitoring Report, “Tittle and Reference of Methodology”, the reference of Tool 30 “Calculation of the fraction of non-renewable biomass” version 3.0 has been given instead of version 4.0. Therefore, PP has to clarify the relevance of the applicable tool version under current project activity. Under section 3.2 of submitted Joint PD Monitoring Report, “Applicability of Methodology”, PP shall cross check the VMR0006, version 1.1. and clarify how the mentioned, applicability conditions are consistent with para 1-4 of clause no 2.0. Further, PP shall also clarify, why the recent studies and increasing population data have not been referred as plant is commissioned in year 2021. 	
Project participant response	Date: 08-June-2023
<ol style="list-style-type: none"> The version of the Tool 30 “Calculation of the fraction of non-renewable biomass” have been modified to version 4.0. along with the weblink. The compliance of the Project activity in accordance to para 1-4 of clause no 2.0 is described under section 3.2 of the revised PD 2011 publication by FSI (Forest survey of India) is being used to define the non-renewable biomass usage. However as the publication by FSI is the latest available source the same is being referred to in the PD. 	
Documentation provided by project participant	
Revised joint PD-MR	
DOE assessment	Date: 10-June-2023
<p>Under the revised Joint PD and Monitoring Report:</p> <ul style="list-style-type: none"> The version number of applicable Tool 30, “Calculation of the fraction of non-renewable biomass” has been updated to latest version 4.0 which is later checked by the assessment team and found acceptable. Thus, this observation is closed now. The compliance pertaining to applicability condition of the project activity has now been revised under section 3.2 of Joint PD & Monitoring Report which is further checked and found consistent with clause no. 2.0 and 4.0 of applied methodology VMR0006, Version 1.1. Thus, this observation is closed now. <p>Hence, finding (CL-06) is closed</p>	

CL ID	07	Section no.	3.4.5	Date: 06-June-2023
Description of CL				
<p>Under Section 3.5 of submitted Joint PD Monitoring Report,</p> <ul style="list-style-type: none"> Reference of “Positive List” has been mentioned, therefore further PP has to clarify weather CDM tool 32 of positive list is applicable to current project activity? If yes then, necessary update shall be required along with justification. 				
Project participant response				Date: 08-June-2023
<p>The project establishes additionality based on the criteria/ condition for demonstration of additionality in accordance to paragraph 7 of the methodology and not in accordance to Tool 32. Paragraph 7 of the methodology elaborates steps for demonstrating the project as positive list. Detailed elaboration of the compliance of the project activity to the “positive list” in accordance to the stipulated condition of the methodology and additionality conditions is presented under section 3.5 of the joint PD_MR.</p>				
Documentation provided by project participant				
Revised Joint PD-MR				

DOE assessment	Date: 10-June-2023
<p>Under section 3.5 of the revised Joint PD Monitoring Report:</p> <ul style="list-style-type: none"> Details pertaining to additionality demonstration of project activity as “Positive List” has now been encapsulated which is further checked by the assessment team & found inline with “Step 2: Positive List”, Clause 7, of applied methodology, VMR0006, Version 1.1. Thus, this observation is closed now. <p>Hence, finding (CL-07) is closed now.</p>	

CL ID	08	Section no.	3.4.6	Date: 06-June-2023
Description of CL				
<p>Under Section 4.4 of submitted Joint PD Monitoring Report “Baseline Emissions”</p> <ul style="list-style-type: none"> Efficiency of project stove (fraction) of value 32.19 % has been taken for the calculation. However, source of applied value not indicated also supportive evidences is not submitted. For parameter ERY_n, PP shall clarify why the estimated ER calculation is based on the calculation of second year not on first year. Clarification required. Also, PP has to justify, how 5 % stove loss being applied on entire crediting period considered for current project activity. 				
Project participant response				Date: 08-June-2023
<ol style="list-style-type: none"> Test certificate of the ICS with rated efficiency of 36.42% is considered for emission reduction estimation copy of the test certificate submitted. Estimation approach is revised. Table containing year wise emission reduction for each states included No stove loss is being considered in accordance to equation 2 of the methodology for estimation of emission reduction. Cook stove loss factor are accounted for ex-post estimation of emission reduction. 				
Documentation provided by project participant				
<ol style="list-style-type: none"> Revised PD_MR ICS test certificate 				
DOE assessment				Date: 10-June-2023
<p>Under section 4.4 of submitted Joint PD Monitoring Report:</p> <ul style="list-style-type: none"> Test Certificate issued by Indian Institute of Delhi dated 09-July-2022 to validate the efficiency 36.42% has now been furnished which is further checked and verified by the assessment team. Thus, this observation is closed now. Estimation of emission reduction calculation approach has now been revised under section 5.4 (As per revised template version of Joint PD Monitoring Report) which is further checked and verified by the assessment team & found consistent with furnished “Ex-ante ER Estimation Spreadsheet”. Therefore, this observation is closed now. Also, there is no stove loss factor is being considered under the project activity instead yearly discount factor 0.99, has ben applied, consistent with equation 2 of VMR0006, Version 1.1, Same has been checked & acceptable to the assessment team. Therefore, this observation is closed now. <p>Hence, finding (CL-08) is closed now.</p>				

