



HOLISTIC DEVELOPMENT OF NORTH EAST INDIA THROUGH CLEAN ENERGY ACCESS

SDG13 VENTURES PTE LTD

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1 PROJECT DETAILS

1.1 Summary Description of the Project

The proposed grouped project activity seeks to reduce greenhouse gases emissions by disseminating fuel- efficient cookstoves in North East part of India, which includes seven hilly states. Northeast India (officially North Eastern Region, NER) is the easternmost region of India representing both a geographic and political administrative division of the country. It comprises eight states – Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura and Sikkim. The proposed grouped project activity seeks to increase access of households and communities to improved cookstoves by disseminating high thermal efficiency and low greenhouse gas emitting cooking stoves known as Improved Cook Stoves (ICS) to the rural and semi-urban households of North Eastern states. Their old low efficiency and high greenhouse gas emitting stoves would be replaced. The implementation of the project activity, will result in the reduction of firewood consumption & consequent emissions from combustion leading to climate change mitigation in a sustainable manner. Overall objectives are reduction of greenhouse gases, conservation of forests and woodlands as well as improved health conditions of ICS users due to improved indoor air quality along with drudgery reduction in everyday cooking.

‘SDG13 Ventures Pte Ltd’ (herein after called as “SDG”) is the project participant (“PP”) for this project. SDG is a company registered in the Republic of Singapore. SDG will facilitate distribution of ICS for rural and semi-urban households in North Eastern states. The project activity will enable the dissemination of ICS manufactured by appropriate ICS manufacturers or technology suppliers meeting project eligibility criteria to the end user.

SDG through its representative in project areas will coordinate with the users of ICS directly or through local partners or its representative to ensure that all requirements with respect to project activity, such as assisting with validation and registration, record keeping, monitoring and survey of households at a regular interval are met.

The individual households using ICS will sign an agreement with the project proponent acknowledging the inclusion of their stove into project activity.

The baseline scenario is the continued use of non-renewable wood fuel by the target population to meet similar thermal energy needs as provided by project cookstoves in absence of project activity.

The first project instance under the group project is expected to distribute 250,000 improved cook stoves in phased manner of distribution. It has planned to distribute 50,000 ICS/year up to 5 years.

The estimated average annual GHG emission reduction from the project is 8,096,480 tCO₂e and the total GHG emission reduction estimated for the whole crediting period from the project activity is 680,017 tCO₂e.

1.2 Sectoral Scope and Project Type

Sectoral Scope: 03

Project Type: Type II – Energy Efficiency Improvement Project

Grouped Project: Yes

1.3 Project Eligibility

The project involves energy efficient cookstove distribution which falls under the category of efficiency improvements in thermal applications, therefore it is eligible under the scope of VCS Program.

1.4 Project Design

The project is a multiple project activity instance. Instances under this project consist of the distributed ICS with a thermal efficiency of at least 25% to household users cooking with non-renewable biomass in the baseline scenario.

☒ The project is a grouped project

Eligibility Criteria

The project is a grouped project. Each new project will be confirmed against the eligibility criteria below:

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
1	Defined geographical boundary	The new project instance boundary shall be confined to national boundaries of North East part of India, which includes seven hilly states. Northeast India (officially North Eastern Region, NER)	Records of household location under the customer registration database. For this instance, records of sales (customer registration database) with clear delineation of project boundary i.e. North East part of India,

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
			which includes seven hilly states. Northeast India (officially North Eastern Region, NER) is provided to the VVB for their reference.
2	Conditional to avoid double counting	To prevent double counting of ICSs distributed under the project, ICS shall be uniquely marked, and new project instance implementers shall provide assurances/declarations that they are not included in any other CDM or Voluntary GHG offset schemes outside of this project	• Unique marking on each ICS (such as a Logo/Serial number or batch number which identifies it as part of the new project instance together with the project database) • Written attestation from the project proponent confirming that the ICSs distributed in the new project instance are not part of any other CDM or Voluntary GHG trading scheme.
3	The specifications of technology/measure including the level and type of service, performance specifications including compliance with testing/certifications	All technologies implemented in the project must demonstrate a minimum thermal efficiency of 25%.	• Independent Third-Party lab testing certificate demonstrating thermal efficiency greater than 25% using testing protocol WBT4.2.1 or a more recent protocol where available. • Product description and specifications For this instance, lab test efficiency certificate for model distributed under this instance has clearly showing the efficiency above 25% will be submitted to VVB.
5	The conditions that ensure that new project instances meet the requirements pertaining to the demonstration of additionality in VCS Standard.	There is no regulatory requirement to use ICS in India, therefore according to 3.8.9 of the VCS Standard (Version 4.1), this section does not need to be completed further.	There is no mandatory legal requirement for installation of cookstoves in households/institutions of North Eastern States of India. The policies relevant to the program are 'the Rural Energy Policy', 'the Renewable (Rural) Energy

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
			Subsidy Policy’ and ‘the Renewable (Rural) Energy Subsidy Delivery Mechanism’. The Renewable (Rural) Energy Subsidy Policy 2016 has made provisions of financial subsidy support for the installation of the household biogas plants only. The above policies only provide the incentives for the installation of household biogas plants and do not provide any obligations or enforced targets, nor do they ban the use of fuel wood for cooking. Therefore, the baseline is use of non-renewable biomass in terms of firewood. No need for further substantiation.
6	Conditions to provide an affirmation that funding from Annex I parties, if any, does not result in a diversion of official development assistance	under this project, new project instance operators shall be required to provide an affirmation that funding from annex I parties, if any, does not result in a diversion of official development assistance	Individual new project instance operators shall sign ODA declarations for new project instances implemented by them to attest that no funding from annex 1 parties that leads to diversion of ODA has been used in the project. the statement shall specify whether or not annex 1 funding is used within the project where funding is sought from annex 1 parties the ODA declaration shall be supported by details regarding annex 1 funding that affirms that the funding doesn’t divert ODA For this instance, no funding from Annex-1 parties is received and

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
			hence, no ODA declaration is required.
7	The Group project-specific requirements stipulated by the project proponent including any conditions related to undertaking local stakeholder consultations and environmental impact analysis	The local stakeholder consultation will be conducted at the initially during the group PD level. Each new project instance/project will be implemented in similar social economic situations. The key stakeholders of the program both at group project activity and new project instance level are the same. No further actions needed at the new project instance level to satisfy the eligibility criteria.	The conditions to meet the requirements on undertaking the local stakeholder consultation have been proven in section further sections of this PD. The conditions to meet the requirements on undertaking the environmental impact assessment have been proven in the group PD.
9	Where applicable, the conditions related to sampling requirements for the group project in accordance with the “Standard for sampling and surveys for CDM project activities and programme of activities”	Monitoring of all new project instances will adhere to all requirements related to sampling for a group project activity in accordance with the sampling guidelines including all annexes and amendments till EB 86 Annex 04.	Specification of the sampling methods applied and compliance with the sampling requirements are established at the group DD. For each new project instance, sampling will be undertaken as part of the group project activity sampling plan, and in the new project instance-PD describes how the group project activity sampling Plan is to be applied For this instance, sampling plan is described in subsequent sections.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
11	Approval of new project instance by project proponent	The project proponent approves each project instance to be included into its registered group project activity.	Statement of project proponent giving approval for the new project instance to be included into its registered group project activity. Since, for this instance project proponent is the implementer, no further approval is required, however for the cases, where implementer other than PP, an approval on the same shall be given by PP in order to include the instance into this grouped project.
12	VCU ownership	End users receiving ICSs under the specific new project instance contractually cede their rights to claim and own emission reductions under the VCS to the project proponent of the group project.	A default distribution agreement for end users including the provision that emission reductions generated by the stove are owned by the project proponent will be provided for each new project instance. Waiver of carbon credits from the end users are submitted to the VVB for this instance.
13	Awareness and agreement of those operating a new project instance on group project subscription	Contractual provisions to ensure that those operating the new project instance are aware and have agreed that their activity is being subscribed to the new project instance.	Evidence for inclusion, in case new project instance operators are different from the project proponent: a declaration from project proponent/implementer, stating that they are aware and have agreed that their activity is being subscribed to the group project will be provided for each new project instance.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
			Since, for this instance, project proponent is the only implementer, no further requirements related to awareness and agreement on their instance to be subscribed under this grouped project, however, for the cases, where implementer other than PP, an agreement on the awareness between PP and new instance implementer shall furnished.

