Verified Carbon Standard

ENERGY EFFICIENT COOK STOVE **IMPLEMENTATION** IN INDIA

Document Prepared By

Enen Green Services Private Limited

Project Title	Energy Efficient Cook Stove Implementation in India
Version	1
Date of Issue	17-09-2020
Prepared By	Enen Green Services Private Limited
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1 PROJECT DETAILS

1.1 Summary Description of the Project

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

The estimated annual emission reductions over a 10 year period of first crediting period are 35,472 tCO2e/year. The total emission reductions for 10 years crediting period will be 354,719 tCO2e. Total GHG emission reduction in first monitoring period 18th April 2019 to 31st March 2020 is 33,916 tCO_2e.

As per the calculation in the section, each ICS will reduce emissions by approximately 1.46 tonnes of CO2e per year (net of leakage and continued use of the baseline stoves). To achieve the initial targeted volume of emission reductions, the project proponent aims to disseminate 25,520 ICS under the project activity. Project started distribution from April 2019 and last batch distributed on Dec 2019. All ICS taken account under the project activity are commissioned.

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

1.2 Sectoral Scope and Project Type

The project activity under consideration is not a grouped project activity.

Sectoral Scope: 03 Energy Demand.

Project Type: Type II Energy Efficiency Improved Projects

Grouped Project: No

1.3 Project Eligibility

According to VCS Standard, version 4.0, the scope of the VCS Program includes:

1) The six Kyoto Protocol greenhouse gases.

2) Ozone-depleting substances.

3) Project activities supported by a methodology approved under the VCS Program through the methodology approval process.

4) Project activities supported by a methodology approved under a VCS approved GHG program, unless explicitly excluded under the terms of VERRA approval.

5) Jurisdictional REDD+ programs and nested REDD+ projects as set out in the VCS Program document Jurisdictional and Nested REDD+ (JNR) Requirements.

The project activity generated renewable electricity without any GHG emissions, which displaced part of the electricity otherwise been supplied by grid connected fossil fuel fired power plants generating mainly CO2 emission. Thus, GHG emission reductions can be achieved. The project is eligible under the scope (the six Kyoto Protocol greenhouse gases) of the VCS Program.

1.4 Project Design

Project is a single project activity not a grouped project activity.

Eligibility Criteria

Project activity is not a grouped project activity hence this is not applicable.

1.5 Project Proponent

Organization name	Enen Green services Private Limited
Contact person	Ruchika Sharma
Title	Director
Address	D- 30 A, FF, Ashoka Enclave,Sector 35, Faridabad, Haryana.
Telephone	+919953935506
Email	enengreen@gmail.com

1.6 Other Entities Involved in the Project

Organization name	Greentech Environment
Role in the project	Project Implementor
Contact person	Viral Pushpavadan
Title	Director
Address	22,23, Shree Rangkutir Shopping Center, Bholav, Bharuch, Gujarat-392012

Telephone	
Email	ge@enengspl.com

1.7 Ownership

The improved cook stoves technology installed at site of each of the project activity as part of the project activity are under ownership of respective Green Tech Environment.

1.8 Project Start Date

The first ICS was commission on 18th April 2019. Thus the project starts date is 18/04/2019.

1.9 Project Crediting Period

Project Crediting Period: First

Start Date: 18/04/2019 (First operating day of the project activity ICS).

End date:17/04/2029

Total Number of Years: 10 (Fixed)

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_2e)
2019 (From 18/04/2019 to 31/12/2019)	25,073
2020	35,472
2021	35,472
2022	35,472
2023	35,472

2024	35,472
2025	35,472
2026	35,472
2027	35,472
2028	35,472
2029 (From 01/01/2029 to 17/04/2029)	10,398
Total estimated ERs	354,719
Total number of crediting years	10
Average annual ERs	35,472

1.11 Description of the Project Activity

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

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

Project aims to reach disadvantaged people with the clean cooking solutions in form of ICS. Project implementer shall train people appropriately at the local level to cater the households with stove construction. Female stove makers will be trained to the extent possible. Once the installation completes, representatives from the implementing entity will perform paperwork and the stove is recorded in the database. The database will be maintained in MS Excel and contains the following information.

- Name of the User
- Name of the Households Head
- Total Family Members
- District
- Municipality/Rural Municipality
- Ward No.
- Ethnicity
- Installation Date
- Unique ID

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

District wise breakup of distributed cookstove:

State	District	Tehsil	No of Household
		Baksa	1300
		Goreswar	1450
		Jalah	1340
		Mushalpur	1440
		Rangia	1905
		Sarepeta	2876
		Tamulpur	2458
	Baksa	Tihu	1571
		Dalgaon	1200
		Dhekiajuli	2678
		Mazbat	1994
		Udalguri	2012
	Udalguri	Harisinga	2096
Assam	Barpeta	Baghabore	1200
		Total	**25520**