CL ID	09	Section no.	3.4.6	Date: 06-June-2023
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Description of CL	
Under Section 5.1 of submitted Joint PD Monitoring Report, "Baseline Emissions" <ul style="list-style-type: none"> For parameter, "$F_{NRB,y}$", With reference to para 5 of Tool 30, PP shall clarify how the sourced value (0.8185) consistent with current project activity. Demonstration shall be required under relevant section for further assessment. For parameter, "$\eta_{new,y,t,j}$", PP has to clarify how the ICS's efficiency decreasing by each year along with supportive evidences. 	
Project participant response	Date: 08-June-2023
1. The DNA has not delineate the applicable area for which $fNRB$ is determined. Therefore, in accordance to para 5 of Tool 30 project proponent has considered the geographical boundary of the state from which woody biomass is sourced for end-users as the applicable area for which $fNRB$ is determined, 2. The year wise efficiency is estimated in accordance to Equation 5 and default value of annual efficiency loss.	
Documentation provided by project participant	
1. State wise $fNRB$ estimation sheet 2. Revised PD_MR	
DOE assessment	Date: 10-June-2023
Under the revised Joint PD Monitoring Report: <ul style="list-style-type: none"> Under section 6.1(as per revised joint pd monitoring template), the "$F_{NRB,y}$", values has now been revised and incorporated for each state inline with para 5 of Tool 30, Version 4.0, Further "$F_{NRB,y}$", calculation has been checked by the assessment team with furnished separate spreadsheet for each state & found acceptable. Thus, this observation is closed now. The efficiency of improved cookstove, "$\eta_{new,y,t,j}$", has been decreasing with default value of discount factor , 0.99 applied from first year of crediting period in accordance with equation 5 of applied methodology, VMR0006, Version 1.1. which is further checked & verified by the assessment team and found acceptable. Therefore, this observation is closed now. 	
Hence, finding (CL – 09) is closed now	

CL ID	10	Section no.	3.4.8	Date: 06-June-2023
Description of CL				
With Reference to onsite visit conducted by the assessment, following observation has been acknowledged: Observation For State Rajasthan <ul style="list-style-type: none"> For the Sample Cookstove Sr. No GHG-22/0248523, Village Balrasar Athoona, district Churu the Baseline "Mud-Stove" has also been observed under the premises. Justification required. The procedure to ensure that any change of beneficiary information is updated into the database is not indicated. PP to clarify the same. In one of the sample ICS distributed, it is observed to have faded color at some of the places. Clarification required, over the frequency of the periodic operation and maintenance to ensure that distributed ICS would be durable for claimed warranty period (7 Years). Process of awareness and sensitization of the beneficiary is not indicated. PP to clarify. The process of ensuring that the ICS is not double counted is not clearly indicated. PP to clarify With the interview of beneficiary having sample ICS Id: GHG-22/D/0098404, beneficiary informed to assessment team that, they were using ICS for around 345-350 days in a year as the family visits the relatives or other occasion for 15-20 days a year so the non-usage days of ICS is accounted. Please clarify. 				
Project participant response				Date: 08-June-2023

