Gold Standard
for the Global Goals

TEMPLATE

KEY PROJECT INFORMATION & PROJECT DESIGN DOCUMENT (PDD)

PUBLICATION DATE **14.10.2020**

VERSION **v. 1.2**

RELATED SUPPORT

- **TEMPLATE GUIDE Key Project Information & Project Design Document v.1.2**

This document contains the following Sections

KEY PROJECT INFORMATION

GS ID of Project	GS11655
Title of Project	Implementation of clean energy technology in rural areas of India-1
Time of First Submission Date	10/05/2022
Date of Design Certification	N/A
Version number of the PDD	05
Completion date of version	22/02/2023
Project Developer	Greneity Infocom Service Private Limited
Project Representative	Greneity Infocom Service Private Limited
Project Participants and any communities involved	Greneity Infocom Service Private Limited Green Mission Welfare Society
Host Country (ies)	India
Activity Requirements applied	☒ Community Services Activities ☐ Renewable Energy Activities ☐ Land Use and Forestry Activities/Risks & Capacities ☐ N/A
Scale of the project activity	☐ Micro scale ☒ Small Scale ☐ Large Scale
Other Requirements applied	N/A
Methodology (ies) applied and version number	AMS-I.E. Switch from non-renewable biomass for thermal applications by the user - Version 12
Product Requirements applied	☒ GHG Emissions Reduction & Sequestration ☐ Renewable Energy Label ☐ N/A
Project Cycle:	☐ Regular ☒ Retroactive

Table 1 – Estimated Sustainable Development Contributions

Sustainable Development Goals Targeted	SDG Impact (defined in B.6.)	Estimated Annual Average	Units or Products
13 Climate Action (mandatory)	Emission reductions	53,605	tCO_2e
7 Affordable and Clean Energy	Access to affordable and clean energy services	11,000	Number of affected users
8 Decent Work and Economic Growth	Unemployment rate, by sex, age and persons with disabilities	10 employments.	Number of employments created.
8 Decent Work and Economic Growth	Unemployment rate, by sex, age and persons with disabilities	2 trainings per year.	Number of trainings provided.
3 Good health and well being	Improvement in health and decrease in illness	11,000 biogas plant users will have improved health conditions	No. of affected users

SECTION A. DESCRIPTION OF PROJECT

A.1 Purpose and general description of project

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The project activity aims to replace the commonly used inefficient wood fired mud stove technology, with efficient biogas-based cook stove, which is clean and sustainable. The project activity involves bundling household biogas plants located in the state of Punjab, India. The proposed project activity includes 11,000 digesters of capacity $4m^3$ which are expected to complete the implementation between June, 2021 and February, 2022.

Each household will utilize the dung of its cows to feed the digester for the production of biogas for domestic purposes. The generated biogas from the plants to be used for the purpose of cooking and other thermal energy needs in households. The thermal energy generated from the project activity replaces the equal amount of thermal energy which otherwise would have been supplied from the woody biomass (fire-wood) based stove technology. Therefore, the project activity replaces firewood for equal thermal energy needs and thereby reduces harmful greenhouse gases in the atmosphere. In addition, the hygienic conditions in the rural areas will be improved by an appropriate disposal of waste. Further, residue from the bio digesters is used as organic fertilizer and will improve soil conditions in rural areas.

Pre project Scenario:
Household survey was conducted to assess the baseline fuel and quantity used. As per the Survey, firewood was the main fuel used to suffice domestic energy needs (cooking). It was sourced from nearby forests and open market. Usage of firewood in inefficient cooking system (conventional system) leads to indoor pollution and land use patterns have been showing a decrease in forest land cover and increase in degraded land. 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.

Project Scenario:
The project activity involves bundling of 11,000 household biogas plants located in the state of Punjab, India with capacity – $4m^3$. The project development is performed & maintained by Green Mission Welfare society Project activity involves installation of new biogas plant in the households of Punjab and produced biogas will be used in the biogas stoves for thermal energy needs. Hence, the project activity is a Greenfield project activity. Residues from the bio digesters are used as organic fertilizer in the garden area and fields of the local people.
The project has been implemented from June 2021 to February 2022. A total of 11,000 biogas plant. Only 11,000 project plant are covered under this project activity; and no further addition would be associated with this project activity. The year wise installation details are as follows;

Year	No. of Plants installed
2021	10,986
2022	14

Project activity will result in average saving of 53,605 tCO_2e/year.

A.1.1. Eligibility of the project under Gold Standard

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The project is eligibility under GS4GG as the project activity involves dissemination of household biogas which is eligible under Gold Standard pursuant to clause 3.1.1 of the GS4GG Principles and Requirements document. The eligibility compliance under GS4GG is detailed as follows;

Eligibility Criteria Category	Eligibility criterion – Required condition	Justification
1. Types of Project	Eligible projects shall include physical action/implementation on the ground. Pre-identified eligible project types are identified in the Eligibility Principles and Requirements section.	The project is already implemented since its start date. As per section 3.1.1 (a) of GG4GG Community Services Activity Requirements ver.1.2," Renewable energy types such as solar (photovoltaic and solar thermal electricity generation), tidal/wave, wind, hydropower, geothermal, waste to energy and renewable biomass that are connected to mini grid or off grid solutions for targeted users and/or applications." Since, project activity includes utilization of cow dung as feed to bio-digesters along with other organic waste to generate biogas. Hence, it meets the criterion. Thus, the project technology/measure falls under GG4GG Community Services Activity Requirements. Section 4.1.3 of the GS4GG Principles and Requirements document states following for automatic eligibility for a project "A Project type is automatically eligible for Gold Standard Certification if there are Gold Standard approved Activity Requirements and/or Impact Quantification Methodologies associated with it or it's referenced in the Gold Standard

		Product Requirements." The Gold Standard has published Community Services Activity Requirements; therefore, the project activity falls under the list of Pre-identified eligible project and is automatically eligible for Gold standard certification.
2. Location of Project	Projects may be located in any part of the world.	Location of the project is the state of Punjab, India.
3. Project Area, Project Boundary and Scale	The Project Area and Project Boundary shall be defined. Projects may be developed at any scale although certain rules, requirements and limitations may apply under specific Activity Requirements, Impact Quantification Methodologies and Products Requirements. In order to avoid double counting the Project shall not be included in any other voluntary or compliance standards programme unless approved by Gold Standard (for or compliance standard programme of a similar nature, the Project shall demonstrate that there is no double counting of impacts at design and performance certification (for example use of similar technology or practices through which the potential arises for double counting or misestimation of impacts amongst projects) example through dual certification). Also, if the Project Area overlaps with that of another Gold Standard or other voluntary	The boundary for the project activity in terms of a geographical area is defined as the territorial boundary of the state of Punjab, India. The project falls under waste handling and disposal with emission reductions 53,605 tCO_2 with installed energy output of 39.42 MWth (Below the threshold of 45 MWth). Hence, the project falls under small scale projects. To avoid inclusion of any bio-digester which is a part of another registered carbon project/ programme, all the 11,000 bio-digesters under this project activity have a unique ID number to uniquely identify the bio-digesters avoiding any double counting and trace its user, later during monitoring and verification.