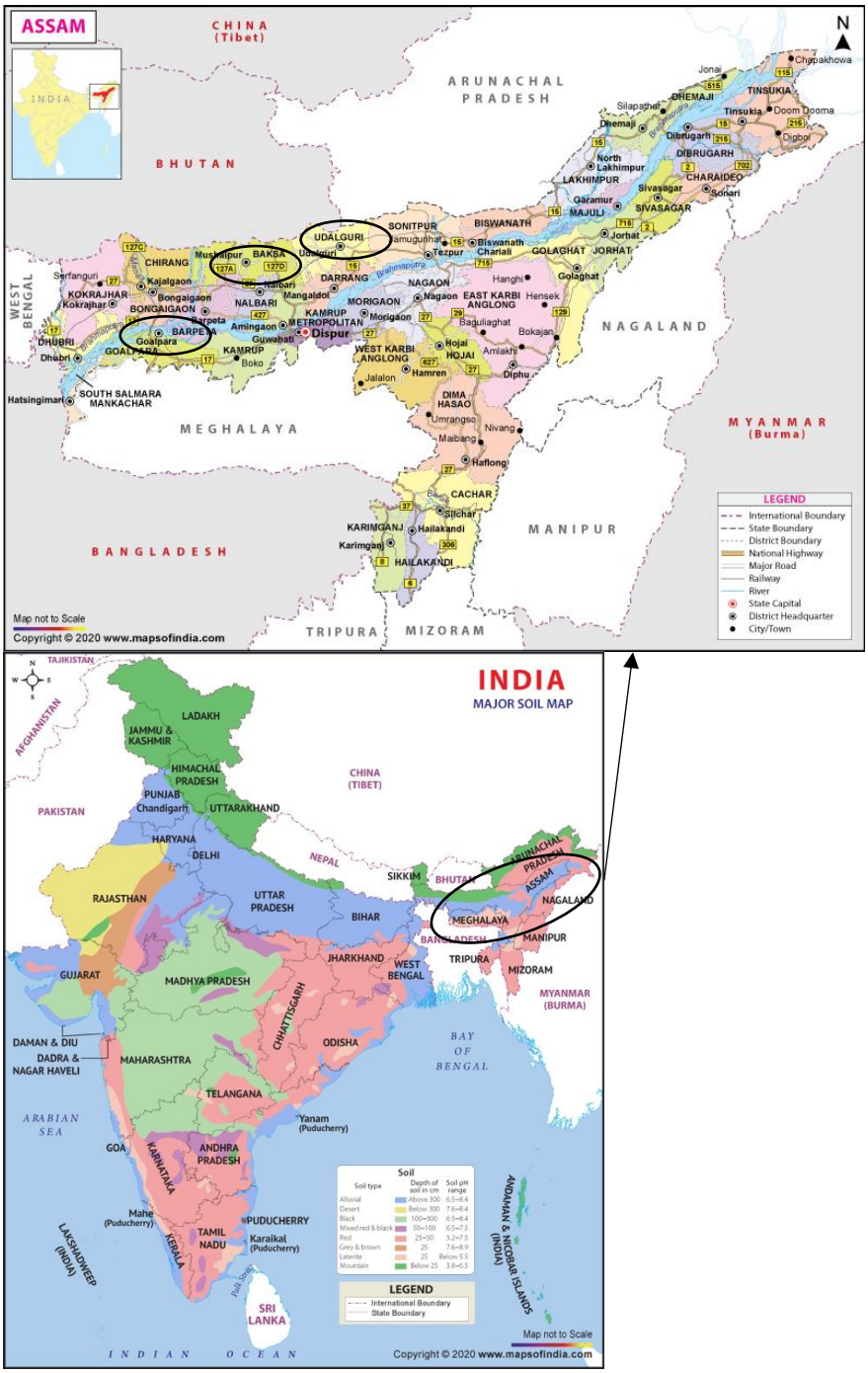
The project will promote smart stove which is an improved stove design. The main design improvement is the use of a prefabricated metallic or ceramic combustion chamber. This combustion chamber ensures consistent quality and durability of the ICS and will improve the lifespan of the stove with consistent performance in terms of efficiency, reduction of indoor air pollution and emissions, and safety. The metal or ceramic combustion chamber is surrounded by an isolative material, then the outer body is constructed in a cube shape, the stove incorporates an L-shaped combustion chamber and pot "skirt" to improve heat transfer and combustion efficiency during cooking activities. The combustion chamber consists of a horizontal fuel magazine and vertical internal chimney. Wood is fed horizontally into the fuel magazine ensuring even combustion from one end and a more easily regulated feed rate. The internal chimney creates draft, accelerating combustions gases from the fire. These gases are then forced through the skirt that surrounds the cook pot. Greater convective heat transfer is the result of improved advection and increased surface area contact. With the high power combustion, emission of indoor air pollutants is minimized rendering a smoke-free kitchen. It is pertinent to clarify that despite the project is eligible to earn credit for 10 years, a stove has a lifetime of 7 years which requires the stoves to be replaced after 7 years of installation.

1.12 Project Location

Project activity would be located in District Baksa, Udalguri and Barpeta of state Assam country India. Thus geographical area of project activity is considered as India. The geographical boundary is delineated in the form of extreme geographic coordinates as follows:

Latitude: 20.5937^{0}N

Longitude: 78.9629^{0}E



1.13 Conditions Prior to Project Initiation

The scenario existing prior to the implementation of the project activity instances is the usage of traditional biomass and inefficient cook stoves with poor ventilation, causing excessive indoor air

pollution (IAP) and has been a serious health risk for women and children who spend several hours in the kitchen.

The proposed project activity reduces the use and demand for fossil fuels and non-renewable biomass that would have been used in the replaced stove to achieve the same output (i.e cooking daily meals and boiling hot water) with the ICS. This directly leads to reduced GHG emissions. Therefore, the project has been implemented to generated GHG emissions for the purpose of their subsequent reduction, removal or destruction.

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

There exists no mandatory law or regulation in the host country requiring the introduction of ICS in India, therefore the project is a voluntary effort by the project proponent.

The project is in compliance with relevant laws, statues and other regulatory frameworks.

The project does not violate any laws, statutes and or other regulatory frameworks in India.

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 and is not seeking registration under any other GHG emission program to avail carbon benefits during the crediting period of the project activity.

1.15.2 Projects Rejected by Other GHG Programs

The project proponent hereby corroborates that the project activity has not been rejected by any other GHG program.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

The net GHG emission reductions generated by the project activity will not be used for compliance with an emissions trading program or to meet binding limits on GHG emissions.