<ol style="list-style-type: none"> 1. Traditional Mud-stove were kept in some of the households from deep religious belief and for sacred rituals. The Project proponent has ensured that the traditional stoves is not being used through regular users interaction and spot check. 2. Detailed procedure/approach relating to change of beneficiary information in the database is outlined under section emergency preparedness of the monitoring plan of the joint PD_MR. 3. The cookstoves are subjected to Preventive / predictive maintenance of ICS once in a year, condition-based maintenance based on the spot check report from distributor/ project proponent and reactive maintenance based on user complaint (as and when basis) to ensure that distributed ICS would be durable for claimed warranty period (7 Years). Manufacturer declaration regarding the same is submitted. 4. Distributors are responsible for undertaking users awareness, sensitization and training, the details of which is outlined under monitoring plan section for the joint PD_MR. 5. Detailed process of double counting is outlined under monitoring plan section for the joint PD_MR. 6. An overall reduction of 5.48% in of emission reduction (considering 20 days of ICS non-usage) is considered 	
Documentation provided by project participant	
<ol style="list-style-type: none"> 1. Manufacturer declaration regarding maintenance 2. Revised joint PD_MR. 	
DOE assessment	Date: 10-June-2023
<ul style="list-style-type: none"> • Justification given by the project proponent is acceptable to the assessment team , further same has been verified by the public articles (https://timesofindia.indiatimes.com/city/patna/mitti-kachulha-binds-hindus-and-muslims/articleshow/17235516.cms) and confirms that there are many places in India Mud Stove has been used for religious belief and sacred rituals. Thus, observation is closed now. • Section 6.3, “Monitoring Plan”, under sub para “emergency preparedness” of joint pd monitoring report has now been updated, pertaining details to missing or relocated users information which is further checked and acceptable to the assessment team. Therefore, observation is closed now. • Justification provided by the project proponent for preventive & predictive maintenance has been acceptable to the assessment team. Moreover, assessment team also, verified the furnished “Manufacturer (GHG Reduction Technologies Private Limited) Declaration” for the same. Therefore, current observation is closed now. • Information pertaining to training, awareness program, grievance & sensitization has now been incorporated under “Internal Audit”, of section 6.3 of revised Joint PD monitoring report, same has been checked and accepted to the assessment team. Hence, this observation is closed now. • Details incorporating information for “Double Counting” has now been encapsulated under sub para “Avoidance of Double Counting”, which is further checked and verified by the assessment team. Moreover, “No Double Counting declaration” has now been submitted by the manufacturer, Project Owner and Distributor which is further checked and acceptable to the assessment team. Hence, current observation is closed now. • Percentage of annually non-usage, “5.48 %”, has been incorporated under sub-heading, “Monitoring Parameter”, of section 6.3 of revised joint pd monitoring report which is checked and verified by the assessment team & found consistent with “Ex-post”, ER spreadsheet calculation. Hence, this observation is closed now. 	
Hence, finding (CL – 10) is closed.	

Table 2. CAR from this validation and verification

CAR ID	01	Section no.	1.4	Date: 06-June-2023
Description of CAR				

Under section 1.1 of submitted Joint PD & Monitoring Report,	
<ul style="list-style-type: none"> With reference to VCS, PD-MR template filling instructions, version 4.2, PP shall be required to incorporate "An estimate of annual average and total GHG emission reductions and removals". Older version for Joint PD monitoring report is incorporated. PP shall update the template and pertaining information consistent with Joint PD & MR, version 4.2. Corrective Action Required. 	
Project participant response	Date: 08-June-2023
<ol style="list-style-type: none"> Estimated annual average and total GHG emission reductions is included under section 1.1 of the revised PD-MR The version of the joint PD-MR updated to version 4.2 	
Documentation provided by project participant	
Revised joint PD-MR	
DOE assessment	Date: 10-June-2023
Under section 1.1 of revised Joint PD & Monitoring Report:	
<ul style="list-style-type: none"> An estimate of annual average and total GHG emission reductions and removals has now been incorporated under section 1.1 of the Joint PD MR which is checked and verified by the assessment team & found consistent with revised ER spread-sheet (Ex-post and Ex-ante). Thus, current observation is closed now. The new version, 4.2 of Joint PD-MR, has now been updated from version 4.0, which is checked & verified by the assessment team and found acceptable. 	
Hence, finding (CAR – 01) is closed now.	