4. Host Country Requirements	Projects shall be in compliance with applicable Host Country's legal, environmental, ecological and social regulations.	The project activity is in compliance with the host country's legal, environmental, ecological & social regulation. Project Owner has voluntarily implemented the project activity and there are no legal, environmental, ecological and social regulations /law that mandatorily enforces the implementation of the project activity or there is no other law/regulations that prevents the project owner to set up the project activity.
5. Contact Details	As part of the Project Documentation the Project Developer shall provide (i) name and (ii) contact details of all Project Participants; AND in case of an organisation (iii) the legal registration details and (iv) documentation by the governing jurisdiction that proves that the entity is in good standing (defined as being a legal or other appropriate entity registered in or allowed to operate within the required jurisdiction and with no evidence of insolvency or legal/criminal notices placed against it or any of its Directors). Gold Standard retains the right (at its own discretion) to refuse use of the Standard where reputational concerns are highlighted.	The details are provided in the Appendix 2 of this document. Further, PP has submitted covering letter and legal registration document to Sustain-CERT. The project participants are not banned by the government.
6. Legal Ownership	Full and uncontested legal ownership of any Products that are generated under Gold Standard	The project activity includes installation of household biogas plants in the rural areas of Punjab.

	Certification, (for example carbon credits) shall be demonstrated. Where such ownership is transferred from project beneficiaries this must be demonstrated transparently and with full, prior and informed consent (FPIC). Note that for certain Project types there is a requirement for full and uncontested legal land title/tenure to be demonstrated. These are contained within specific Activity or Product Requirements. All projects shall immediately report to Gold Standard any land title/tenure disputes arising.	The owners of the bio digester have transferred their all legal rights, interests, credits, entitlements, benefits or allowances arising from or in connection with any greenhouse gas emissions reductions arising from the operation of the digester (Emission Reduction) in the lieu of free operation and maintenance of the plant to Green Mission Welfare Society. Same is mentioned in the Commissioning certificates co-signed by the respective plant owners. Also, Green Mission Welfare Society has signed agreement with Greneity Infocom Service Pvt Ltd to take all necessary action required for registering the project under suitable Voluntary Standard along with complete assistance during operation and maintenance of the biogas plants included in the project activity. Also feedback has been collected during the physical local stakeholder consultation meeting as well as SFR round for the project activity.
7. Other Rights	As well as legal title and ownership, the Project Developer shall also demonstrate where required uncontested legal rights and/or permissions concerning changes in use of other resources required to service the Project (for example, access rights, water	Not Applicable.

	rights etc.). Any known disputes or contested rights must be declared immediately to Gold Standard by the Project Developer and resolved prior to further project implementation in affected areas.	
8. Official Development Assistance (ODA) Declaration	All Project Developers applying for project activities located in a country named by the OECD Development Assistance Committee's ODA recipient list and seeking Gold Standard Certification for carbon credits shall declare the Official Development Assistance (ODA) support. The Project Developer shall follow the GHG Emissions Reduction & Sequestration Product Requirements and submit the declaration at the time of Design Certification.	No ODA is involved in the Project activity. A declaration is being submitted.

Eligibility under Gold Standard Community Services Activity (CSA) Requirements

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As per section 3.1.1 of GS4GG Principles & Requirements, Eligibility criteria is defined below:

Eligibility Criteria Category	Eligibility criterion - Required condition	Justification
1. Eligible Project Types	All CSA Projects shall lead to climate change mitigation and/or adaptation by providing or improving access to services/resources at the household or community or institution level. Eligible services include electricity and energy, water and sanitation, waste management, housing, etc.	The project is already implemented since its start date. As per section 3.1.1 (a) of GG4GG Community Services Activity Requirements ver.1.2," Renewable energy types such as solar (photovoltaic and solar thermal electricity generation), tidal/wave, wind, hydropower, geothermal, waste to energy and renewable biomass that are connected to mini

		grid3 or off grid solutions for targeted users and/or applications." Since, project activity includes utilization of cow dung as feed to bio-digesters along with other organic waste to generate biogas Hence, it meets the criterion.
2. GENERAL ELIGIBILITY CRITERIA - Type of project	(a) Renewable energy: Renewable energy types such as solar (photovoltaic and solar thermal electricity generation), tidal/wave, wind, hydropower, geothermal, waste to energy and renewable biomass that are connected to mini grid3 or off grid solutions for targeted users and/or applications.	As per section 3.1.1 (a) of GG4GG Community Services Activity Requirements ver.1.2," Renewable energy types such as solar (photovoltaic and solar thermal electricity generation), tidal/wave, wind, hydropower, geothermal, waste to energy and renewable biomass that are connected to mini grid3 or off grid solutions for targeted users and/or applications." Since, project activity includes utilization of cow dung as feed to bio-digesters along with other organic waste to generate biogas Hence, it meets the criterion.
3. GENERAL ELIGIBILITY CRITERIA – Project Area, Boundary and scale	Project Area and Boundary shall be defined in line with the applicable Impact Quantification Methodologies and Product Requirements.	The boundary for the project activity in terms of a geographical area is defined as the territorial boundary of the state of Punjab, India. The project falls under waste handling and disposal with annual emission reductions 53,605 tCO_2 with installed energy output of 39.42 MWth (Below the threshold of 45 MWth). Hence, the project falls under small scale projects.