1.16.2 Other Forms of Environmental Credit

The project proponent hereby corroborates that the project activity has not created or sought or received any other form of environmental credit.

1.17 Additional Information Relevant to the Project

Leakage Management

The project does not involve any transfer of equipment from outside the project boundary to the project boundary. The project will use the stoves either built on site or manufactured by a prequalified companies in India. Thus the provision on leakage associated with project boundary is not applicable.

Commercially Sensitive Information

All relevant information for the purpose of Project description is included in VCS PD. All the information disclosed to the validator has been provided in the public version of the report.

Sustainable Development

Project's contribution to Sustainable Development

The contributions of proposed project activity towards sustainable development are explained with indicators viz. social, economic, environmental, technological well-being, legislative and temporal as follows:

Environmental well-being

The project activity will result in the reduction of firewood consumption and emission of greenhouse gases and thus conserve forest and biodiversity.

Social well being

The project activity will pave the way for development and increases the social status and living conditions and the prevailing living standard in the vicinity of the project activity and thus results in empowering the nearby. Also it will contribute to a small increase in the local employment by employing skilled and un-skilled personnel for operation and maintenance of the equipment. The project will reduce the drudgery of women, time saving and the use of saved time for other productive activities.

Economic well being

The project has created a business opportunity during construction phase for local stakeholders such as suppliers, contractors etc. contributing to economic well-being aspects. Further, the project also influences creation of employment opportunities for local people, which would enhance their social status. Sufficiently enhance indoor air quality thereby improving health of women and children and reducing incidences of smoke and fire related injuries and therefore result in saving of health related expenses.

Technological well being

The proposed project activity will promote improved cook stoves that result in reduced fuel consumption and emissions due to cooking and heating water in homes.

Further Information

Legislative:

The Project Proponent has obtained all the relevant approvals required for the establishment and operation of the project activity

Temporal:

EGSPL has not applied for any other kind of renewable or carbon benefit anywhere else for the same.

2 SAFEGUARDS

2.1 No Net Harm

No negative impact of project activity

2.2 Local Stakeholder Consultation

Describe the process for, and the outcomes from, the local stakeholder consultation conducted prior to the joint validation and verification. Include details on the following:

- *The procedures or methods used for engaging local stakeholders (e.g., dates of announcements or meetings, periods during which input was sought).*
- *The procedures or methods used for documenting the outcomes of the local stakeholder consultation.*
- *The mechanism for on-going communication with local stakeholders.*
- *How due account of all and any input received during the consultation has been taken. Include details on any updates to the project design or justify why updates are not appropriate.*

For AFOLU projects, also demonstrate how the project has or will communicate the following:

- *The project design and implementation, including the results of monitoring.*
- *The risks, costs and benefits the project may bring to local stakeholders.*
- *All relevant laws and regulations covering workers' rights in the host country.*
- *The process of VCS Program validation and verification and the validation/verification body's site visit.*

2.3 Environmental Impact

- Environmental Benefits: Reduction in firewood consumption and emission of greenhouse gases, forest and biodiversity conservation.

- Economic Benefits: Employment creation and saving of health cost.
- Air quality: Sufficiently enhance indoor air quality thereby improving health of women and children and reducing incidences of smoke and fire related injuries.
- Social Benefit: Reduces drudgery of women, time saving and the use of saved time for other productive activities

2.4 Public Comments

The project was open for public comments from XX/XX/XXXX

2.5 AFOLU-Specific Safeguards

Not applicable

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Title: Energy efficiency measures in thermal applications of non-renewable biomass
Type: Type II – Energy Efficiency Improved Projects
Category AMS II.G - Energy efficiency measures in thermal applications of non-renewable biomass /Version 11.1
Sectoral Scope: 03

Reference: The reference has been taken from the list of the small-scale CDM project activity categories contained in Appendix B of the simplified M&P for small-scale CDM project activities. https://cdm.unfccc.int/methodologies/DB/ZI2M2X5P7ZLRGFO37YBVDYOW62UHQP

CDM tools: Tool 30: Calculation of the fraction of non-renewable biomass.

3.2 Applicability of Methodology

The project activity falls under the Type II and Category II G, the applicability conditions in the AMS –II.G. Version 11.1 is described in the following table.

S. N.	AMS II.G, Version 11.1 Requirements	Project activity applicability	Means of verification
1.	This methodology comprises efficiency improvements in thermal applications of non-renewable biomass. Examples of applicable technologies and measures include the introduction of high efficiency biomass fired project devices (cookstoves or ovens or dryers) to	This project includes the dissemination of the high efficiency biomass fired cook stoves having the efficiency >= 20% compared to traditional stoves. This project will save non-renewable	This will be verified by the stove test certificate issued by credited laboratory.