CAR ID	02	Section no.	3.1	Date: 06-June-2023
Description of CAR				
<ul style="list-style-type: none"> Under section 1.3 of submitted Joint PD Monitoring Report, the reference of VCS standard version 4.2 has been taken which is currently updated with latest version effective from 21 Dec 2022. Therefore, PP shall cross check the updated standard and incorporate the same for current project activity. Under section 1.9, "Project Crediting Period" of Joint PD Monitoring Report, PP shall mention para or clause as a reference for specifically choosing 21 years for grouped project. Under section 1.10, of submitted Joint PD Monitoring Report, Estimated ER Emission reductions or removals observed to be inconsistent with submitted ER spreadsheet. PP shall cross check and revise the table. Further, Sample Survey results shall be required in separate tab of spreadsheet along with annual loss calculation.				
Project participant response				Date: 08-June-2023
<ol style="list-style-type: none"> Version of VCS standard updated to Version 4.4 under section 1.3 of the Joint PD Monitoring Report Section 1.9 has included the paragraph reference of 3.9.1 of the VCS Project Standard 4.4 for selection of seven years (twice renewable for a total up to 21 years) crediting period. ER value under section 1.10 revised based on the number of Project activity instances. Revised ER sheet submitted. Survey sample results are included in Ex-ante ER estimation. Since all the ICS were in operation annual ICS loss is not considered under Ex-ante ER estimation. 				
Documentation provided by project participant				
<ol style="list-style-type: none"> Revised PD – MR Revised Ex-ante ER estimation 				
DOE assessment				Date: 10-June-2023

Under revised Joint PD Monitoring Report:

- Applicable VCS standard version 4.1, has now been updated to version 4.2 (latest applicable) under section 1.3 which is checked and acceptable to the assessment team. **Thus, observation is closed now.**
- Details pertaining to the crediting period of the project activity, has now been updated under section 1.9 of the revised Joint PD-MR and further checked & found consistent with para 3.9.1 of VCS Standard, version 4.4 by the assessment team & **found acceptable.**
- Estimated ER Emission reductions or removals has now been revised under section 1.10 of the updated Joint PD_MR which is further checked & verified by the assessment team and found consistent with furnished Ex-ante ER Estimation Spreadsheet. **Thus, observation is closed now.**

Further, sample survey results has now been furnished for each state across the country which is checked & found acceptable to the assessment team, Also, the annual discount factor of 0.99 has been applied consistent with applied methodology VMR0006, version 1.1.

Hence, finding (CAR – 02) has now been closed.

CAR ID	03	Section no.	3.1	Date: 06-June-2023
Description of CAR				
Under section 1.11 of submitted Joint PD Monitoring Report, For the table “technical specification” PP shall incorporate the following details:				
<ul style="list-style-type: none"> • Technical Specifications shall be required by the project proponent to validate the incorporated information under the table of section 1.11. 				
Project participant response				Date: 08-June-2023
Section 1.11. of the joint PD- MR modified based on the ICS model used and technical specification by Manufacturer and ICS Thermal efficiency test certificate submitted.				
Documentation provided by project participant				
<ol style="list-style-type: none"> 1. Revised joint PD-MR 2. ICS Test Certificate 3. ICS manufacturer specification 				
DOE assessment				Date: 10-June-2023
The technical specifications details has now been updated under section 1.11 of revised joint pd monitoring report, which is further checked and verified by the assessment team & found consistent with furnished ICS manufacturer specification and ICS Test Certificate issued by the Indian Institute of Delhi. Therefore, this observation is closed now.				
Hence, finding (CAR – 03) is closed now.				

CAR ID	04	Section no.	3.1	Date: 06-June-2023
Description of CAR				
Under section 1.17 of submitted Joint PD Monitoring Report, CDM project activity has been mentioned. Therefore, PP shall cross check and correct terminology associated with applied scheme (VCS-Verra) under the referred section and throughout the report as well.				
Project participant response				Date: 08-June-2023
Section 1.17 of the joint PD-MR revised				
Documentation provided by project participant				

1. Revised joint PD-MR	
DOE assessment	Date: 10-June-2023
<p>The terminology associated with CDM project activity has now been revised under section 1.17 & throughout the revised Joint PD Monitoring Report. Therefore, this observation is closed now.</p> <p>Hence, finding (CAR – 04) is closed now.</p>	