		To avoid inclusion of any bio-digester which is a part of another registered carbon project/ programme, all the 11,000 bio-digesters under this project activity have a unique ID number to uniquely identify the bio-digesters avoiding any double counting and trace its user, later during monitoring and verification.
4. GENERAL ELIGIBILITY CRITERIA – Legal Ownership	(a) Projects involving the distribution of a large number of devices for services such as heating, cooking, lighting, electricity generation, water treatment technology such as water filter, etc. shall provide a clear description of the ownership of the Products that are generated under Gold Standard Certification all along the investment chain. In line with the FPIC requirement, the proofs that end-users are aware of and willing to give up their rights on Products shall be provided. (b) The transfer of Product ownership shall be discussed during local stakeholder consultations for projects.	The project activity includes installation of household biogas plants in the rural areas of Punjab. The owners of the bio digester have transferred their all legal rights, interests, credits, entitlements, benefits or allowances arising from or in connection with any greenhouse gas emissions reductions arising from the operation of the digester (Emission Reduction) in the lieu of free operation and maintenance of the plant to Green Mission Welfare Society. Same is mentioned in the Commissioning certificates co-signed by the respective plant owners. Also, Green Mission Welfare Society has signed agreement with Greneity Infocom Service Pvt Ltd to take all necessary action required for registering the project under suitable Voluntary Standard along with complete assistance during operation and maintenance of the biogas plants included in the project activity.

		Also feedback has been collected during the physical local stakeholder consultation meeting as well as SFR round for the project activity.

A.1.2. Legal ownership of products generated by the project and legal rights to alter use of resources required to service the project

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The project activity is the household level biogas plants and the owner of the technology is the particular household using biogas plants. The owners of a digester signed an agreement[1] with Green Mission Welfare Society by transferring all legal rights, interests, credits, entitlements, benefits or allowances arising from or in connection with any greenhouse gas emissions reductions arising from the operation of the digester (Emission Reduction), and agrees to take all necessary action required to ensure the transfer of those Emission Reductions to the Green Mission Welfare Society or its nominee, including executing any relevant documents.

A.2 Location of project

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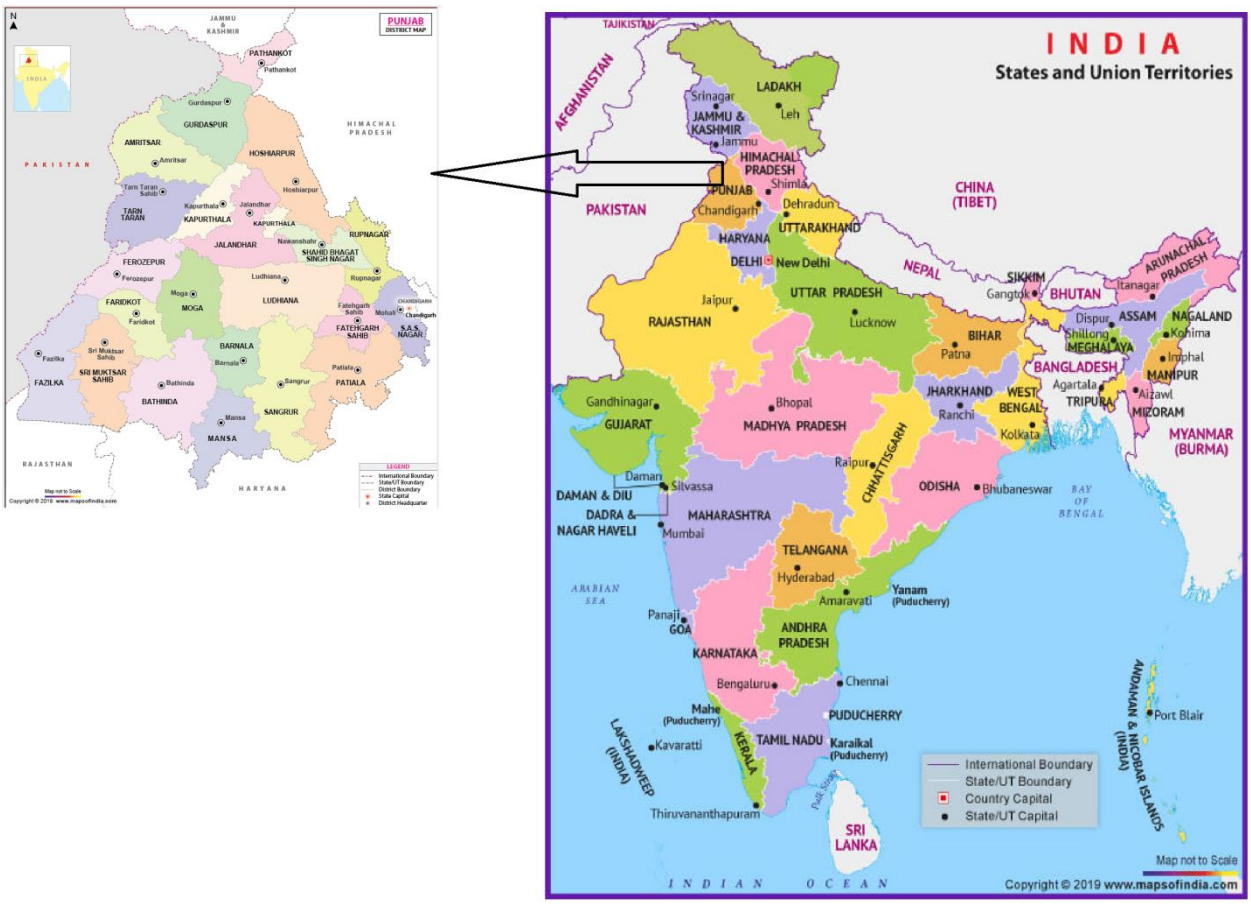
Country: India

State: Punjab

Geo co-ordinates:

It is located between 29"30'N to 32"32'N latitude and 73"55'E to 76"50'E longitude

[1] Commissioning certificates co-signed by the respective plant owners and Green Mission Welfare Society.



A.3 Technologies and/or measures

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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). The target group of the project are households with at least one head of cattle (generally cows or buffalos) who currently use non-renewable woody biomass (firewood) for cooking purposes. The project aims to utilize the methane produced from household biogas digesters to replace the current non-renewable energy sources that is used by households.