S. N.	AMS II.G, Version 11.1 Requirements	Project activity applicability	Means of verification
	replace the existing devices and/or energy efficiency improvements in existing biomass fired cookstoves or ovens or dryers	biomass which otherwise would have been consumed by less efficient cooking appliances.	
2.	In the case of cookstoves, the methodology is applicable to the introduction of single pot or multi pot portable or in-situ cookstoves with rated efficiency of at least 20 per cent. The Water Boiling Test (WBT) method shall be used to test the efficiency of the cookstove to meet this eligibility requirement, following the requirements indicated in "Data / Parameter table 12" which details the options for testing and certification as well as supporting documentation (e.g. certificate issued by third party or test results) that needs to be presented to the validating DOE.	This project includes the dissemination of the high efficiency biomass fired cook stoves having the efficiency >= 20% compared to traditional stoves.	This will be verified by the stove test certificate issued by credited laboratory and submitted to the DOE for validation.
3.	The aggregate energy saving of a single project activity shall not exceed the equivalent of 60 GWh per year or 180 GWh thermal per year in fuel input.	Annual energy savings from a single ICS is 0.00693 GWh. With this quantity of energy saved the project can include maximum of 25,962 ICS to meet the limit of 60 GW specified by the methodology.	This will be verified using project database.
4.	Project participants are able to show that non-renewable biomass has been used 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 1989. The information was derived from the field interview with the respondents during the baseline survey.	fNRB is calculated based on CDM tool 30 Calculation of the fraction of non-renewable biomass.
5	For cases where the biomass is sourced from renewable sources, the project participants should use a corresponding Type I methodology.	Not applicable.	Not applicable.
6	If the project device requires a specific fuel for this device (e.g. briquettes, pellets, woodchips), the consumption of the fuel should be monitored during the crediting period.	Not applicable. The ICS doesn't require a specific fuel.	Not applicable.
7	The CDM-PDD or CDM-PoA-DD/CPA-DD shall explain the proposed method for distribution of project	PP has defined the unique identification number to	

S. N.	AMS II.G, Version 11.1 Requirements	Project activity applicability	Means of verification
	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 device to avoid double accounting.	
8	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.	To avoid double accounting of project devices PP has given unique identification number to each devices and PP has given declaration that project will not claim credits in any other programme.	Declaration letter from PP to avoid double accounting of credits.
9	The use of this methodology in a project activity under a programme of activities is legitimate if the following leakages are estimated and accounted for, as required on a sample basis using a 90/30 precision for the selection of samples: a) Use of non–renewable woody biomass saved under the project activity to justify the baseline of other CDM project activities can also be a potential source of leakage. If this leakage assessment quantifies a portion of non--renewable woody biomass saved under the project activity that is then used as the baseline of other CDM project activities then $Bold,i,j$ is adjusted to account for the quantified leakage; b) Increase in the use of non-renewable woody biomass outside the project boundary to create non–renewable woody biomass baselines can also be a potential source of leakage. If this leakage assessment quantifies an increase in the use of non–renewable woody biomass outside the project boundary then $Bold,i,j$ is adjusted to	The PP chooses to account for all leakage in the project activity by applying the adjustment factor of 0.95 to the $B_{old,i,j}$.	Applied adjustment factor 0.95

S. N.	AMS II.G, Version 11.1 Requirements	Project activity applicability	Means of verification
	account for the quantified leakage; c) As an alternative to subparagraphs (a) and (b) $Bold,i,j$ can be multiplied by a net to gross adjustment factor of 0.95 to account for both leakages, in which case surveys are not required.		
10	To determine the value of the fraction of non--renewable biomass (f_{NRB}), use one of the two options as follows: (a) Conduct local studies to determine the local fNRB value (sub national values) as per the "TOOL30: Calculation of the fraction of non-renewable biomass"; (b) Use default national values approved by the Board. The choice of which option to use shall be made ex ante. However, a switch from a national value of f_{NRB} (i.e. option (b)) to sub-national values (i.e. option (a)) is permitted, under the condition that the selected approach is consistently applied.	The PP has decided to adopt the option (a) , i.e. to calculate fNRB as per Tool30: Calculation of the fraction of non-renewable biomass. The choice of which option to use shall be made ex ante.	Fraction of non-renewable biomass is calculated as per the fNRB calculation tool which is 91% as per Tool30: Calculation of the fraction of non-renewable biomass
11	Monitoring approaches for $B_{savings,i,j}$ and values for parameters f_{NRB} (when Option (a) in paragraph 48(c) is chosen) and the quantity of woody biomass $B_{old,i,j}$ may be determined	The PP considers to determine the parameters f_{NRB} and the parameter $B_{old,i,j}$	Emission reduction calculation spreadsheet
11.	Leakage related to the non-renewable woody biomass saved by the project activity shall be assessed based on ex post surveys of users and the areas from which this woody biomass is sourced (using 90/30 precision for a selection of samples). The potential source of leakage due to the use/diversion of non-renewable woody biomass saved under the project activity by non-project households/users that previously used renewable energy sources shall	$B_{y\ saving\ i,j}$ will be adjusted by multiplying it with an adjustment factor of 0.95 to account for leakages and in this case surveys will not be required.	Emission reduction calculation spreadsheet.

S. N.	AMS II.G, Version 11.1 Requirements	Project activity applicability	Means of verification
	be considered. If this leakage assessment quantifies an increase in the use of non-renewable woody biomass by the non-project households/users, that is attributable to the project activity, then $B_{old\ i,j}$ is adjusted to account for the quantified leakage. Alternatively, $B_{y\ saving\ i,j}$ is multiplied by a net to gross adjustment factor of 0.95 to account for leakages, in which case surveys are not required. (AMS II G v11.1, para 39)		

3.3 Project Boundary

Project activity would be located within geographical boundaries of Republic of India.

Source		Gas	Included?	Justification/Explanation
Baseline	Combustion of non renewable biomass for cooking	CO_2	Yes	Major source of emissions
		CH_4	No	Not required by methodology, only CO2 emission factor for fossil fuels is considered. Conservative Assumption.
		N_2O	No	Not required by methodology, only CO2 emission factor for fossil fuels is considered. Conservative Assumption.
Project	Combustion of non renewable biomass for cooking	CO_2	No	Not required by methodology
		CH_4	No	Not required by methodology, only CO2 emission factor for fossil fuels is considered.
		N_2O	No	Not required by methodology, only CO2 emission factor for fossil fuels is considered.