CAR ID	05	Section no.	3.3.2	Date: 06-June-2023
Description of CAR				
<p>Under section 2.2 of submitted Joint PD Monitoring Report, “Local Stakeholder Consultation”, PP shall incorporate information regarding procedure & methods used for documenting the outcome of local stakeholder consultation, details of engagement of local stakeholders, mechanism of ongoing communication with local stakeholders etc. along with submission of following documents:</p> <ul style="list-style-type: none"> • Grievance Register maintained at project site • Minutes signed during Local stakeholder consultation • Attendance sheet along with the participant stakeholder names • Public information shared for LSC to among local people etc. along with other supportive documents associated with Section 				
Project participant response				Date: 08-June-2023
<p>Section 2.2 of the Joint PD MR updated with the information relating to stake-holders consultation. Supportive documents submitted.</p>				
Documentation provided by project participant				
<ol style="list-style-type: none"> 1. Minutes of Meeting 2. Attendance Sheet 3. Public notice 4. Photographs 5. Grievance register 				
DOE assessment				Date: 10-June-2023
<p>Details associated with Local stakeholder consultation, engagement of local stakeholders, mechanism of ongoing communication with local stakeholders, grievance process etc has now been included under section 2.2 of revised Joint PD Monitoring Report. Further, assessment team has verified the furnished sample documents like Public Notice, Attendance sheet, photographs and Grievance Register and found acceptable. Thus, this observation is closed now.</p> <p>Hence, finding (CAR – 05) is closed.</p>				

CAR ID	06	Section no.	3.4.3 & 3.4.4	Date: 06-June-2023
Description of CAR				
<ul style="list-style-type: none"> • Under section 3.3 of submitted Joint PD Monitoring Report, “Project Boundary”, Revise the table as per latest joint PD_MR template filling instructions, Version 4.2. <ol style="list-style-type: none"> 1) • Under section 3.4 of submitted Joint PD Monitoring Report, “Baseline Scenario”, PP shall incorporate the applied methodology name, version and para reference for Baseline Scenario. 				
Project participant response				Date: 08-June-2023

<ol style="list-style-type: none"> 1. Section 3.4 of the joint PD&MR revised in accordance to the latest joint PD_MR template filling instructions, Version 4.2. 2. Applied methodology name, version and para reference has been included under section 3.4 of the joint PD_MR 	
Documentation provided by project participant	
1. Revised joint PD-MR	
DOE assessment	Date: 10-June-2023
Under the revised joint PD Monitoring Report: <ul style="list-style-type: none"> • Section 3.3, “Project Boundary”, has now been updated under the revised joint PD Monitoring Report which is further checked and found consistent with VCS Template Filling Instructions Version 4.2. Therefore, this observation is closed now. • Applied methodology name, version and para reference, has now been revised under section 3.4, of the Joint PD Monitoring Report which is further checked and acceptable to the verification team. Therefore, this observation is closed now. 	
Hence, finding (CAR – 06) is closed	

CAR ID	07	Section no.	3.4.5	Date: 06-June-2023
Description of CAR				
Under section 3.5 of submitted Joint PD Monitoring Report, “Additionality” <ul style="list-style-type: none"> • PP shall mention para and clause no of applied methodology and throughout the report where applicable. Same is observed to be missing from the section. • Exaggerated information pertaining to Tool 32 with latest applicable version and their demonstration shall be required as same has been referred under the section 3.5. 				
Project participant response				Date: 08-June-2023
<ol style="list-style-type: none"> 1. Para and clause no of applied methodology is included under section 3.5 2. The project establishes additionality based on the criteria/ condition for demonstration of additionality in accordance to paragraph 7 of the methodology and not in accordance to Tool 32. Paragraph 7 of the methodology elaborates steps for demonstrating the project as positive list. Detailed elaboration of the compliance of the project activity to the “positive list” in accordance to the stipulated condition of the methodology and additionality conditions is presented under section 3.5 of the joint PD_MR. 				
Documentation provided by project participant				
Revised joint PD-MR				
DOE assessment				Date: 10-June-2023
Under section 3.5 of revised Joint PD Monitoring Report: <ul style="list-style-type: none"> • Paragraph reference (Para No. 07) for additionality demonstration under VMR0006, Version 1.1, has now been updated along with throughout the report which is further checked and verified by the assessment team & found acceptable. • Information pertaining to establish additionality has now been demonstrated under section 3.5 of the revised Joint PD Monitoring Report inline with sub “Step 2: Positive List”, para 1 and para 2, of applied methodology VMR0006, Version 1.1. 				
Hence, finding (CAR – 07) is closed now.				