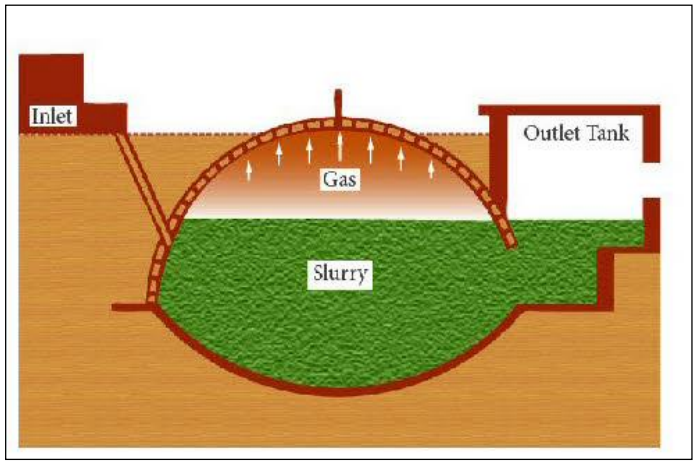
The project activity involves bundling of household bio-digesters with Deenbandhu model technology installed in the state of Punjab. The bio-digester models of sizes 4m^3. The major feed cattle dung is mixed with water and fed into the plant through the inlet chamber of the plant. This waste is converted into biogas with the help of a special type of anaerobic bacteria. The digested material, which comes out of the plant, is enriched manure.

Deenbandhu Model:

The major feed cow dung and other organic waste material is mixed with water and fed into the plant through the inlet chamber of the plant. This waste is converted into biogas with the help of a special type of anaerobic bacteria. The digested material, which comes out of the plant, is enriched manure.

The main feature of a Deenbandhu biogas plant is the fixed underground digester chamber, constructed with a layer of bricks and an additional layer of cement mortar forming the roof above. Connected to the underground chamber is an inlet tank (labelled on diagram as "Mixing Tank"), through which manure is fed into the plant. The manure then ferments separating the slurry from the methane gas which rises and collects at the top of the digester tank, and is released through the gas outlet pipe. The slurry passes into the outlet tank where it is ejected from the plant and can be used as fertilizer on the field

Figure1: Deenbandhu type Biogas plant



Function

A fixed-dome plant comprises of a closed, dome-shaped digester with an immovable, rigid gas-holder and a displacement pit, also named 'compensation tank'. The gas is stored in the upper part of the digester. When gas production commences, the slurry is displaced into the compensating tank. Gas pressure increases with the volume of gas stored, i.e. with the height difference between the two slurry levels. If there is little gas in the gas-holder, the gas pressure is low.

Digester

The digesters of fixed-dome plants are usually masonry structures, structures of cement and ferro-cement exist.

Fixed-dome Gasholder
A fixed-dome gas-holder in deenbandhu model is a hemispherical digester. The top part of a fixed-dome plant (the gas space) must be gas-tight. Concrete, masonry and cement rendering are not gas-tight. The gas space must therefore be painted with a gas-tight layer (e.g. 'Water-proofer', Latex or synthetic paints).

The cattle dung otherwise would have been left to decay in open which leads to methane emissions and by utilizing the same for generation of biogas leads to capture of methane and utilize as fuel. The biogas thus generated replaces firewood that otherwise would have been used for cooking and heating purposes. The project is expected to reduce 53,605 tCO_2 per annum.
The projects operational life time Is expected to be around 20 years[2].

A.4 Scale of the project

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The project activity is a small scale project activity. The project falls under waste handling and disposal with emission reductions 53,605 tCO_2 with installed energy output of 39.42MWth (Below the threshold of 45 MWth). Hence, the project falls under small scale projects.

A.5 Funding sources of project

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No public funding from parties included in Annex I to the UNFCCC, is available to the project.
No Official Development Assistance involves in the project activity.

[2] https://www.ctae.ac.in/images/editorFiles/file/CTAE-2017/Biogas%20FAQ_English.pdf (Refer the page no. 14 point 25 of the document.)

SECTION B. APPLICATION OF APPROVED GOLD STANDARD METHODOLOGY (IES) AND/OR DEMONSTRATION OF SDG CONTRIBUTIONS

B.1. Reference of approved methodology (ies)

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Methodology: AMS-I.E - Switch from non-renewable biomass for thermal applications by the user.

Version: Version 12.0

Reference: https://cdm.unfccc.int/methodologies/DB/BLVN9ULDP1FRUVS2LYWW6WPYN9W78E

B.2. Applicability of methodology (ies)

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AMS-I. E. "Switch from Non-Renewable Biomass for Thermal Applications by the User" Version 12.0 is applicable to the proposed project because the project meets all applicability criteria. The applicability of the methodology is outlined as below:

Criteria AMS-I.E.	Applicability
Project participants4 are able to show that 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.	Survey was conducted to check since when villagers were using firewood. Random sample survey was performed to check the duration of usage of firewood. It is evident from the survey that all the households in the sampling have been using firewood as a cooking fuel for more than three and half decades (which is earlier than 31 December 1989)
In the case that technologies using renewable biomass are used under the project activity, this methodology is applicable where all emissions related to processing of biomass are fully accounted for and biomass is sourced from biomass residues and/or a dedicated plantation of the CDM project activity, meeting the following conditions: (a) For projects that use biomass residues, prior to the implementation of the project	Biomass is not used in the project activity. Hence, the conditions are not applicable.

activity, the biomass residues have not been collected and used but been left for decay and would, in the absence of the project activity, continue to be left for decay; and (b) For projects that use biomass residues from a production process (e.g. production of sugar or wood panel boards), the implementation of the project does not result in an increase of the processing capacity of raw input (e.g. sugar, rice, logs, etc.) or in other substantial changes (e.g. product change) in this process; and (c) The biomass used by the project facility is not stored for more than one year; and (d) In the case biomass from dedicated plantations are used, the applicability conditions of TOOL16 "Project and leakage emissions from biomass" are satisfied.	
For electric cook stoves with integrated renewable energy device or with grid connected renewable energy system employing net metering, project participants shall demonstrate that, on an annual basis, at least 80% of the electricity generated is consumed by the electric cook stoves (i.e. 20% or less of electricity is consumed by other loads connected).	The project does not involve any electric cook stove and hence the condition is not applicable for the project.
For electric cook stoves, in all cases under paragraph 2(d) above where back-up diesel generators are used, this methodology is only applicable when no more than 1% of total electricity supply occurs from back up diesel generators on an annual basis.	The project does not involve any electric cook stove and hence the condition is not applicable for the project.
Under this methodology, emission reductions cannot be claimed only due to fuel-switch aspect and proposed project activities shall introduce new renewable	The project activity involves technology switch from conventional firewood based cooking system to renewable biogas based cooking system. Hence, the criteria are met.