1.5 Project Proponent

Organization name	SDG13 Ventures Pte Ltd
Contact person	Ms Neha Juneja
Title	Director
Address	100 Peck Seah Street #10-18 PS100 Singapore 079333
Telephone	+65 6962 0655
Email	sdg13ventures@gmail.com , nj@sdg13ventures.com

1.6 Other Entities Involved in the Project

Organization name	OFFSETFARM Pte Ltd
Contact person	Mr. Saurabh Saraf
Title	Director

Address	160 Robinson Road, #14-04 Singapore Business Federation Centre Singapore (068914)
Telephone	
Email	info@offsetfarm.io

Organization name	Global Himalayan Expedition
Contact person	Mr. Jaideel Bansal
Title	CEO
Address	Pristine Ladakh 104, Ground Floor, Norgyasling, Murtsey, Leh – 194101
Telephone	+91 99100 89129
Email	jaideep@ghe.co.in

1.7 Ownership

The project ownership is with 'SDG13 Ventures Pte Ltd.' During the registration of ICS, the participating household will sign a declaration to transfer the ownership rights of the carbon assets generated from this project to the project proponent.

1.8 Project Start Date

01/10/2022, the expected start date, it is assumed that the first ICS will be distributed by this date. However, this is an assumption based on the planning.

1.9 Project Crediting Period

01 July 2022 to 31-March -2032, ten years fixed crediting period.

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	X

Large project

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
2022-23	272,927
2023-24	512,962
2024-25	728,145
2025-26	921,038
2026-27	1,093,941
2027-28	975,989
2028-29	874,852
2029-30	659,669
2030-31	466,776
2031-32	293,873
Total estimated ERs	6,800,172
Total number of crediting years	10
Average annual ERs	680,017

1.11 Description of the Project Activity

Stoves disseminated under this grouped project activity will target rural and semi-urban households using traditional, unimproved cookstoves and open fires for cooking. The projects under the group project will distribute improved wood cookstove to households, a portable improved-efficiency stove manufactured in India. The ICS will have an average lifespan of 7 years and thermal efficiency of about 38%.

A typical project instance under project activity will replace conventional firewood stoves with higher efficiency ICS models by leveraging resources provided by the project activity in rural/semi-urban areas. ICSs are more efficient than conventional firewood stoves as they reduce heat loss and improve heat transfer and combustion efficiency. The ICS models are fuel efficient, resulting in a decrease in fuel use in comparison to conventional pre-project stoves while also reducing particulate matter and carbon emissions. Design considerations have also incorporated ergonomics and safety.

The project activity will continually assess biomass stove technology options with the goal of providing the high performing, affordable and locally appropriate technologies to the local environments when possible. As the project expands, several models of biomass stoves produced by ICS manufacturers may be included in the project activity. Inclusion of such stoves would be subject to compliance with requirements of the methodology and the eligibility criteria of the project. The PP is committed to investing in research and development for the improvement of the current stoves being proposed to be disseminated. Thus, during the life of the project activity, research and development may result in dissemination of more efficient ICS models, which shall be absorbed by this project, subject to methodological and eligibility criteria of the project. Upon inclusion into the project activity, all ICS will remain valid throughout the lifetime of the project period until the PP chooses to discontinue crediting of the improved stoves. Each project instances will provide a detailed description on the specific stove model/s implemented/envisaged to be implemented and the target customers for each of them.

Below are the currently eligible ICS:

1. Greenway Jumbo stoves
2. Greenway stoves (e.g. Smart, Prime, Uno)
3. Any other stove with minimum efficiency of 25% shall also be part of inclusion in future instances.

The ICS cooking system is made of a fuel chamber for combusting the renewable biomass. The pot-rest is above the fuel chamber. The stove has one air inlet and weighs approximately 3782 grams.



Fig. Green Jumbo ICS

A record keeping system and unique identification of the ICS will be done by user's information collected through the Beneficiary Agreement and compiled in distribution records. This will include user name, identification number and address/location of the user's house, stove

unique serial code and distribution date. The record keeping system will ensure that each ICS can be traced to project to avoid double counting.

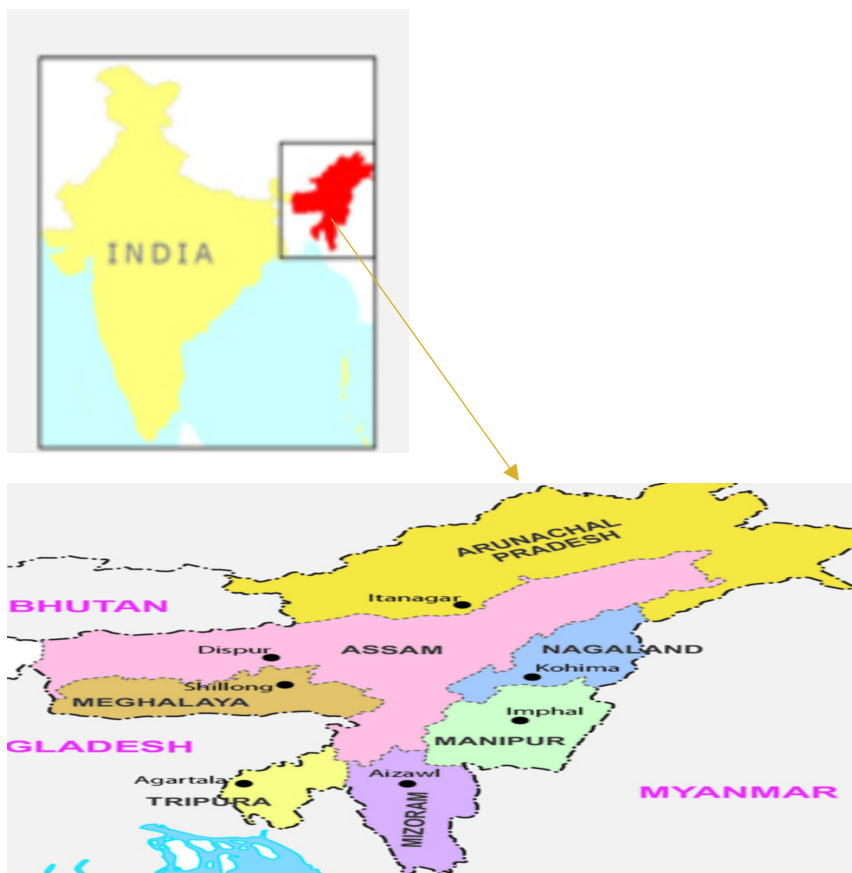
1.12 Project Location

The digesters in this PA are located at various locations across North Eastern States as Indicated in section 1.1. The geographical coordinates of North Eastern states of India are:

Coordinates:

State	Latitude	Longitude
Meghalaya	25° 30' N	91° 00' E
Arunachal Pradesh	28° 00' N	95° 00' E
Assam	28° 00' N	95° 00' E
Manipur	24° 44' N	93° 58' E
Mizoram	23° 30' N	20° 52' E
Nagaland	26° 00' N	94° 20' E
Tripura	23° 45' N	91° 30' E

The map showing the district coverage by the project is given below:



1.13 Conditions Prior to Project Initiation

Various research shows that, firewood was the main fuel used to suffice domestic needs. The publicly available research¹ undertaken by TERI shows the following facts about the North Eastern states of India:

The Himalayan states of India, viz. Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, Uttarakhand and West Bengal are biodiversity hotspots, with a high percentage of their geographical area under forest cover. Many of them have a history of forest conservation and have seen many community-driven movements (Ishizaka, 2013).