CAR ID	08	Section no.	3.4.6	Date: 06-June-2023
Description of CAR				

Under section 4.4 of submitted Joint PD Monitoring Report, assessment team has observed following:	
<ul style="list-style-type: none"> • PP has not submitted the ex-ante emission reductions calculation sheet • “Baseline Emissions”, with reference to template filling instructions, version 4.2, PP shall incorporate the formula quantification for estimated emission reductions along with sample calculation consistent with furnished ER estimated spreadsheet. • For parameter “$(DF\eta)^{y-1}$”, Declaration foam, from manufacturer and referred literature web-link shall be required to furnish by the project proponent to validate the applied value. • PP shall incorporate the procedure of calculating annual stove “loss rate” and justification for concluding 5 % applied value. Corrective Action Required. • PP shall cross check and revise the table information ER estimation considered for entire crediting period. Observed to be inconsistent with submitted ER estimation spreadsheet. 	
Project participant response	Date: 08-June-2023
<ol style="list-style-type: none"> 1. Revised ex-ante emission reductions calculation sheet. 2. Section 5.4 modified. 3. Methodology default value of annual efficiency loss is considered. 4. Annual stove loss rate is not considered as a part of emission reduction estimation, 5. Table information relating to the emission reduction value considered for entire crediting period is revised. 	
Documentation provided by project participant	
<ol style="list-style-type: none"> 1. Ex-ante Estimation of emission reduction. 2. Revised PD-MR 	
DOE assessment	Date: 10-June-2023
<ol style="list-style-type: none"> 1. Updated Ex-ante Estimated Emission Reduction Spreadsheet has now been submitted by the project proponent which is further checked & acceptable to the assessment team. Thus, observation is closed now. 2. Section 5.4 (Under the revised template of Joint PD Monitoring Report, Version 4.2), has now been updated with formula quantization along-with sample calculations for estimated value of “Emission Reductions” for each state. Same has been checked and acceptable to the assessment team. Thus, current observation is closed now. 3. There is no stove loss factor is being considered under the project activity instead yearly discount factor 0.99, has ben applied, consistent with evaluation 2 of VMR0006, Version 1.1, Same has been checked & acceptable to the assessment team. Therefore, this observation is closed now. 	
Hence, finding (CAR -08) is closed now.	

CAR ID	09	Section no.	3.4.8	Date: 06-June-2023
Description of CAR				
Under section 5.1 of submitted Joint PD Monitoring Report, “Data & Parameters Available at Validation”:				
<ul style="list-style-type: none"> • For parameter, $f_{NRB,y}$, PP shall incorporate tool version and name at current section and throughout the report along with correction under the submitted ER sheet. <ol style="list-style-type: none"> 2) Also, incorporate the web-link of fraction for woody biomass. • PP shall Attach web link for IPCC default value for each applicable parameter along with page number. Same is observed to be missing from the table. 				
Project participant response				Date: 08-June-2023
<ol style="list-style-type: none"> 1. Tools version and the weblink is corrected for “Calculation of the fraction of non-renewable biomass” is updated into the revised version of joint PD_MR. 2. The IPCC default value is obtained from the methodology and the same is referenced in the joint PD_MR. 				
Documentation provided by project participant				

Revised Joint PD_MR	
DOE assessment	Date: 10-June-2023
<p>Under the revised Joint PD Monitoring Report:</p> <ul style="list-style-type: none"> Parameter, $f_{NRB,y}$, details (under section 6.1 of updated template version 4.2 of joint PD MR) has now been updated with nomenclature of Tool and their version. However, weblink still observed to be missing from the section. Therefore, current observation is still open. Methodology reference for associated parameters “Default IPCC Values” has now been incorporated under the revised Joint PD Monitoring Report. However, IPCC details mentioned under the “Source of Data” shall be demonstrated with valid and working weblink under the footnote. Thus, observation is currently open. <p>Hence, finding (CAR -09) is still open</p>	
Project participant response	Date:12-June-2023
<ol style="list-style-type: none"> Weblink of Tool 30 is included under section 6.1 Weblink of IPCC default value under section 6.1 included 	
Documentation provided by project participant	
Revised Joint PD_MR	
DOE assessment	Date:14-June-2023
<ul style="list-style-type: none"> Section 6.1 has now been updated with valid and working weblink which is further checked and acceptable to the assessment team. Therefore, this observation is closed now. Methodology reference for default IPCC Values has now been updated under section 6.1 of the revised Joint PD Monitoring Report which is further checked & found acceptable to the assessment team. Thus, observation is closed. <p>Hence, finding (CAR-09) is closed now.</p>	