energy based technologies, i.e. technology switch is also involved.	
Project participants shall describe in the PDD/PoA-DD the proposed method for distribution of project devices and how the double counting of emission reductions has been addressed, for example, using methods such as unique identifications of product and end-user locations (e.g. programme logo), to prevent double counting of emission reductions from the project devices (e.g. between end users, distributors and producers of stoves, producers of renewable energy, producers of processed renewable biomass).	Each of the bio-digesters shall be allocated a unique id against each end users. End user and project implementer shall have an agreement to avoid any double counting.
For project activities introducing bio ethanol cook stove, project participants shall demonstrate that the bioethanol cook stove are designed, constructed and operated to the requirements (e.g. with regard to safety) of a relevant national or local standard or comparable literature. Latest guidelines issued by a relevant national authority or an international organization may also be used.	The Project is using biogas digesters and bio- ethanol is not used and safety requirement does not arise here. Hence, the criteria is met.

B.3. Project boundary

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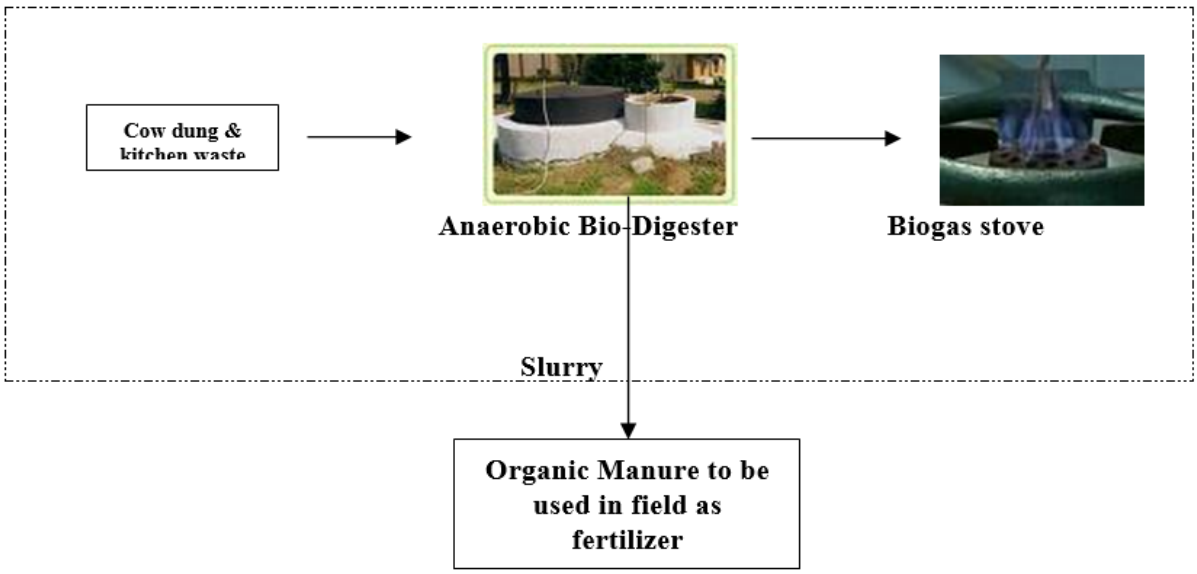
According to AMS-I.E, the project boundary is the physical, geographical site of the use of biomass or the renewable energy. At the unit level, the project boundary is defined by the individual sites and refers to the operation of the biogas digester units at the household level. Table below shows the emission sources that are under the control of the project participants and attributable to biogas digesters.

	Source	GHGs	Included?	Justification/Explanation
Baseline	Firewood	CO_2	Yes	Main emission source.
		CH_4	No	Excluded for simplification.
		N_2O	No	Excluded for simplification.
	Emissions from fossil fuel use for cooking	CO_2	No	Excluded for simplification.

		CH_4	No	Excluded for simplification.
		N_2O	No	Excluded for simplification.
Project scenario	Firewood	CO_2	Yes	Project emissions form continued use of fire-wood shall be accounted.
	Emission from digester and biogas cooking stove	CO_2	No	Not required by the methodology
		CH_4	No	Not required by the methodology
		N_2O	No	Not required by the methodology



B.4. Establishment and description of baseline scenario

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As per "***AMS I.E. Switch from non-renewable biomass for thermal applications by the user, Version 12"*** 'A baseline scenario would be the use of fossil fuels for meeting similar thermal energy needs'.

The project activity involves the installation of anaerobic bio digesters for the production of biogas which replaces non-renewable biomass, used as a fuel for household cooking purposes. A baseline survey has been done to estimate the average firewood consumption prior to project activity at user point following sampling standard as per UNFCCC 'Sampling and surveys for CDM project activities and programmes of activities' version 09 and guideline 'Sampling and surveys for CDM project activities and programmes of activities' version 04.

The baseline survey was performed by a third party covering various districts of Punjab. A 90% confidence interval and 10% error margin applied for sample calculation. To understand the cooking method pattern especially with focus on rural targeted households in various districts of

Punjab, to establish a baseline with respect to the fuel used for cooking; and to facilitate a clean cooking programme for the state of Punjab. As part of this objective, a primary survey of households was carried out to gauge the extent of the use of non-renewable biomass for cooking in households.To understand the level of detail and data points required, a conclusive research methodology, through structured face-to-face interviews, was used to arrive at statistically-valid estimates for the relevant parameters. In consonance with the objective of the study, the following methodology was adopted for carrying out the assignment.

- Preparation of detailed Questionnaire for household survey
- Mobilization of appropriate teams for village and household survey
- Orientation of the team members about the survey objectives
- Collection of primary and secondary data.
- Compilation and analysis of the collected data

Sampling Plan:

To establish a statistically representative sample size, from the total rural targeted households in Punjab, Guidelines for sampling and surveys for CDM project activities and programmes of activities (Ver04.0, CDM-EB67-A06-GUID) issued by UNFCCC, is used. As per the guidelines provided by UNFCCC, for the representative sampling methods, sample size shall be chosen for a 90/10 precision (90% confidence interval and 10% margin of error) for parameter values used to determine emission reductions.