3.4 Baseline Scenario

The actual baseline is the use of non renewable biomass. Methodology AMS II.G states that “in the absence of the project activity, the baseline scenario would be the use of fossil fuels for meeting similar thermal energy needs”. This is a conservative approach to determine the baseline emissions. In absence of the project activities, the intended beneficiaries of the project would

continue using the traditional inefficient cooking stoves, consuming high quantity of non-renewable biomass.

3.5 Additionality

The ICS fall under the project category in paragraph 18 of the methodological tool AMS II.G "stating that "Project activities solely composed of isolated units where the users of the technology /measure are households or communities or Small and Medium Enterprises (SMEs) and where the size of each unit is no larger than 5% of the small-scale CDM thresholds", and therefore do not need to provide documentation to demonstrate additionality.

3.6 Methodology Deviations

No deviations from the applied approved methodology have been taken for the project activity.

4 ESTIMATED GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

In accordance with AMS.II-G version 11.1 paragraph 23, It is assumed that in the absence of the project activity, the baseline scenario would be the projected use of fossil fuels to meet similar thermal energy needs as those provided by the project devices. The actual baseline scenario is the use of NRB. Since NRB has higher carbon intensity than the fossil fuels proposed in AMS II.G, this assumption reduces the emission reductions significantly, making the outcome more conservative. The detailed calculations are provided in section 4.4 of the VCS PD.

4.2 Project Emissions

As per the applied methodology there is no accounting of the project emissions required for the proposed project. Hence the project emissions shall not be applicable for the project.

4.3 Leakage

As per the paragraph 39 of the methodology AMS II.G/v011.1, the following leakages are to be considered:

The use/diversion of non-renewable woody biomass saved under the project activity by non-project households/users that previously used renewable energy sources. If this leakage assessment quantifies an increase in the use of non-renewable woody biomass used by the non-project households/users that is attributable to the project activity, then B_{old} is adjusted to account for the quantified leakage. Alternatively, B_{old} is multiplied by a net to gross adjustment factor of 0.95 to account for leakages, in which case surveys are not required. PP has opted to use the adjustment factor of 0.95 in order to account for leakage.

As per the paragraph 39 of the methodology AMS II.G/v11.1, if equipment currently being utilised is transferred from outside the boundary to the project activity, leakage is to be considered.

The project does not involve any transfer of equipments from outside the project boundary to the project boundary. The programme will use the stoves either built on site or manufactured by a prequalified companies in India. Thus the provision on leakage associated with project boundary is not applicable

4.4 Estimated Net GHG Emission Reductions and Removals

According to paragraph 24 of methodology AMS II.G/v11.1, emission reductions would be calculated as:

$$ER_y = \Sigma_i \Sigma_j ER_{y,i,j} - LE_y$$

Where:

i = Indices for the situation where more than one type of project device is introduced to replace the pre--project devices

j = Indices for the situation where there is more than one batch of project device

ERy = Emission reductions during year *y* in tCO_2e

ERy,i,j, = Emission reductions by project device of type *i and* batch *j* during year *y* in tCO_2e

LEy = Leakage emissions in the year *y*

$$ERy,i,j, = B_{y,savings,i,j} \times N_{y,i,j} \times \mu_y \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected\_fossilfuel}$$

Where:

$B_{y,savings,i,j}$	=	Quantity of woody biomass that is saved in tonnes per cookstove device 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})
$NCV_{biomass}$	=	Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.0156 TJ/tonne, based on the gross weight of the wood that is 'air-dried')
$EF_{projected\_fossilfuel}$	=	Emission factor for the fossil fuels projected to be used for substitution of non-renewable woody biomass by similar consumers. Use a value of 64.4 t CO2/TJ for South Asia
$N_{y,i,j}$	=	Number of project devices of type i and batch j operating during year y
μ_y	=	Adjustment to account for any continued use of pre-project devices during the year y when applying equations 6 and 8 (fraction) of the methodology. Use 1.0 in other cases

$N_{y,i,j}$is monitored directly, for $NCV_{biomass}$ and $EF_{projected\_fossilfuel}$, the indicated default values are used, and $LE_y$is set to zero, since leakage is considered by multiplying $B_{old,i,j}$ with net to gross adjustment factor of 0.95. Whereas, the factor μ_y will be monitored.

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

In line with para 32 of applied approved methodology AMS-II.G version 11.1, four options are given to determine $B_{y,savings,i,j}$.

Here, PP has chosen Option 3 i.e. "Water Boiling Test" (WBT) with corresponding formula given below:

$$B_{y,savings,i,j} = B_{old,i,j} \times L_y \times [1 - (\eta_{old,i,j} / \eta_{new,i,j})]$$

Where,

$B_{old,i,j}$	=	Annual quantity of woody biomass that would have been used in the absence of the project activity to generate useful thermal energy equivalent to that provided by the project device type *I* and batch *j*
$\eta_{old,i,j}$	=	Efficiency of the old devices being replaced by project devices of type *I* and batch *j*
$\eta_{new,i,j}$	=	Efficiency of the project device *I* and batch *j*
LE_y	=	leakage adjustment factor or 0.95 (as per default value) of AMS-II.G version 11.1

Other provisions, in line with the applied methodology, AMS-II.G, version 11.1:

- In line with the para 34 of applied methodology, in case more than one project device is deployed in household at project level, an adjusted formula shall be used.

For example, if 2 project devices are installed per household, 0.5 times the baseline woody biomass consumption per household ($B_{old,HH}$) is used as the total annual quantity of woody biomass that would have been used in the absence of the project activity in each device ($B_{old,i,j}$).