CAR ID	10	Section no.	3.4.8	Date: 06-June-2023
Description of CAR				
<p>Under section 5.2 of submitted Joint PD Monitoring Report, “Data & Parameters Monitored” for achieved emission reduction and removals</p> <ul style="list-style-type: none"> For parameter “Ny,i,j”, PP shall check the applied value with submitted data base for each state and revise the pertaining information accordingly. For parameter verification “$By=1,new,i,j,survey$”, monitoring sample results shall be required for each state. For parameter “Date of Commissioning of batch j”, PP shall demonstrate transparently along with batch date of ICS commissioned. Also, furnish supportive document for the same. Project proponent shall check the nomenclature/notation applied under “baseline emissions” calculation & attenuate with the standard. Further, PP has not submitted ex-post emission reductions sheet 				
Project participant response				Date: 08-June-2023
<ol style="list-style-type: none"> Value of “Ny,i,j”, updated in the revised version for the joint PD_MR Monitoring sample record included for “$By=1,new,i,j,survey$”, in the ex-ante and ex-post ER estimation sheet. Since each ICS is considered as Project activity instances therefore the monitoring parameter relating to “Date of Commissioning of batch j”, is removed. The date of commissioning of each ICS/ project activity instances is outlined in the user database. Nomenclature for emission reduction estimation is updated Ex-post emission reduction sheet submitted 				
Documentation provided by project participant				

1. Revised joint PD_MR 2. User database 3. Ex-post emission reduction estimation	
DOE assessment	Date: 10-June-2023
Under the updated Joint PD Monitoring Report: <ul style="list-style-type: none"> Value for monitoring parameter “<i>N_{y,i,j}</i>”, (Number of project devices) under section 6.2 (Updated Joint PD-MR Template, Version 4.2) has now been updated to total 398,897 numbers in 9 states across the country. Further, information has been checked by the assessment team & found acceptable. Therefore, this observation is closed now. “Ex-post” Emission Reduction Spreadsheet has now been furnished by the project proponent incorporating the details of Monitoring Sample records for each state and monitoring parameter “<i>B_{y=1,new,i,j,survey}</i>”, (Annual Quantity of Woody Biomass). Further, details has been checked and verified by the assessment team & found consistent with revised Ex-post Spreadsheet. Thus, this observation is closed now. Justification provided by the project proponent has been acceptable to the assessment team and further cross verified by the “submitted database” & “updated joint PD Monitoring Report”. Thus, observation is closed. Nomenclature under the baseline emission calculation section has now been updated along with formula attenuation which is checked and found consistent applied methodology, VMR0006, Version 1.1. Thus, observation is closed now. Ex-Post emission reductions spreadsheet has now been furnished, which is checked and found consistent with applied values under the updated Joint PD Monitoring Report. <p>Hence, finding (CAR – 10) has been closed now.</p>	

CAR ID	11	Section no.	3.5.8	Date: 06-June-2023
Description of CAR				
Under section 5.3 of submitted Joint PD Monitoring Report, “Monitoring Plan”: <ul style="list-style-type: none"> Training materials supportive of sampling personal shall be required along with supportive documents. PP shall exaggerate the calibration details of utilised equipment for current project activity and their frequency details for further assessment. 				
Project participant response				Date: 08-June-2023
1. Record of training submitted 2. Since new equipment (weighing scale) is used for monitoring the PO of the same is submitted as a evidence.				
Documentation provided by project participant				
1. Record of training submitted 2. PO of equipment				
DOE assessment				Date: 10-June-2023
Under the revised Joint PD Monitoring Report: <ul style="list-style-type: none"> Attendance sheet and Meeting Minutes, dated 27-April -2023 has now been furnished by the project proponent which is further checked & acceptable to the assessment team. Thus, current observation is closed now. Purchase Order of weighing equipment has now been incorporated. However, their calibration details still observed to missing from the updated Joint PD Monitoring report. Also, Purchase Order for the state Gujarat and Dadar & Nagar Haveli observed to be missing from the submitted set of documents. Thus, observation is still open. <p>Hence, finding (CAR-11) is currently open.</p>				
Project participant response				Date: 12-June-2023

1. Purchase order of the weighing equipment used for the State of Gujarat and Dadra and Nagar Haveli Submitted	
Documentation provided by project participant	
Purchase order of the weighing equipment used for the State of Gujarat and Dadra and Nagar Haveli Submitted	
DOE assessment	Date:14-June-2023
Purchase order of the weighing equipment along with the calibration details has now been incorporated under the monitoring section of the revised Joint PD Monitoring Report. Therefore, this observation is closed now.	
Hence, finding (CAR -11) is closed now	