The effects of firewood consumption in Indian Himalayan states for cooking and heating purposes have been studied widely. Affluent households with higher levels of firewood consumption are expected to collect or indirectly procure (via market) higher amounts of firewood from forests. Both demand for and supply of firewood is also expected to vary seasonally and thus determine their pattern of fuel stacking.

¹ <https://www.teriin.org/article/firewood-consumption-and-forest-degradation-himalayan-states-review-research-gaps>

Table 1: Snapshot of Indian Himalayan States Wherein the Group Project is Planned to be Implemented.

States	Share of geographical area in the Indian Himalayan Region	Share of rural households using firewood as fuel for cooking
Arunachal Pradesh	0.16	0.85
Assam	0.03	0.81
Manipur	0.04	0.82
Meghalaya	0.04	0.94
Mizoram	0.04	0.81
Nagaland	0.03	0.92
Sikkim	0.01	0.71
Tripura	0.02	0.93

Source: ENVIS Centre on Himalayan Ecology, Census 2011, Forest Survey of India (various years), Maps of India

Usage of inefficient firewood leads to indoor air pollution and land use patterns have been showing a decrease in forest land cover and increase in degraded land. Increasing pressure from human and livestock population and indiscriminate and illegal exploitation of forest resources are among factors that have led to further intensification of the problem. A trend of forests turning into open scrubs has been observed. Degradation of forest lands has exacerbated the already existing problem of desertification. There is a need to maintain adequate forest cover in the state to mitigate climate change effects.

The purpose of the project is to reduce the demand for non-renewable biomass for household cooking needs. AS indicated in the above table that more than 70% of households in the identified project region still cook using traditional biomass stoves and open fires. The project aims to reduce the environmental and social burdens caused by inefficient biomass cooking by introducing energy efficient wood stoves to low- income households.

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

There are no laws and regulations governing the use of improved cookstoves in India for households. The project is a voluntary effort by the project proponent. Though, the government of India promotes use of clean fuel e.g. LPG, however due to the initial capital cost and operating cost, the usage levels are low and most of the rural households still use traditional stoves for cooking.

There is no specific concern made on improved cookstoves project from the above laws and regulations.

1.15 Participation under Other GHG Programs

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

The project activity has not been registered or currently seeking registration under any other GHG programs. The project has not participated under any other GHG program.

1.15.2 Projects Rejected by Other GHG Programs

The Project Participant hereby declares that any other GHG program has not rejected the project activity; an undertaking for the same has been submitted by the Project Participant.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

This project activity is voluntary initiative and it is not to meet any local laws or regulatory compliances. An undertaking has been submitted that PP shall not claim for GHG emission reduction credits for the given crediting period under any other emission-trading program or GHG binding limits.

1.16.2 Other Forms of Environmental Credit

The Project Participant declares that emission reductions generated from the project activity will not be double-counted (i.e. issuance of other form of environmental credit like under CDM) for the particular crediting period, which is being claimed under VCS mechanism. PP has submitted an undertaking to the VVB that they shall not claim for GHG emission reduction credits for the given period under any other emission-trading program

1.17 Sustainable Development Contributions

The following sustainable development benefits are envisaged from the project activity.

Distribute 250,000 high-efficiency, clean burning Greenway Jumbo Cookstoves in North Eastern states of India, to benefit over 2 million individuals. (SDG 7.1.2)

Reduce the total fuelwood usage in the project area to generate approximately 6.8 million tCO₂e of emission reductions. (SDG 13)

Significantly reduce Household Air Pollution (HAP) in rural households (SDG 3.9.1)

Reduce instance of non-communicable respiratory disease, such as Chronic Obstructive Pulmonary Disease (COPD) among adult family members, particularly women and the elderly. (SDG 3.4.1)

Reduce the risk of mortality among infants and children under five years of age due to (1) acute lower respiratory illnesses (ALRI), such as pneumonia and bronchitis, the cause of mortality in 12% of children under five, and (2) burns resulting from children falling into open cooking fires. (SDG 3.2.1, 3.2.2)

Reduce the proportion of time rural women spend on unpaid domestic work related to collection of firewood, and cooking meals on inefficient traditional cookstoves. (SDG 5.4.1)

1.18 Additional Information Relevant to the Project

Leakage Management

Not applicable as the project adopts a net gross adjustment factor of 95% to account for leakage.

Commercially Sensitive Information

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

Further Information

Not Applicable

2 SAFEGUARDS

2.1 No Net Harm

No potential negative environmental or socio-economic impacts have been identified for the project. The project involves the distribution and installation of Greenway certified improved cook stoves to households in North Eastern States which currently use mostly traditional open fire for cooking as explained in section 1.1 above with the research documents. The activities under the proposed project promote improved cook stoves that result in reduced fuel consumption and emissions due to cooking and heating water in homes. The ICS used in this project have characteristics that improve the efficiency of combustion and thermal transfer to the pot compared with three-stone fires or traditional pot support. Furthermore, traditional cooking methods involve open fires that result in the emissions of local pollutants such as carbon monoxide and particulate matter in often poorly ventilated rooms, which lead to respiratory problems. In addition, open fires are frequent causes of burns and other injuries. Switching from fireplaces to ICS reduces the incidence of such injuries and health problems. Therefore, the Greenway Jumbo Stove installed under this project presents positive environmental impacts wherever they are applied, and no negative environmental impacts have been identified.

2.2 Local Stakeholder Consultation

The Local Stakeholder meeting was conducted in online mode considering the rising COVID-19 cases and also this project is greenfield project. The invitations were sent out on email and the newspaper advertisements in regional newspaper 'Meghalaya Times' which has a wide readership in the identified distribution area. Advertisement was published on 06th April 2022 in the cite regional newspaper and local stakeholder meeting was held on 04th May 2022. This ensured that the project adhered to the criteria of giving reasonable time notice to stakeholders invited. Stakeholders were chosen in such a manner that they represent the various fields e.g., the experts of climate change, cookstoves, consultants, NGOs including the potential users. The minutes of the meeting were recorded by the project participant. The meeting invitation through newspaper is presented below:



Contractors accused of using second-hand pipes
Tongkhar warns against shortcuts in JJM
Staff Reporter
Shillong, April 6: The state government has accused contractors of using second-hand pipes in the construction of the Jaintia Jalpaiguri (JJM) project. The state government has accused contractors of using second-hand pipes in the construction of the Jaintia Jalpaiguri (JJM) project. The state government has accused contractors of using second-hand pipes in the construction of the Jaintia Jalpaiguri (JJM) project.

Govt ready to check army vehicles for drugs
Staff Reporter
Shillong, April 6: The state government has announced that it will check army vehicles for drugs. The state government has announced that it will check army vehicles for drugs. The state government has announced that it will check army vehicles for drugs.

Police probing bomb threat
Staff Reporter
Shillong, April 6: The state police are probing a bomb threat against the state government. The state police are probing a bomb threat against the state government. The state police are probing a bomb threat against the state government.

Man takes the law into his own hands
Staff Reporter
Shillong, April 6: A man has taken the law into his own hands by attacking a police officer. The man has taken the law into his own hands by attacking a police officer. The man has taken the law into his own hands by attacking a police officer.

Govt releases Rs 60 cr for SSA teachers' dues
Staff Reporter
Shillong, April 6: The state government has released Rs 60 crore for the payment of dues to school teachers. The state government has released Rs 60 crore for the payment of dues to school teachers. The state government has released Rs 60 crore for the payment of dues to school teachers.

Govt yet to appoint new DGP
Staff Reporter
Shillong, April 6: The state government has not yet appointed a new Director General of Police (DGP). The state government has not yet appointed a new Director General of Police (DGP). The state government has not yet appointed a new Director General of Police (DGP).