The baseline saving shall be determined as:
$B_{old,i,j}=B_{old,HH}/N_{d,HH}$

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

- In line with the para 35 of the methodology, the PP keeps that provision that where charcoal is used as the fuel by baseline (old) or project (new) devices, the quantity of woody biomass shall be determined by using a default wood to charcoal conversion factor of 6 kg of firewood (wet basis) per kg of charcoal (dry basis).Alternatively, credible local conversion factors determined from a field study or literature may be applied.

Determination of the Share of Non-Renewable Biomass:

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

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

Thus, according to methodological tool 30: "Calculation of the fraction of non--renewable biomass" version 02.0, shall be used to calculate f_{NRB}:

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

Where,
NRB = Quantity of non-renewable biomass (t/yr) determined as per paragraphs 10 and 11 of the tool.
RB = Quantity of renewable biomass determined as per section 4.2 (t/yr) of the tool.

The parameters NRB & RB are also referred under the "Default f_{NRB} guideline" which is based on this particular Tool30. Calculated fNRB value for India is 91%.

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)
2019 (From 18/04/2019 to 31/12/2019)	26,337	0	1,264	25073
2020	37,259	0	1,787	35472
2021	37,259	0	1,787	35472
2022	37,259	0	1,787	35472
2023	37,259	0	1,787	35472
2024	37,259	0	1,787	35472
2025	37,259	0	1,787	35472
2026	37,259	0	1,787	35472
2027	37,259	0	1,787	35472
2028	37,259	0	1,787	35472
2029 (From 01/01/2029 to 17/04/2029)	10,923	0	525	10398
Total	**3,72,592**	0	**17,873**	**3,54,719**

5 MONITORING

5.1 Data and Parameters Available at Validation

Data / Parameter	$B_{old,HH}$

Data unit	tonnes/household/year
Description	Quantity of woody biomass used per ICS in the absence of the project activity
Source of data	Baseline Survey
Value applied:	2.50
Justification of choice of data or description of measurement methods and procedures applied	Default value baseline firewood consumption i.e. 0.5 tons/capita/year is applied. Baseline Survey shows there are averagely 5 persons / household. Based on the above, $B_{old,p}$= 0.5 tons/capita/year * 5 persons/household = 2.5 tons/household/year
Purpose of Data	Calculation of Quantity of woody biomass that is saved in tonnes per device
Comments	This parameter shall remain fixed for the monitoring periods.

Data / Parameter	$N_{p,HH}$
Data unit	Number
Description	Average number of persons served per household prior to project implementation
Source of data	Census India 2011
Value applied:	4.8
Justification of choice of data or description of measurement methods and procedures applied	Latest National Census in India from 2011 (https://censusindia.gov.in/2011census/hh-series/hh01.html)
Purpose of Data	Calculation of Quantity of woody biomass that is saved in tonnes per device
Comments	This parameter shall remain fixed for the monitoring periods.

Data / Parameter	$B_{old,p}$
Data unit	tonnes/person/year
Description	Annual quantity of woody biomass that would have been used per person in the household in the absence of the project activity to

	generate useful thermal energy equivalent to that provided by the project devices
Source of data	Baseline Survey
Value applied:	0.5
Justification of choice of data or description of measurement methods and procedures applied	A default value of 0.5 tonnes/capita per year may be used. This option is limited to household project devices (not eligible for oven and dryers)
Purpose of Data	Calculation of Quantity of woody biomass that is saved in tonnes per device
Comments	This parameter shall remain fixed for the monitoring periods.

Data / Parameter	$f_{NRB,y}$
Data unit	Percentage
Description	Fraction of woody biomass saved by the project activity during year y that can be established as non-renewable biomass
Source of data	Fraction of non-renewable biomass is calculated as per the fNRB calculation TOOL30: Calculation of the fraction of non-renewable biomass
Value applied:	91%
Justification of choice of data or description of measurement methods and procedures applied	Any changes/ revisions to this value would be monitored and if new default values are approved by the CDM EB the value of the fraction of NRB used will be updated.
Purpose of Data	Calculation of share of non-renewable biomass
Comments	This parameter shall remain fixed for the monitoring periods.

Data / Parameter	$\eta_{old,i,j}$
Data unit	Percentage
Description	Efficiency of the system being replaced (Traditional Cooking Stoves)
Source of data	Table 18 of AMS II.G/v11.1
Value applied:	10%

Justification of choice of data or description of measurement methods and procedures applied	The default value of 0.10 is used as the replaced system is a three stone fire, or a conventional device with no improved combustion air supply or flue gas ventilation, i.e. without a grate or a chimney.
Purpose of Data	Calculation of Quantity of woody biomass that is saved in tonnes per device
Comments	This parameter shall remain fixed for the monitoring periods.

Data / Parameter	$NCV_{biomass}$
Data unit	TJ/tonne
Description	Net calorific value of the non-renewable woody biomass that is substituted
Source of data	Table 13 of AMS II.G/v11.1
Value applied:	0.0156
Justification of choice of data or description of measurement methods and procedures applied	As per the methodology AMS II.G/v11.1
Purpose of Data	Emission reduction calculation
Comments	This parameter shall remain fixed for the monitoring periods.

Data / Parameter	$EF_{projected\_fossilfuel}$
Data unit	tCO2/TJ
Description	Emission factor for the substitution of non-renewable woody biomass by similar consumers
Source of data	Table 2 of AMS II.G/v11.1
Value applied:	64.4
Justification of choice of data or description of measurement methods and procedures applied	This value represents the emission factor of the substitution fuels likely to be used by similar users, on a weighted average basis. This default value applicable for South Asia.
Purpose of Data	Emission reduction calculations
Comments	This parameter shall remain fixed for the monitoring periods.