The project activity is envisage to implement in the various districts of the state Punjab, India. As the project activity is planned to implement in various districts of Punjab; since, the population are homogeneous in nature, a simple random sampling is performed.

The following equation is used for arriving the sample size.

Where:

n= Sample size

N = Total number of biogas system of type i installed under the project

p = expected proportion

1.645 = represents the 90% confidence required

0.1 = represents the 10% relative precision

Using the above formula, the sample size arrived is around 261.

However, on a conservative note, the project developer, has decided to go for 300 household sampling. The total sample size decided is 300 households.

Baseline assessment:
This study examines the patterns of domestic energy consumption of households in various districts of Punjab, India over the period of past three and half decades. In India there is no legislation prohibiting the use of firewood for domestic purpose. Further, there are no legal, environmental, ecological and social regulations /law that mandatorily enforces the use of household biogas digesters.

Potential Fuels options available for cooking in the survey area are as follows;

Kerosene: Dependence on kerosene as a primary fuel for cooking or for lighting has decreased in India, and it is used much less for cooking than for lighting. It is evident from the survey, that none of the households utilize Kerosene as the primarily source of energy for cooking owing to is higher price and limited quantity is available is Fair price shop which is not sufficient to meet their energy demands. Prices in the open market shop is very high and hence making it out of the reach of the local population. None of the targeted households were using kerosene; hence the same is not considered as the baseline/staking fuel.

LPG:
During this survey it was found that Fuel wood has remained the principal component of rural domestic energy. From the survey conducted it is very evident that, In India, the transition to modern fuel is slow and still a large number of households are using traditional fuels for cooking and lighting. So, it is important to understand the household level behavior towards use of different types of traditional and modern fuel. The households in the project area are still bank upon the traditional energy sources for cooking i.e. firewood With with the slow rate of growth of LPG, the Government of India launched the Pradhan Mantri Ujjwala Yojana (PMUY) in May 2016 to facilitate underprivileged households' access to LPG for cooking (Cabinet Committee on Economic Affairs 2018). The scheme aimed to empower women and safeguard health. But still, LPG has not become the primarily source of fuel because of the following reasons:
•High upfront costs
• High refill costs
•Extended refilling time
•Lack of adequate infrastructure
During the survey it was found, there were lack of LPG distributors within a reasonable distance and therefore can be considered as major problem, as carrying cylinders over long distances (5–11 km) is exhausting, especially in view of the lack of roads in some rural areas are acting as the main barriers for the non-adoption of LPG. None of the targeted households were using kerosene; hence the same is not considered as the baseline/staking fuel.

Firewood:
It was found during survey firewood provided the main fuel source for home heating, domestic hot water, and food preparation. The forest has been the dominant source for the supply of wood. However, due to increase in demand, fuel wood is also sourced from Trees outside forest, shrubs, dead logs. Being cost effective, relative affordability and easily accessible makes its primary fuel choice.

Crop residue:
It was evident from the survey that none of the household utilize crop residue as main fuel for cooking / or stacking fuel, due to the following reasons;

- Majority of the population burn it on the ground
- Crop residue is high in moisture
- Many of the targeted population utilize it as cattle feed

Cow dung cakes:
It was evident from the survey that none of the household utilize cow dung cakes as main fuel for cooking / or stacking fuel, due to the following reasons;

- High moisture
- High smoke
- Directly applying to the agricultural field

Conclusion:
During the survey conducted by third party, both survey area and targeted population was assessed. In the survey area it was found that 100% of the targeted population is reliant on the firewood as the main source of fuel.
The baseline survey study concludes that, firewood is the primary source of fuel in the district of Punjab, India.
Also, as per baseline survey report, states that firewood provided the main fuel source for home heating, domestic hot water, and food preparation. Being cost effective, relative affordability and easily accessible makes its primary fuel choice. Also, baseline survey report, confirms firewood is the primary source of fuel in the district of Punjab, India.
From the survey report, it can be concluded that 100% of the targeted population is reliant on firewood and it remains as main source of the fuel in the project area.

The kitchen performance test: A Kitchen Performance test is performed in accordance the clean cooking alliance protocol, to understand an average consumption of fuelwood usage per household. The kitchen performance test allows the testers to understand the rate of daily fuelwood consumption per household, as they are used in the normal household environment over a period of time. The KPT is a prolonged test conducted with the willing cooperation of the individual families. More than 90% of the approached families are willing to participate in the kitchen performance test. It is done by conducting daily measurement as families use the traditional stove for a period of 3 days. Results are compiled at the end of the test period. The kitchen performance test household data helps to derive the monthly and yearly consumption of biomass usage per household. Total number of individuals in a household reflects the rationality of the quantity of biomass fuel consumed.

For 3 experimental days, it is observed that the average frequency for food preparation is 3 times a day.

The average daily consumption for the three experimental days is taken. On an average, the surveyed households were found to consume 5.34 tons of fuelwood annually.

B.5. Demonstration of additionality

B.5.1 Specify the methodology, activity requirement or product requirement that establishes deemed additionality for the proposed project (including the version number and the specific paragraph, if applicable).	The project activity involves the installation of anaerobic bio digesters for the production of biogas which replaces non-renewable biomass, used as a fuel for household cooking purposes. The methodology used is AMS I.E. Switch from non-renewable biomass for thermal applications by the user, Version 12. The project falls under GG4GG Community Services Activity Requirements. As per Annex-B Positive list under 'GG4GG Community Services Activity Requirements' the project meets the criteria 3 'Project activities solely composed of isolated units where the users of the technology/measure are households or communities or institutions and where each unit results in <= 600 MWh of energy savings per year or <=600 tonnes of emission reductions per year'.

Describe how the proposed project meets the criteria for deemed additionality.	The emission reduction for an individual unit is far below 600 tonnes of emission reduction per year. Hence, the proposed project activity falls under the 'Positive List' and hence under Principle 5 – Financial Additionality & Ongoing Financial Need, the project is considered deemed additional.