Kinks in school bus project being worked out
Staff Reporter
Shillong, April 6: The state government is working to resolve the kinks in the school bus project. The state government is working to resolve the kinks in the school bus project. The state government is working to resolve the kinks in the school bus project.

Students miss exams because of landslides
Staff Reporter
Shillong, April 6: Students have missed their exams due to landslides. Students have missed their exams due to landslides. Students have missed their exams due to landslides.

HC wants action report on prevention of 'loot of minerals'
Staff Reporter
Shillong, April 6: The High Court has asked the state government to submit an action report on the prevention of the 'loot of minerals'. The High Court has asked the state government to submit an action report on the prevention of the 'loot of minerals'. The High Court has asked the state government to submit an action report on the prevention of the 'loot of minerals'.

Students miss exams because of landslides
Staff Reporter
Shillong, April 6: Students have missed their exams due to landslides. Students have missed their exams due to landslides. Students have missed their exams due to landslides.

2.3 Environmental Impact

No negative environmental impacts have been identified from the project and environmental impact assessment (EIA) is not required for the project.

There are no major impacts on the environment due to the installation of the ICS. The local ecology is not likely to get impacted by this type of programme activity. The group activity included under this group project helps in reducing the consumption of the firewood thus reducing the pressure on forest, reduces indoor air pollution and benefits with the use of dung cakes as fuel farmyard manure thus having positive environmental impacts.

2.4 Public Comments

After the detailed presentation on the grouped project the participants got involved asking their questions regarding the ICS. The following excerpts were recorded during the meeting:

Name of Stakeholder	Question by Stakeholder	Answer by Project Participant
Ms. Udisha Trivedi	Ms. Udisha asked how will the social impact of the project be quantified and monitored?	Mr. Saurabh Saraf (SDG representative) answered that the quantification of the social impact will be done by the team consisting of both SDG-13 Ventures Pte Ltd and Global Himalayan Expedition. The quantification will be done as per the methodological guidance of Verra VCS standards.
Sagar Saroha	Mr. Sagar asked whether the stove has been custom designed to meet the needs of local inhabitants of the North East?	Mr. Ankit Mathur answered that the stoves are designed so that it thermodynamically enables air draft to move in a way that it ensures that the particulate matter is combusted to the maximum extent possible, in all geographic locations. Jumbo stoves would suffice in North Eastern areas too.

There were no negative comments raised by stakeholders in local stakeholder consultation meetings and due to the associated benefits stakeholders have appreciated the proposed project activity. The detailed 'Minutes of Meeting' is presented in Appendix 1.

2.5 AFOLU-Specific Safeguards

This section is not applicable as the project is a non-AFOLU project.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Following approved baseline & monitoring methodology is applied;

Methodology: VMR0006- Methodology for Installation of High Efficiency Firewood Cookstoves

Version: 1.1

Sectoral Scope: 03

Tools:

“TOOL30: Calculation of the fraction of non-renewable biomass”; Version-03, EB 108, Annex 11

3.2 Applicability of Methodology

The methodology measures below constitute the justification for the choice of the selected methodology by showing that project instances under the project activity meets each applicability condition of the methodology.

S. No	VCS Methodology requirement	Project justification
1	The project stove is a single pot or multi pot portable or an in-situ cookstove using only woody biomass; Additional requirement to demonstrate that the biomass used is solely renewable biomass in case project activities replacing baseline stoves using fossil fuel	The proposed instances will distribute high efficiency single-pot improved cook stove for thermal application, which will replace inefficient traditional cookstove leading to saving of non-renewable biomass. The ICS to be distributed under the project activity is Greenway Jumbo stoves/greenway stoves. All ICS in this project will replace existing traditional wood stoves; therefore, no greenfield installations are included. Further, the project activity will utilize only renewable biomass under project scenario. This criterion will be checked from data recorded on the baseline stove used prior to ICS installation.
2	Project activities shall be implemented in domestic premises or in community-based kitchens	The project activity will replace traditional wood-based stove in individual households

		or community-based kitchens in rural/semi urban areas.
3	The project stove shall have specified high-power thermal efficiency of at least 25% per the manufacturer's specifications and shall exclusively use woody biomass and can be single pot or multi-pot; in case of project stove replacing fossil fuel baseline stove, it shall exclusively use renewable biomass	The Greenway or Greenway Jumbo single pot portable improved cooking stoves planned to be distributed have a specified efficiency of 38% as per water boiling test in compliance with Tier II and above as per ISO as tested and certified by third party.
4	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	Proof that biomass has been used in the project region, i.e., in the host country India since 31 December 1989 is available through widespread documentation. Report by National sample survey organization (NSSO), department of statistics, Government of India reveals that 79% of the rural households in India were dependent of firewood and chips in the year 1987-88². The same article reported 78% of rural households to be dependent on firewood and chips in the year 1993-94. National sample survey organization, Government of India reveals that 75% of the rural households in rural India were primarily dependent of fuelwood and chips³. Fuel wood is the main source of energy in rural areas. Wood energy is mainly used as fuel for cooking at household. The above clearly shows that the rural areas in the host country are dependent on biomass since and before 1989 with not much change in the trend which clearly depicts the dependence of the people of the host country on woody biomass as fuel

² http://mospi.nic.in/sites/default/files/publication_reports/410_2_part2_final.pdf

³ http://mospi.nic.in/sites/default/files/publication_reports/511_final.pdf

		for meeting thermal energy requirement for cooking at households.
5	For the specific case of biomass residues processed as a fuel (e.g. briquettes, wood chips), it shall be demonstrated that: (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 displaced fossil fuel and hence disregarded	The ICS is introduced as energy efficiency measure to replace baseline stoves and reduce the use of non-renewable biomass for combustion. The consumption of the fuel used in the project activity will be monitored. If briquettes utilization in project case the energy consumption for manufacturing of briquettes and transportation of briquette will be monitored to calculate project emissions
6	The project description 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).	A record keeping system and unique identification of the project device will be used. This will include user name, user identification number and address/ location of the user's house and distribution date. The record keeping system will ensure that each ICS can be traced to project instances to avoid double counting.
7	The project description 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.	The project proponent will sign an end user agreement with individual household/user to ensure only PP can claim the emission reduction. A default distribution agreement for end users including the provision that emission reductions generated by the stove are owned by the PP will be provided for each user.

Tool 30 - Calculation of the fraction of non-renewable biomass

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);	Option (b) applied to calculate the project specific f_{NRB} value as described under section 4.1 of the PD.

or (b) project participants to calculate project- or PoA-specific fNRB values.	
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3.3 Project Boundary

Table 1: GHG Sources Included In or Excluded From the Project Boundary

Source		Gas	Included?	Justification/Explanation
Baseline	Emission from use of non-renewable biomass/Fossil fuel	CO2	Yes	Major source
		CH4	Yes	Major source
		N2O	Yes	Major source
		Other	No	No other source identified
	Production & Transport of Fuel	CO2	Yes	Can be a major source
		CH4	Yes	Can be a major source
		N2O	Yes	Can be a major source
		Other	No	No other source identified
Project	Emission from use of non-renewable biomass	CO2	Yes	Major source
		CH4	Yes	Major source
		N2O	Yes	Major source
		Other	No	No other source identified
	Production & Transport of Fuel	CO2	Yes	Can be a major source
		CH4	Yes	Can be a major source
		N2O	Yes	Can be a major source
		Other	Yo	No other source identified

3.4 Baseline Scenario

The existing traditional stoves used in the baseline are simple structures made from clay or having stone or metal tripods with poor combustion air supply or flue gas ventilation system i.e. without a grate or a chimney. These stoves use non-renewable biomass (firewood).

3.5 Additionality

Activity Method

Step 1: Regulatory Surplus

There is no mandatory legal requirement for installation of cookstoves in households/institutions of India. Since is no regulatory requirement to use ICS in India, therefore according to 3.8.9 of the VCS Standard (Version 4.1), this section does not need to be completed further.