Data / Parameter	L_y
Data unit	Fraction
Description	Leakage adjustment factor
Source of data	Paragraph 39 of AMS II.G/v11.1
Value applied:	0.95
Justification of choice of data or description of measurement methods and procedures applied	As per the methodology AMS II.G/v11.1, B_{old}can be multiplied by a net to gross adjustment factor of 0.95 to account for leakages, in which case surveys are not required.
Purpose of Data	Emission reduction calculations
Comments	This parameter shall remain fixed for the monitoring periods.

5.2 Data and Parameters Monitored

Data / Parameter	$N_{y,i.a}$
Data unit	Number
Description	Number of project devices of type i and age a that are operating in year *y*
Source of data	Annual ICS users' survey
Description of measurement methods and procedures applied	The information on the number of devices operational is determined by the ICS users' survey by an independent third party through monitoring of the user households drawn at random sample
Frequency of monitoring/recording	Annual
Value applied:	25,520
Monitoring equipment	Annual user survey
QA/QC procedures applied	Measured directly or based on a representative sample. Sampling standard shall be used for determining the sample size to achieve 90/10 confidence precision. A discount shall be applied based on the percentage of devices operational as determined by the sample survey, e.g. if survey shows that 10% of the devices is non-

	operating, an adjustment factor of 0.9 shall be applied to number of project devices commissioned in a particular batch. Separate samples shall be taken for each batch
Purpose of data	Emission reduction calculation
Calculation method	If households are found continuing the use of traditional stoves, such households will be counted for having non-operational project device and equal proportion of households will not be counted towards emission reductions. Nevertheless, some households may retain their traditional stoves for religious reason where the traditional stoves are not used, the annual ICS users' survey will capture this information and it will be used accordingly while calculating the emission reductions.
Comments	

Data / Parameter	$\eta_{new,i,a}$
Data unit	Fraction
Description	Efficiency of the device of type I and batch j being deployed as part of the project activity.
Source of data	Water Boiling Test report conducted by an independent third party during the annual ICS users' survey
Description of measurement methods and procedures applied	The efficiency test will be carried out for different types and models of ICS. The value obtained from the test will be used to calculate the emission reductions of the systems for that year of operation. The sampling test of stoves by such certification bodies/agents or manufacturers shall be conducted following a 90/10 precision in accordance with the "Standard for sampling and surveys for CDM project activities and programme of activities".
Frequency of monitoring/recording	Annual
Value applied:	30.15%
Monitoring equipment	-

QA/QC procedures applied	During the annual users' survey, an independent third party will inspect representative sample households to check if the devices are operating or not.
Purpose of data	The monitored value of this parameter will be used in the determination of the ex-post emission reduction.
Calculation method	Third party certification.
Comments	If any sample stove is found to be operating below the 20% efficiency, the proportionate number of stoves will be considered non-operational and not accounted for ER calculation.

5.3 Monitoring Plan

The purpose of the monitoring plan is to ensure successful monitoring of the emission reductions of the proposed project during its crediting period. The overall monitoring will be managed by the project implementer Greentech Environment, India

Activities and performance related to emissions reduction are monitored by EGSPL. The PP proposed the following structure for data monitoring, collection, data archiving and calibration of equipments for this project activity instance. The team comprise will follow the below organizational structure.

The monitoring activities will involve data collection during distribution as well as usage information post distribution. The data collected during distribution will involve information about the stove, the purchaser and location to enable one to uniquely identify each ICS unit and avoid double counting. This will form what is called the sales record. Greentech Environment will distribute the stoves, as well as carry out the monitoring activities that occur during the distribution of stoves. Greentech Environment or through their associates will ensure that the distributor is trained on how to capture the sales data. The project activity implementer is fully responsible to ensure the correct distribution process and data gathering is followed. In turn, the distributing agent will link remuneration to the complete and accurate collecting of information during the distribution of stoves.

The following information will be recorded at the time of distribution of ICS to the user:

- Name of the User
- Name of the Households Head
- Total Family Members
- District
- Municipality/Rural Municipality
- Ward No.
- Ethnicity
- Installation Date
- Unique ID

However, during post distribution, monitoring activities will involve selecting a sample of stove from the sales record and visiting the premises where these stoves are located to monitor key parameters pertinent in ER Calculation. The individuals carrying out the monitoring activities will follow instructions provided during training, to check and record the following key parameters:

- Check the efficiency of the ICS.
- Check if project stoves are operational and in use
- Check if there is any on-going use of replaced stoves.

Data collecting & handling is conducted in a transparent way to secure high quality of recording and storing of data. Data collected and monitored are stored electronically in a secure and retrievable manner for at least two years after the end of the project crediting period. Uncertainty related to data handling (if any) would be rectified, if necessary by revising monitoring procedures. The changes would be approved by a verifier (e.g. Designated Operational Entity)

Roles and responsibilities of different participators are proposed to be as follows:

Entity/Person	Roles & Responsibilities
Enen Green	✓ VCS documentation development ✓ Communicate with VERRA for all VCS related matters ✓ Communicate with DOEs for validation & verification ✓ Engage consultant or any entity for CDM process (if required) ✓ Identify local partners for local representation and support ✓ Identity suitable ICS manufacturers (both local & for import) ✓ Design the distribution plan for on ground implementation of ICS ✓ Design the monitoring system (including data collection using digital tool &too collate in an electronic database) ✓ Training and development of local resources (as may be required) ✓ Regular Monitoring and quality assurance of data ✓ Monitor & Supervise on-ground distribution, etc. ✓ Annual Review meeting with Local Teams and other associated entity in order to ensure continuous improvements of the project activity
Greentech Environment **(Local Representative)**	✓ To support & assist Enen Green in achieving the stated goal of the project activity ✓ Assist and facilitate Enen Green in baseline data collection, efficiency testing, etc. ✓ To be the local representative and communicate, act and engage in implementation activities of project activity ✓ To identify and deploy suitable local team and resources for ICS distribution, data collection, regular spot-check at households etc. ✓ Assist and facilitate Enen Green during training of the Operational Team and capacity building across the end users. ✓ To bridge any gap in between end users of ICS and Enen Green in order to ensure smooth operation of the program to achieve overall objective of the project activity
Operational Team	The operational team(s) would consist of different members depending on the requirement at the time of dissemination of the ICS. A proposed team composition would be as follows: ✓ **ICS Distributor(s)** – who will be responsible for deploying the ICS at household and register the end user in the digital tool. They will also