Table 3. FAR from this validation and verification

FAR-ID	**	Section No.	Date: DD/MM/YYYY
Description of FAR			
N/A			
Project participant response			Date: DD/MM/YYYY
Documentation provided by project participant			
DOE assessment			Date: DD/MM/YYYY

APPENDIX 4: COMPETENCY STATEMENTS

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk review	On-site inspection	Interviews	Verification findings
1.	Lead Auditor/Technical Expert	OR	Singh	Jitendra Mohan	TQC-Outsourced entity	Yes	Yes	Yes	Yes
2.	Auditor in Training	OR	Rai	Amit	TQC-Outsourced entity	Yes	No	Yes	Yes

Technical reviewer and approver of the verification and certification report

No.	Role	Type of resource	Last name	First name	Affiliation (e. g. name of central or other office of DOE or outsourced entity)
1.	Technical reviewer (TR)	EI	Shen	Simon	Applus+ Certification
2.	Approver	IR	Calle de Miguel	Agustin	Applus+ Certification

Short CVs of the Team:

Mr. Jitendra Mohan Singh has done Advanced MSc in Sustainable Energy Systems and Management from International Institute of Management, University of Flensburg, Germany and B.Tech. in Agricultural Engineering from Allahabad University, India. He has more than (18) years of working experience in different organizations like IARI, IIT Delhi, ICAR, IRADe, CAPART, SMEC and Perenia Carbon and M B Power (Madhya Pradesh) Ltd. in the area of Agriculture, Energy & Environment and Climate Change. He also worked on contract basis (ad hoc) as a RIT expert in UNFCCC from 2010 to 2013. Currently, he is empanelled with Applus+

Dr. Amit Rai has done Bachelor of Technology in Electrical & Electronics Engineering from Dr. A.P.J. Abdul Kalam Technical University, India and Government Certified Competency Class – I, Electrical Supervisor from Government of National Capital Territory of Delhi, India. He has more than (6) years of working experience in different organizations like Sunrator Technologies, Sun Source Energy Private Ltd. (SHV Energy Group, Singapore) & KBS Certification Services Private Ltd. (UNFCCC's – DOE), in the area of Renewable Project Management, Execution, Designing & Climate Change Services. Currently, he is associated with Applus+ Certification to carry out validation & Verification activity related to GHG reduction projects as Auditor in Trainee. Mr. Amit Rai is based in Delhi, India

Mr. Simon Shen (Master's Degree in Thermal Energy Engineering, Bachelor's Degree in Environmental Engineering) is an Auditor appointed by Applus+ LGAI for the GHG project assessment, auditing and technical review. He has more than 6 years of work experience in CDM/GS4GG/VCS project assessment and review with Applus+, apart from the years of experience working as GHG Auditor and ISO 9001/14001 in TUV SUD for 3.5 years before he joined Applus+. Mr. Simon Shen has extensive experience also as former Applus+ Shanghai CDM Technical Manager. Mr. Simon Shen is based in Shanghai, China. Mr. Simon Shen participate in the project's technical review team.

APPENDIX 5: CALIBRATION DETAILS OF WEIGHING SCALE

Sr. No	Equipment	Equipment make	Equipment Serial	Date of purchase	Status of calibration	Calibration frequency
1	Digital weighing scale	Balancia	JHM-113521	6-11-2022	Calibrated	Annual
2	Digital weighing scale	Virgo	TMY-1212694	27-04-2023	Calibrated	Annual
3	Digital weighing scale	Shree Ji Plus	SMT-095342	15-03-2023	Calibrated	Annual
4	Digital weighing scale	Balancia	JHM-121035	12-05-2023	Calibrated	Annual
5	Digital weighing scale	Virgo	TMY-1126411	7-11-2022	Calibrated	Annual
6	Digital weighing scale	Balancia	JHM-131126	05-05-2023	Calibrated	Annual
7	Digital weighing scale	ATPL BB SS	YKP-098765432	03-05-2023	Calibrated	Annual
8	Digital weighing scale	Digital Weighing Machine	KDG-149567	2-5-2023	Calibrated	Annual
9	Digital weighing scale	Virgo	TMY-1327399	1-5-2023	Calibrated	Annual