3.6 Methodology Deviations

The project activity has not taken any deviation in applied approved methodology VMR0006, version 1.1.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

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 t CO₂e
- ER_{y,i,j} = Emission reductions by improved cookstove of type i and batch j during year y in t CO₂e

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

Where:

- B_{y,savings,i,j} = Quantity of woody biomass that is saved in tonnes per improved cookstove of type i and batch j during year y
- f_{NRB,y} = Fraction of woody biomass that can be established as non-renewable biomass (f_{NRB})
- NCV_{wood fuel} = Net calorific value of the non-renewable woody biomass that is substituted or reduced (IPCC default for wood fuel, 0.0156 TJ/tonne)⁴

⁴ 2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 2 Energy, Chapter 1 Introduction

EF_{wf,CO_2}	=	CO ₂ emission factor for the use of wood fuel in baseline scenario (IPCC default for wood fuel, 112 tCO ₂ /TJ) ⁵
$EF_{wf,non\ CO_2}$	=	Non-CO ₂ emission factor for the use of wood fuel in baseline scenario (IPCC default for wood fuel, 26.23 tCO ₂ /TJ) ⁶
$N_{y,i,j}$	=	Number of improved cookstoves of type i and batch j operating during year y
0.95	=	Discount factor to account for leakage

To calculate $B_{y,savings}$, we use Option 1 of the applied methodology⁷

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

Where:

B_{old}	Quantity of wood fuel used in the absence of the project activity in tonnes
η_{old}	A default value of 0.10 may be optionally used if the replaced system is a three stone fire, or a conventional system with no improved combustion air supply or flue gas ventilation system, i.e., without a grate or a chimney.
$\eta_{new,i,j}$	Efficiency of the system being deployed as part of the project activity (fraction), as determined using the Water Boiling Test (WBT) protocol.

As some of the project households continue to use baseline cookstoves along with improved cookstoves, B_{old} has been adjusted ex-post based on the percentage of project households found to continue such practice according to the Equation 6 of applied methodology as follows:

$$B_{old,adjusted} = B_{old} \times (1 - \mu_y)$$

Where:

$B_{old,adjusted}$	=	Adjusted B_{old} to account the ex-post usage of firewood in baseline cookstove(s) by project households in addition to improved cookstove (in tonnes per device)
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⁵ 2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 2 Energy, Chapter 2 Stationary Combustion

⁶ 2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 2 Energy, Chapter 2 Stationary Combustion

⁷ Equation 3 of methodology VMR 0006

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

For ex-ante estimates:

Calculation of f_{NRB}

Calculation of f_{NRB} has been carried out as per the latest version of CDM tool 32 and the spreadsheet with evidence shall be submitted to VVB for validation.

The fraction of woody biomass that can be established as non-renewable, is:

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

Where:

f_{NRB} = Fraction of non-renewable biomass (fraction or %)

NRB = Quantity of non-renewable biomass (t/yr)

RB = Quantity of renewable biomass (t/yr)

Estimation of consumption of woody biomass (H/Bold,total) is done following paragraph 11 (a) of the tool 'Official Statistics'.

As per Forest Survey of India report 2011, Annual fuelwood consumption in household sector and consumption of wood in House construction, Furniture and Agriculture is given below: Parameter

States

Assam

HWregion *Nregion	Annual wood fuel consumption in household sector (Ton/year)	13910000 ⁸
Tlregion	Non-domestic wood consumption (ton/year)	26449750 ⁹
H= HWregion *Nregion+Tlregion	Total wood consumption (ton/year)	40364750

Procedure to estimate RB:

Renewable biomass (RB) in the country/region/area is estimated using the equation below:

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

⁸ http://fsi.nic.in/cover_2011/chapter7.pdf

⁹ http://fsi.nic.in/cover_2011/chapter7.pdf

Where:

$MAI_{forest,i}$ = Mean Annual Increment of woody biomass growth per hectare in subcategory i of forest areas (t/ha/yr). For this parameter report from report from publicly available research paper is used⁹.

$F_{forest,i}$ = Extent of forest in sub-category i (ha). India state of forest report, 2019 has been referred for this parameter.

$MAI_{other,i}$ = Mean Annual Increment of woody biomass growth per hectare in subcategory i of other wooded land areas (t/ha/yr). This data is not available and hence not used.

$F_{other,i}$ = Extent of other wooded land in sub-category i (ha). This data is not available and hence not used.

P_{forest} = Extent of non-accessible area (e.g. protected area where extraction of wood is prohibited, geographically remote area) within forest areas (ha). This data is not available and hence not used.

P_{other} = Extent of non-accessible area (e.g. protected area where extraction of wood is prohibited, geographically remote area) within other wooded land areas (ha). This data is not available and hence not used.

i = Sub-category i of forest areas and other wooded land areas. This data is not available and hence not used.

State	Assam
$MAI_{forest,i}$	0.974 ¹⁰
$F_{forest,i}$	1853000 ¹¹
RB	1904822

Accordingly, the fNRB would be: State	H	RB	NRB (H-RB)	fNRB
Assam	40364750	1904822	38459928	95%

Sample Calculation for the 1st year of operation

$$B_{y,savings,i,j} \text{ (For the first year)} = 4.2 \times (1 - 0.10/0.357)$$

$$= 3.095 \text{ Tones/Year}$$

$$ER_{y,i,j} \text{ (For the first year)}$$

$$= 3.095 \times 50,000 \times 0.95 \times 0.0156 \times (112 + 26.23) \times 0.95$$

$$= 272,927 \text{ (Rounded down value)}$$

¹⁰

<https://link.springer.com/article/10.1007/s10584-010-9986-3#:~:text=Using%20recent%20remote%20Dsensing%20based,43%20Mg%20C%20ha%20%E2%88%92%201>

¹¹ <https://fsi.nic.in/isfr19/vol2/isfr-2019-vol-ii-assam.pdf>

4.2 Project Emissions

The methodology does not account for baseline emissions separately, but instead quantifies net emission reductions achieved by the project. Please refer to Section 4.4.

4.3 Leakage

Leakage is already accounted in calculation of emission reduction by adjusting with default value of 0.95.

4.4 Net GHG Emission Reductions and Removals

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e) ¹²	Estimated net GHG emission reductions or removals (tCO ₂ e)
2022-23	320,046	0	0	272,927
2023-24	606,957	0	0	512,962
2024-25	864,148	0	0	728,145
2025-26	1094,685	0	0	921,038
2026-27	1301,318	0	0	1,093,941
2027-28	1,166,469	0	0	975,989
2028-29	1,045,533	0	0	874,852
2029-30	788,342	0	0	659,669
2030-31	557,805	0	0	466,776
2031-32	351,172	0	0	293,873
Total	8,096,475	0	0	6,800,172

5 MONITORING

¹² 5% leakage is already deducted and considered in the baseline calculation as per the methodology.