One biogas system can save around 5.34 tons/household /year of fire wood, the emission reduction as per applied methodology (AMS-I.E ,version 12) for a single plant is calculaded as below:

$$B_y = N_{HH} \times (BC_{BL,HH,y} - BC_{PJ,HH,y})$$

Where,

$\mathbf{B_y}$ = Quantity of woody biomass that would be substituted or displayed in tons.

N_{HH} = Number of households in the project activity, number. it Is considered 1 considering a single unit.

$BC_{BL,}$ =Average annual consumption of woody biomass per household before the start of the project activity, tonnes/household/year 5.34 ton/HH/yr is considered

$BC_{PJ,HH,y}$ = If it is found that pre-project devices were not completely displaced but continue to be used to some extent, average annual consumption of woody biomass per household in the pre-project devices during the project activity, tonnes/household/year.it is considered conservatively that entire wood is replaced.

B_y = 1*(5.34 ton-0)

= 5.34 ton

Therefore, emission reduction

$$BEy = By \times f_{NRB,y} \times NCVbiomass \times EF_{projected\_fossil\_fuel}$$

= 5.34*100%(most conservative value)*0.0156*64.4

=5 tCO_2

Therefore, The emission reduction for an individual unit is far below 600 tonnes of emission reduction per year. Hence, the proposed project activity falls under the 'Positive List' and hence under Principle 5 – Financial Additionality & Ongoing Financial Need, the project is considered deemed additional.

B.5.1 Prior Consideration

>> As per GS4GG rule for retroactive projects, project documents need to submit to GS within one year of the project start date to meet prior consideration. Only biogas plants commissioned from one year prior to GS submission shall be considered. The

project activity is retroactive and the chronology of the events is mentioned in the table below;

Events	Date
Tri-party Agreement between PP, Implementing partner and End user	15/05/2021
Purchase order placed for biogas challahs (Start date of the project)	01/06/2021
First unit commissioning	10/06/2021
Final Commissioning date	05/02/2022
Date of first submission to GS	10/05/2022
Date of initiation of SFR	10/05/2022
End date of SFR	10/07/2022
Date of Listing	25/07/2022
VVB appointment date	08/08/2022

B.5.1 Prior Consideration

As per GS4GG rule for retroactive projects, project documents need to submit to GS within one year of the project start date to meet prior consideration. Only biogas plants commissioned from one year prior to GS submission shall be considered.

B.5.2 Ongoing Financial Need

>>

As per the clause 3.5.2.2 of GS4GG 'principle and requirements', the ongoing financial needs will be demonstrated during the Design Certification Renewal stage.

B.6. Sustainable Development Goals (SDG) outcomes

Relevant Target/Indicator for each of the three SDGs

Sustainable Development Goals Targeted	Most relevant SDG Target	SDG Impact Indicator (Proposed or SDG Indicator)
13 Climate Action (mandatory)	SDG target (13.2)- Integrate climate change measures into national policies, strategies and planning	Quantity of emission reductions achieved from the project activity.

8 Decent Work and Economic Growth	SDG target 8.5- Quality of Employment; and Quantitative employment and income generation	Number of Training Programmes provided to the employees and the Maintenance & Service staff. Number of Employees for Maintenance & Service.
7 Affordable and clean energy	7.1- By 2030, ensure universal access to affordable, reliable and modern energy services	7.1.2-Proportion of population with primary reliance on clean fuels and technology
3 Good Health and Well Being	3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.	3.9.1Mortality rate attributed to household and ambient air pollution

B.6.1 Explanation of methodological choices/approaches for estimating the SDG Impact

>>

As per "AMS I.E- Switch from non-renewable biomass for thermal applications by the user, Version 12, the baseline emissions (BEy) are calculated as:

$$BEy = By \times f_{NRB,y} \times NCVbiomass \times EF_{projected\_fossil\_fuel}$$

Where,

BE_y = Baseline emissions during the year y in t CO_2e

B_y = Quantity of woody biomass that is substituted or displaced in tonnes

$f_{NRB,}$ = Fraction of woody biomass used in the absence of the project activity in year y that can be established as non-renewable biomass (fNRB)

$NCV_{biomass}$ = Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.0156 TJ/tonne)

$EF_{projected\_fossil\ fuel}$ = Emission factor for the substitution of non-renewable woody biomass by similar consumers. Use a value of 64.4 tCO2/TJ

B_y is determined by using option (a) paragraph 29 of the methodology as follows:

"Calculated as the product of the number of households multiplied by the estimate of average annual consumption of woody biomass per household that is displaced by the project activity (tonnes/ household/year)";

$$B_y = N_{HH} \times (BC_{BL,HH,y} - BC_{PJ,HH,y})$$

Where,

N_{HH} = Number of households in the project activity, number

$BC_{BL,,}$ = Average annual consumption of woody biomass per household before the start of the project activity, tonnes/household/year

$BC_{PJ,HH,y}$ = If it is found that pre-project devices were not completely displaced but continue to be used to some extent, average annual consumption of woody biomass per household in the pre-project devices during the project activity, tonnes/household/year

.

$BC_{BL,HH,Y}$ has been determined by third-party survey for the sample of households explained in section B.4 above.

Fraction of woody biomass used in the absence of the project activity in year y that can be established as nonrenewable biomass ($f_{NRB,y}$) is determined as per methodological tool 'Calculation of the fraction of nonrenewable biomass' version 03 as follows:

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

$$\text{fNRB} = \frac{\text{NRB}}{\text{NRB} + \text{RB}}$$

fNRB = Fraction of non-renewable biomass (fraction or %)

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

RB = Quantity of renewable biomass (t/yr)

The quantity of non renewable woody biomass consumed in applicable area (NRB) shall be determined as a difference between the total consumption of woody mass in the applicable area and the quantity of renewable biomass the can be sustainably harvested in the applicable area (RB):

NRB = H – RB

Where,

H is total consumption of woody mass in the applicable area in the relevant period (tones)

The total consumption of woody biomass (H) is calculated Using following equation, accounting of all consumption within the applicable area (not only wood fuel but also timber and industrial consumption):

H = HW * N + CE + NE

Where,
HW = annual consumption of wood fuel per household, including fuel wood, charcoal , in the applicable are in relevant period (tonnes/household)

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

NE = commercial woody biomass consumption of non energy applications (e.g constructions and furniture).) that are extracted from the forests or other land areas in the applicable area in the relevant period (tonnes).