	be responsible for giving demonstration of ICS use, discussing with the end users on its benefits and educate them on continued use of ICS and discontinuation of the use of conventional/traditional open firing practice. They will also conduct periodic check at households to gather feedback, address to any technical concerns, collect necessary data and transmit the information.
ICS Manufacturer or Supplier	✓ To design and develop ICS as per required standard ✓ To provide technical parameters and manufacturer's efficiency etc. at the time of supply ✓ To educate and train Greentech Environment team on the installation (delivery), uses, handling etc. of the ICS at households.

6 ACHIEVED GHG EMISSION REDUCTIONS AND REMOVALS

6.1 Data and Parameters Monitored

Data / Parameter	$N_{y,i.a}$
Data unit	Number
Description	Number of project devices of type i and age a that are operating in year *y*
Value applied:	25,520
Comments	During the current monitoring period as per ICS survey 294 samples were collected and all ICS were operational.

Data / Parameter	$\eta_{new,i,a}$
Data unit	Fraction
Description	Efficiency of the device of type i being deployed as part of the project activity.
Value applied:	30.15 %
Comments	If any sample stove is found to be operating below the 20% efficiency, the proportionate number of stoves will be considered non-operational and not accounted for ER calculation.

6.2 Baseline Emissions

In accordance with AMS.II-G version 11.1 paragraph 23, It is assumed that in the absence of the project activity, the baseline scenario would be the projected use of fossil fuels to meet similar thermal energy needs as those provided by the project devices. The actual baseline scenario is the use of NRB. Since NRB has higher carbon intensity than the fossil fuels proposed in AMS II.G, this assumption reduces the emission reductions significantly, making the outcome more conservative. The detailed calculations are provided in section 4.4 of the VCS PD.

6.3 Project Emissions

As per the applied methodology there is no accounting of the project emissions required for the proposed project. Hence the project emissions shall not be applicable for the project.

6.4 Leakage

As per the paragraph 39 of the methodology AMS II.G/v011.1, the following leakages are to be considered:

The use/diversion of non-renewable woody biomass saved under the project activity by non-project households/users that previously used renewable energy sources. If this leakage assessment quantifies an increase in the use of non-renewable woody biomass used by the non-project households/users that is attributable to the project activity, then B_{old} is adjusted to account for the quantified leakage. Alternatively, B_{old} is multiplied by a net to gross adjustment factor of 0.95 to account for leakages, in which case surveys are not required. PP has opted to use the adjustment factor of 0.95 in order to account for leakage.

As per the paragraph 39 of the methodology AMS II.G/v10, if equipment currently being utilised is transferred from outside the boundary to the project activity, leakage is to be considered.

The project does not involve any transfer of equipments from outside the project boundary to the project boundary. The programme will use the stoves either built on site or manufactured by a prequalified companies in India. Thus the provision on leakage associated with project boundary is not applicable.

6.5 Net GHG Emission Reductions and Removals

According to paragraph 24 of methodology AMS II.G/v11.1, emission reductions would be calculated as:

$$ER_y = \Sigma_i \Sigma_j ER_{y,i,j} - LE_y$$

Where:

i = Indices for the situation where more than one type of project device is introduced to replace the pre--project devices

j = Indices for the situation where there is more than one batch of project device

ERy = Emission reductions during year *y* in tCO_2e

ERy,i,j, = Emission reductions by project device of type *i and* batch *j* during year *y* in tCO_2e

LEy = Leakage emissions in the year *y*

$$ERy,i,j, = B_{y,savings,i,j} \times N_{y,i,j} \times \mu_y \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected\_fossilfuel}$$

Where:

$B_{y,savings,i,j}$	=	Quantity of woody biomass that is saved in tonnes per cookstove device 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})
$NCV_{biomass}$	=	Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.0156 TJ/tonne, based on the gross weight of the wood that is 'air-dried')
$EF_{projected\_fossilfuel}$	=	Emission factor for the fossil fuels projected to be used for substitution of non-renewable woody biomass by similar consumers. Use a value of 64.4 t CO2/TJ for South Asia
$N_{y,i,j}$	=	Number of project devices of type i and batch j operating during year y
μ_y	=	Adjustment to account for any continued use of pre-project devices during the year y when applying equations 6 and 8 (fraction) of the methodology. Use 1.0 in other cases

ERy,I,j = 1.60*25520*1*91%*0.0156*64.4 = 35,472 tCO2e

ERy = 35,472 tCO2e

PEy = 0
LEy = 0

Period	No of days	Actual Emission Reduction (tCO2e)
18th April 2019 - 31st Dec 2019	258	25,073
1st Jan 2020 – 31st March 2020	91	8,843
Total		**33,916**

Total emission reduction for period 18th April 2019 to 31st March 2020 is 33,916 tCO_2e.

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
2019	26,337		1,264	25,073
2020	9,289		446	8,843
Total	35,626		1,710	33,916

APPENDIX X: <TITLE OF APPENDIX>

Use appendices for supporting information. Delete this appendix (title and instructions) where no appendix is required.