5.1 Data and Parameters Available at Validation

Data / Parameter	Bold
Data unit	Tonnes/year
Description	Annual quantity of woody biomass that would have been used in the household in the absence of the project activity to generate useful thermal energy equivalent to that provided by the project devices.
Source of data	Value taken from publicly available 'GS' Project 7576' in the same region.
Value applied:	4.20
Justification of choice of data or description of measurement methods and procedures applied	Value taken from publicly available 'GS' Project 7576 in the same region.
Purpose of the data	Calculation of baseline and project emissions
Comments	<i>Nil</i>

Data / Parameter	NCV_{woodfuel}
Data unit	TJ/tonne
Description	Net calorific value of the non-renewable woody biomass that is substituted or reduced
Source of data	Default as per applied approved methodology VMR0006, v1.1
Value applied	0.0156
Justification of choice of data or description of measurement methods and procedures applied	Default value as per applied approved methodology
Purpose of Data	Calculation of baseline emissions
Comments	The value is fixed ex-ante

Data / Parameter	EF_{wf,CO2}
Data unit	tCO ₂ /TJ
Description	CO ₂ emission factor for the use of wood fuel in baseline scenario

Source of data	Default as per applied approved methodology VMR0006, v1.1
Value applied	112
Justification of choice of data or description of measurement methods and procedures applied	Default as per applied approved methodology VMR0006, v1.1
Purpose of Data	Calculation of baseline emissions
Comments	The value is fixed ex-ante

Data / Parameter	$EF_{wf,non\ CO_2}$
Data unit	tCO ₂ /TJ
Description	The non-CO ₂ emission factor for the use of wood fuel in baseline scenario
Source of data	Default as per applied approved methodology VMR0006, v1.1
Value applied	26.23
Justification of choice of data or description of measurement methods and procedures applied	Default as per applied approved methodology VMR0006, v1.1
Purpose of Data	Calculation of baseline emissions
Comments	The value is fixed ex-ante

Data / Parameter	$f_{NRB,y}$
Data unit	Fraction
Description	Fraction of non-renewable biomass saved by the project activity
Source of data	CDM Tool
Value applied:	0.95
Justification of choice of data or description of measurement methods and procedures applied	This parameter shall be determined ex-ante applied by each instance.
Purpose of the data	Calculation of baseline and project emissions

Comments	The report of f_{NRB} will be made available to VVB during the validation
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Data / Parameter	η_{old}
Data unit	Fraction
Description	Efficiency of baseline cookstove
Source of data	Methodological default value
Value applied	0.1
Justification of choice of data or description of measurement methods and procedures applied	A default value of 0.1 shall be used if baseline device is a three-stone fire using firewood (not charcoal), or a conventional device with no improved combustion air supply or flue gas ventilation, that is without a grate or a chimney
Purpose of Data	Calculation of baseline emissions
Comments	The value is fixed ex-ante

Data / Parameter	η_P
Data unit	Fraction
Description	Efficiency of project stove at the start of project activity
Source of data	Manufacturer specification
Value applied	0.38
Justification of choice of data or description of measurement methods and procedures applied	The parameter has been sourced from the efficiency tested in laboratory. Testing results shall be submitted to VVB for validation.
Purpose of Data	Calculation of $\eta_{y,i,j}$
Comments	--

5.2 Data and Parameters Monitored

Data / Parameter	$N_{y,i,j}$
Data unit	Number
Description	Number of project devices of type I and batch j operating during year y
Source of data	Monitoring
Description of measurement methods and procedures to be applied	Measured directly or based on a representative sample. Sampling standard shall be used for determining the sample size to achieve 95/10 confidence precision according to the latest version of Standard for sampling and surveys for CDM project activities and programme of activities.
Frequency of monitoring/recording	At least once every two years
Value applied	For ex-ante emission reduction calculation, it is assumed that the project will distribute up to 50,000 ICS in phases i.e. 250,000 each year for first 5 years.
Monitoring equipment	Monitoring survey
QA/QC procedures to be applied	The project implementor shall maintain a distribution record to calculate this parameter.
Purpose of data	Calculation of baseline emissions
Calculation method	Proportion of operational stoves obtained from the survey is multiplied by the total commissioned stoves to arrive at this value
Comments	--

Data / Parameter	$\eta_{new,i,j}$
Data unit	Fraction
Description	Efficiency of the device of each type i and batch j implemented as part of the project activity
Source of data	Manufacturer specification or <i>Certification by a national standards body or an appropriate certifying agent recognized by that body</i>
Description of measurement methods and procedures to be applied	To adopt Option V given in the methodology: "Efficiency of the improved cookstoves to be estimated using equation 5 of applied approved methodology where loss in efficiency per year is calculated, and therefore this parameter does not need to be monitored"
Frequency of monitoring/recording	Annual
Value applied	0.38 at start of operation Year 1= 0.357 Year 2=0.354 Year 3=0.350 Year 4=0.347 Year 5=0.343 Year 6= 0.340 Year 7= 0.336
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of data	Calculation of baseline emissions
Calculation method	As per equation 5 of VMR0006, version 1.1 i.e. $\eta_{new,i,j} = \eta_P \times (DF_n)^{Y-1} \times 0.94$
Comments	--

Data / Parameter	Life span
Data unit	Years
Description	The operating lifetime of the project device. The life span should be reported if the methodology equation 5 is adopted to determine the project stove efficiency
Source of data	Manufacturer specification
Description of measurement methods and procedures to be applied	The data source as per manufacturer specification
Frequency of monitoring/recording	Once at the time of installation of batch of type of stove
Value applied	7
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of data	Calculation of baseline emission
Calculation method	Not applicable
Comments	--

Data / Parameter	Date of commissioning of batch j
Data unit	Date
Description	To establish the date of commissioning, the Project Participant may opt to group the devices in “batches” and the latest date of commissioning of a device within the batch shall be used as the date of commissioning for the entire batch.
Source of data	Project database
Description of measurement methods and procedures to be applied	Fixed and recorded at the time of commissioning/distribution of the last project device in the batch
Frequency of monitoring/recording	Fixed and recorded at the time of commissioning/distribution of the last project device in the batch
Value applied	01/07/2022 (expected)

Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of data	Calculation of emission reduction
Calculation method	Not applicable
Comments	--

Data / Parameter	μ_y
Data unit	Fraction
Description	Adjustment to account for any continued use of pre-project devices during the year y
Source of data	Monitoring survey
Description of measurement methods and procedures to be applied	This parameter should be monitored using one of the following methods: If the baseline cookstoves are decommissioned and no longer used, as determined by the monitoring survey its value is 0 and Bold, adjusted is equal to Bold. If both the improved cookstove and baseline cookstoves are used together then surveys shall be conducted to record the average continued operation of baseline cookstoves in a sample of households. The surveys should be designed to capture the cooking habits and stove usage of households in the region, including quantification of use of baseline cookstoves, by formulating questions and/or collecting evidences to determine the frequency of usage of both the improved cookstoves and baseline cookstoves.
Frequency of monitoring/recording	At least once in 2 years
Value applied	1
Monitoring equipment	Monitoring survey
QA/QC procedures to be applied	A 95 /10 confidence / margin of error shall be achieved for the sampling parameter irrespective of annual / biennial monitoring frequency as per para 22 of Standard: Sampling and surveys for CDM project activities and programmes of activities, Version 09.0. In the case the desired precision is not met, lower bound

	values shall be used against repeating the survey to determine the operational fraction of stoves.
Purpose of data	Calculation of baseline emissions
Calculation method	Not applicable
Comments	--

5.3 Monitoring Plan

The methods for measuring, recording, storing, aggregating, collating and reporting data and parameters. Where relevant, include the procedures for calibrating monitoring equipment.

The organizational structure, responsibilities and competencies of the personnel that will be carrying out monitoring activities.

The policies for oversight and accountability of monitoring activities.

The procedures for internal auditing and QA/QC.

The procedures for handling non-conformances with the validated monitoring plan.

Any sampling approaches used, including target precision levels, sample sizes, sample site locations, stratification, frequency of measurement and QA/QC procedures.

Sample Plan:

The monitoring plan is designed to monitor the parameters listed in Section above, which are required for calculation of the actual GHG emission reduction achieved by the project activity using ex post sampling survey. The share of operating stoves and the continued use of pre-project devices will be determined based on sampling procedures as outlined below. The PP will be responsible for conducting the sampling surveys and maintaining a database with all operating stoves.

No monitoring for leakage through competitive uses of biomass is required, as the parameter wood usage is multiplied by 95% to account for leakage.

As per the Guideline for Sampling and Surveys for CDM Project Activities and Programme of Activities, version 04, the sampling plan is the following:

(a) Sampling Design

Due to the large number of ICS envisioned to be distributed as part of the project activity, it is not economically feasible to monitor each individual ICS unit distributed. Therefore, representative sampling will be undertaken as part of a project instance-wide Sampling Plan (by grouping and sampling across project activities) that is designed in line with the requirements of the "Sampling and surveys for CDM project activities and programme of activities", version 04.

(i) Objective and Reliability Requirements:

The objective is to obtain an unbiased and reliable estimate of the proportion or mean value of the following key variables over the course of the crediting period. As per CDM Methodology AMS-II.G, 90/10 confidence/precision shall be applied for annual sampling requirement and 95/10 for biennial sampling inspection. As per Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities, 90/10 confidence/precision to be adopted for small-scale project and 95/10 for large-scale project. Given that the size of the project is under the category of large projects, hence 95/10 confidence/precision shall be adopted for all parameters unless the average annual emission reductions *of the project below the threshold*

Monitored Parameter:

Parameter	Description	Parameter type/Frequency
$N_{y,i,j}$	Number of project devices of type i and batch j operating during year y	Proportion/Biennially
$\mu_{y,i,j}$	Adjustment to account for any continued use of pre-pre-project devices during the year y	Proportion/Biennially
$B_{y=1,new,i,j,survey}$	Quantity of woody biomass used by project devices in tonnes per device of type i and batch j	Mean value

(ii) Target Populations:

- The target population for the proportion of ICS still in operation ($N_{y,i,j}$ and $\mu_{y,i,j}$) of this project are all households in the project database which are using fuel wood in ICS distributed under the project for cooking.
- The target population for pre project appliances ($\mu_{y,i,j}$) is the set of old stoves still in use under the project database.

(iii) Sampling Frame

To ensure the homogeneity of the project instances included for a single sampling plan, two sampling frames shall be defined. Overall, all project instances will have same group of end users which is from households from rural/semi-urban areas. The projects are to be implemented in rural/semi-urban areas; thus, it is expected that the geographical locations do not have influence on the parameter of interest. Therefore, all above mentioned parameters can be assumed to be highly homogeneous for each ICS model regardless of how the end user group and distribution/installation location is defined.

1) Sampling frame for proportion of ICS in operation ($N_{y,i,j}$)

The sample frame refers to all the information sources on the Database. There are two primary mechanisms for data collection: the Registration Process for newly distributed/installed ICS and the Monitoring Survey (which includes a household questionnaire and visual inspection of ICSs) that will be used throughout the lifetime of the ICS. The detailed information collected from Registration Process is used to populate the stoves Database and the Monitoring Survey follows “Sampling and Surveys for CDM Project Activities and Programme of Activities”, version 04.

As explained below (on section “Sampling Method”), to take the different characteristics of different project instances Implemented and ICS models into consideration, Project instances shall be grouped together to create a Primary Sampling Unit, which is homogenous. As per EB 86 Annex 04, Appendix-2, paragraph 1, for the use of a single sampling plan covering a group of projects, provided the homogeneity of population can be demonstrated, or differences are taken into account in the sample size calculation, a 95/5 confidence/precision is applied for biennial sampling..

The first step is to identify the Primary Sampling Units. Primary sampling units are project instances, which have:

1. The same ICS models

That is project with the same ICS model can therefore be grouped together and form a Primary Sampling Unit. In case project has two different ICS models being implemented – this will form two Primary Sampling Units. This is justified by the fact that project might vary in terms of performance and it is important for the PP to collect and monitor accurate data for each stove model.

2) Adjustment to account for any continued use of pre-project devices during the year($\mu_{y,i,j}$)

In line with applied approved methodology AMS-II.G, as installing data logger is not practical and if any use of pre project devise can be monitored in a common survey with other monitoring parameters; therefore, a random sub-sample within the common survey can be taken to determine continued use of old cookstoves and its proportional usage by including suitable questionnaire.

There will be two situations 1) project ICS are completely discarded 2) the old stoves used along with project ICS.

Hence in first case it will be simple multiplication of fraction of total number of project ICS displaced by old cookstoves by total number of cookstoves in project, to achieve precise results based on survey result sample size calculation can be repeated.

However, for second case, surveys may be conducted if the use of data loggers to record the continued operation of baseline devices is demonstrated to be not practical, for example when

the baseline device is the three-stone fire. The surveys should be designed to capture the cooking habits and stove usage of households in the region, including quantification of use of baseline devices, by formulating questions and/or collecting evidences to determine the frequency of usage of both the project devices and baseline devices. For example, if there were 3 pre-project devices per household and it was determined during the survey that use of one of them continues during the crediting period then a conservative adjustment factor of 0.66 is applied for the relevant monitoring period. Another example would be the case where there was only one pre-project device per household and its use during the project period continues along with the project stove to meet 25% of the cooking needs of the household in which case the adjustment factor will be 0.75. Where a more precise data is available i.e. the thermal capacity of the project and pre-project devices and respective utilization hours, a weighted average adjustment factor may be used.

3) Quantity of woody biomass used by project devices in tonnes per device of type i and batch j ($B_{y=1,new,i,j,survey}$)

As mentioned above the either separate sampling can be done for this parameter or can be clubbed with sampling of above parameters, wherein interview question to be included to determine the average fuel wood used by the project device.

(iv) Sampling Method

The sampling method for monitored parameters $N_{y,i,j}$, and $\mu_{y,i,j}$ is Simple Random Sampling and samples will be randomly selected from the primary sampling units as illustrated above. To ensure a random selection of ICS, random number generators shall be applied. Each ICS in the target population is uniquely identifiable by its unique ID number. Each ICS can thus be allocated a Sample Selection Number in each monitoring period, starting at 1 and increasing up to the total number of ICS in the Database for that pre-defined sampling frame. Applying the random number generators, the ICS can then be randomly chosen from the defined population up to the required sample size as calculated by the PP.

To determine the parameters, sampling will involve the following approaches (outcome in brackets):

$N_{y,i,j}$: Visual inspection of the premises to see if ICS is operational and in use. Interview with end user if required to verify that ICS is still in use (Yes/No)

$\mu_{y,i,j}$: Pre project device only is in use then fraction to be used to calculate total number, however if pre project device is used along with project ICS, proportion of usage of each will be determined by cooking habits evaluated by survey questionnaire during the monitoring period.

$B_{y=1,new,i,j,survey}$: Quantity of woody biomass used by project devices in tonnes per device (first year of installation)

Using the formulas in the section “Sample Size” below, the PP will randomly sample the required number of ICS from the primary sampling units. It is important to note that for $\mu_{y,i,j}$

where partial usage of both old stoves and project ICS are observed, for each household under sample cooking habits must be taken into consideration.

(v) Sample Size

For the estimation of the proportion or mean value of the parameters investigated, the minimum sample size for each sample frame has to achieve the 95/10 confidence/precision. for annual and 95/5 confidence/precision for biennial sampling.

The procedure to determine the sample of households will ensure that they adequately represent the broader project population, minimizing sampling error. Using, a 95 per cent confidence level, and a 5 per cent margin of error, random samples will be selected from each Primary Sampling Unit. There are three parameters that will be estimated through sampling: the number of stoves still in operation during the monitoring period as determined by the monitoring survey ($N_{y,i,j}$), Quantity of woody biomass used by project devices in tonnes per device ($B_{y=1,new,i,j,survey}$) and the continued use of old stoves, ($\mu_{y,i,j}$). In line with sampling guidelines, all can be sampled in a single survey with a random sample of households using the above described confidence/precision levels depending on annual or biennial monitoring frequency. The $N_{y,i,j}$ and $\mu_{y,i,j}$ requires proportion/percentage parameters, however the wood consumption by ICS may have variation and will be a mean value.

In order to calculate the required sample size estimates, values for the proportions, mean values, and standard deviations are required. As per Guidelines for Sampling and surveys for CDM project activities and programmes of activities, version 07.0 Appendix 1 paragraph 5, there are different ways available to obtain the estimates of the parameter of interest:

- (a) Refer to the result of previous studies and use these results;
- (b) In a situation where information from previous studies is not available, a preliminary sample as a pilot could be conducted and use that sample is used to provide the estimates;
- (c) Use best guesses based on the researcher's own experiences.

For the registration purpose of project, option C shall be applied. For the first monitoring period, values from a pilot shall be applied. For the following monitoring periods, the estimates shall be adjusted taken into account the results of the previous monitoring period(s) or the result from recent pilot study, which is conducted after the previous monitoring periods.

To estimate the sample size for parameters $N_{y,i,j}$ and $\mu_{y,i,j}$ the following equation is used:

$$n \geq \frac{1.96^2 N \times p (1-p)}{(N -1) \times 0.1^2 \times p^2 + 1.96^2 \times p(1-p)}$$

Where:

n = Sample size

N = Population size (Total number of households/ICS)

p = Expected proportion

1.96 = Represents the 95% confidence required

(In the case of 90% confidence, 1.645 shall be used)

0.1 = Represents the 10% relative precision

The following assumptions are made to exemplify the sample size calculation for parameters: $N_{y,i,j}$ and $\mu_{y,i,j}$.

The PP envisage distribution of 500,000 ICSs over next five year. Hence, population size, N , is taken as 500,000 households/ICS (Assuming one ICS for one household).

It is expected at least 90% of ICS will be operational, hence the expected proportion p for $N_{y,i,j}$ is taken as 0.9.

Sample size calculation:

The calculation of the required sample size for each parameter in the first monitoring period is illustrated below for a 95/10 level of confidence and precision (for biennial monitoring periods the sample sizes will be recalculated using 95/5 confidence/precision values). In all cases a conservative approach is taken, however if for any parameter the required 95/10 confidence/precision is not met then the project proponent will randomly select an additional sample and collect further data from this sample to ensure the pooled data meet or exceed the required thresholds.

Parameter $N_{y,i,j}$: Based on the above assumptions, the resulting sampling size for a 95/10 confidence/precision is calculated as:

$$n \geq \frac{1.96^2 \times 500,000 \times 0.9 (1-0.9)}{(500,000-1) \times 0.1^2 \times 0.9^2 + 1.96^2 \times 0.9 (1-0.9)}$$

Which comes out to be

$$n \geq 42.68$$

$$n = 43$$

Therefore, in this case a sample size of 43 is to be sampled from each primary sampling unit.

In case the resulting sample size to achieve the desired confidence/precision levels is smaller than 30 ICS, a minimum sample size of 30 shall be chosen when the parameter of interest is a

proportion in line with para 14 of Standard: Sampling and surveys for CDM project activities and programmes of activities, Version-09.

Parameter $B_{y=1,new,i,j,survey}$:

For the purposes of determining sample size in the first monitoring period, the efficiency of stoves will vary.

To estimate the sample size for parameter $B_{y=1,new,i,j,survey}$ the following equation is used:

$$n \geq \frac{1.96^2 NV}{(N-1) \times 0.1^2 + 1.96^2 \times V}$$

Where,

$V = (SD/\text{mean})^2$

n = Sample size

N = Population size (Total number of households/ICS)

Mean= Expected mean of ICS thermal efficiency

SD = Expected standard deviation

1.96 = Represents the 95% confidence required

(In the case of 90% confidence, 1.645 shall be used)

0.1 = Represents the 10% relative precision

Based on the above assumptions, the sample size calculation for a 95/10 confidence/precision would be

$$n \geq \frac{1.96^2 \times 500,000 \times (0.05/0.5)^2}{(500,000-1) \times 0.1^2 + 1.96^2 \times (0.05/0.5)}$$

Using above values, the sample size comes out to be 3.84 or 4.

The PP may choose to use the same samples to monitor more than one parameter, where parameters have same units. Sampling more than one parameter within the same sample (household) helps reduce travel needs for monitoring and the associated costs. At the same time this approach ensures the random selection of samples for every parameter.

Oversampling is strongly encouraged, not only to compensate for any attrition, outliers or non-response associated with the sample, but also to prevent a situation at the analysis stage where the required

reliability is not achieved and additional sampling efforts would be required. The sample size shown above will be adjusted upwards to account for non-responses, PP shall determine the appropriate non-responses rate based on previous experience.

APPENDIX 1

Minutes of the local stakeholder consultation meeting on VCS grouped project for the “ Holistic development of North East India through clean energy access” of SDG13 Ventures Pte Ltd

Date – May 4, 2022

A local stakeholder consultation meeting was held on 04.05.2022 with an objective of gathering comments and concerns of the stakeholders on the proposed VCS grouped project titled “**Holistic development of North East India through clean energy access**” by SDG13 Pte Ltd and Global Himalayan Expedition. The project will be implemented in North Eastern states of India.

The ongoing Covid and Omicron situation in many areas meant that the physical meeting could not take place. To ensure maximum participation an online meeting link was also shared with the local stakeholders and all the interested parties. A total of 11 people attended the meeting. The list of participants is annexed as **Annexure- 1**.

The following excerpts were recorded during the meeting:

1. The consultation meeting started with a brief explanation of the agenda of the public consultation to the participants and to encourage them to share their opinion on the pertinence of the project and its social- economic and environmental impacts, delivered by Mr. Saurabh Saraf. A brief introduction of SDG-13 and Offset farms was also given to the attendees.
2. Mr. Saraf continued with an informative presentation on traditional fuel type used for cooking in household and its role in Global Warming and its impact on health. Benefits of using Greenway Jumbo stoves were also highlighted.
3. Mr. Jaideep Bansal from GHE then explained about their work with the communities and the impacts that they observe. Team structure and identification of clusters was also discussed.
1)
4. Mr. Saraf then went over the multilayered impacts of the project wrt the SDGs. SDG-3, 5, 7, 8 and 13 were discussed in detail.

The presentation was followed by a ‘Question and Answer Session’. The session marked participation from all concerned stakeholders.

1. Ms. Udisha Trivedi

Question: Ms. Udisha asked how will the social impact of the project be quantified and monitored?

Answer: Mr. Saurabh Saraf answered that the quantification of the social impact will be done by the team consisting of both SDG-13 Ventures Pte Ltd and Global Himalayan Expedition. The quantification will be done as per the methodological guidance of Verra VCS standards.

2. Mr. Sagar Saroha

Question: Mr. Sagar asked whether the stove has been custom designed to meet the needs of local inhabitants of the North East?

Answer: Mr. Ankit Mathur answered that the stoves are designed so that it thermodynamically enables air draft to move in a way that it ensures that the particulate matter is combusted to the maximum extent possible, in all geographic locations. Jumbo stoves would suffice in North Eastern areas too.

Mr. Saraf then delivered the vote of thanks and reiterated SDG13's objective to work in the area of rural development through introducing efficient technologies at the household level. He emphasized the importance of such projects for the country to achieve sustainable development by reducing fuel required for cooking and also improving health of women.

Annexure 1 – List of Attendees

Name	Affiliation	Background
Ankit Mathur	Director, Greenway Grameen Infra	Over a decade in project development and ICS deployment
Saurabh Saraf	Director, OffsetFarm Pte Ltd	Cleantech and climate finance experience of over a decade, Director of OffsetFarm
Jaideep Bansal	CEO, Global Himalayan Expedition	Experience in developing sustainable solutions and systems for grassroot communities in the North Eastern regions of India

Sanjay Kandari	Independent Consultant	Carbon project development expert
Sagar Saroha	PhD IIT Delhi, Researcher	Expert in fluid mechanics and development of technologies using these principles
Udisha Trivedi	Educator, Social Inclusion	Worked in social inclusion of disadvantaged communities in the mainstream education sector
Cathy Guo	Investor	Active in financial investments to early-stage ventures
Zaheen Jesani	Financial Analyst	Involved in international investment advisory and deal structuring
Mustafizur Rahman		
Madhurjya		
Aditi Singh	Senior Associate, Greenway Grameen Infra	Working in carbon project design and management.