N = no. of household consuming wood fuel areas in the applicable area in the relevant period (number).
As per paragraph 15 of methodology for the parameter HW and N, an aggregated value (HW*N) may be used in the calculation, if official statistics provide total household wood fuel consumption (HW*N) but not disaggregate vaule of HW and N separately.

Accordingly, below are the details and calculation provided:

Description of indicators	units	Total quantity	reference
Total woodfuel consumption (HW*N+CE)	Ton/year	456000	India State of Forest Resources 2019, volume 1, chapter 10, pg 160, table 10.2
Annual wood consumption as timber for other use (NE)	Ton/year	3,682,554.334	value calculated by using section 7.4.7 (Annual fuelwood consumption)India State of Forest Resources 2011, chapter no 7
Total annual consumption of wood (H)	Ton/year	4,138,554.334	calculated

Procedure to estimate RB:

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

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

Where:

$MAI_{forest,i}$ = Mean Annual Increment of woody biomass growth per hectare in subcategory i of forest areas (t/ha/yr). The value of $MAI_{forest,i}$ is 0.695 for Punjab. This parameter has been referred from the published paper "Phytomass carbon pool of trees and forests in India"[3].

$MAI_{other,i}$ = Mean Annual Increment of woody biomass growth per hectare in subcategory i of other wooded land areas (t/ha/yr). This value is not considered due to non-availability of data.

$F_{forest,i}$ = Extent of forest in sub-category i (ha). India State of Forest Resources 2021, chapter 13, page no. 427 $F_{other,i}$ = Extent of other wooded land in sub-category i (ha India State of Forest Resources 2021, chapter 13, page no. 427P_{forest} = Extent of non-accessible area (e.g. protected area where extraction of wood is prohibited, geographically remote area) within forest areas (ha). This parameter is taken 0 (it's a area under tiger reserve and in Punjab there is no such area

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 parameter is optional and not considered[4].

I = Sub-category i of forest areas and other wooded land areas

Extent of forest in sub-category (Fforest,i)	hectares	**253000**	India State of Forest Resources 2021, chapter 13, page no. 427
Extent of Other Wooded Land (Fother,i)	hectares	**8000**	India State of Forest Resources 2021, chapter 13, page no. 427
Extent of non-accessible area within forest areas (Pforest)	hectares	**0**	India State of Forest Resources 2021, Table 4.4 (calculated the area of forest cover under the tiger reserves)
Extent of non-accessible area within other wooded land area (Pother)	hectares	**0**	Not given, taken as 0 as conservative value

[3] https://moef.gov.in/wp-content/uploads/2019/06/Pacific.pdf (page no. 16 of Asia-Pacific Forestry Sector Outlook Study II India Outlook Study 2020)
[4] CDM Methodological Tool -30: Calculation of the fraction of non-renewable biomass, version 03

Mean Annual Increment of woody biomass growth per hectare in sub-category i of forest areas (MAIforest,i)	Ton/hectare/Year	**0.695**	Phytomass carbon pool of trees and forests in India
Mean Annual Increment of woody biomass growth per hectare in sub-category i of other wooded land areas (MAIother,i)	Ton/hectare/Year	**0.695**	Phytomass carbon pool of trees and forests in India
Renewable Biomass (RB)	ton/year	**181395**	$RB = \sum (MAI_{forest,i} \times (F_{forest,i} - P_{forest})) + \sum (MAI_{other,i} \times (F_{other,i} - P_{other}))$
Non- Renewable Biomas (NRB)	ton/year	**3,957,159**	$NRB = H - RB$
Fraction of Non-renewable Biomass (fNRB)	fraction	**0.956169477**	$fNRB = \frac{NRB}{NRB + RB}$

The fraction of woody biomass that can be established as non-renewable, is: 95.61 %

Project Emissions (PEy):
As per applied methodology AMS-I.E, version 12, project emissions are accounted for below activities:
- CO2 emissions from on-site consumption of fossil fuels due to the project activity
- CO2 emissions from electricity consumption by the project activity
- Methane emission from solid waste disposal or waste water
- Project emissions related to cultivation of feedstock
- Project emissions from transportation

The project activity does not involve any of the above activity and hence, project emissions for the project activity is not applicable. However, while determining By as per equation 3 of the applied methodology, firewood consumed by pre-project devices during the project activity shall be monitored and applied ex-post. This is to be accounted.

Leakage Emissions (LEy):
Leakage emissions (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 following potential source of leakage shall 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 By is adjusted to account for the quantified leakage. Alternatively, By 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 default option, and By shall be adjusted with adjustment factor of 0.95 to account leakage.

Emission reductions:
Emission reductions are to be estimated based on the equation below:

ERy = BEy – PEy – LEy

SDG 8: The employment records and training records will be monitored and maintained to estimate impact of SDG 8.

SDG 7: Sample survey to be applied to estimate impact of SDG 7.

SDG 3: Sample survey to be applied to estimate impact of SDG 3.

B.6.2 Data and parameters fixed ex ante

Data/parameter	N_{HH} (SDG-13)
Unit	Number
Description	Number of households in the project activity in year y
Source of data	Project Proponent's project database
Value(s) applied	11,000
Choice of data or Measurement methods and procedures	Project database as per the commissioning reports and end user agreements
Purpose of data	Estimation of Baseline
Additional comment	NIL

Data/parameter	$BC_{BL,HH,y}$ (SDG-13)

Unit	tonnes/household/year
Description	Average annual consumption of woody biomass per household before the start of the project activity
Source of data	Baseline survey
Value(s) applied	5.34
Choice of data or Measurement methods and procedures	To know the baseline fuel/technologies which is the firewood and its consumption pattern, a survey was conducted in the state of Punjab. The survey is conducted in line with the methodology and following UNFCCC sampling standard 'Sampling and surveys for CDM project activities and programmes of activities' version 08 and guideline 'Sampling and surveys for CDM project activities and programmes of activities' version 04. A 90% confidence interval and 10% error margin applied for sample calculation.
Purpose of data	Estimation of Baseline
Additional comment	NIL

Data/parameter	$f_{NRB,y}$ (SDG-13)
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	Calculated as per the requirements of methodological tool - Calculation of the fraction of non-renewable biomass, version 03.
Value(s) applied	95.61%
Choice of data or Measurement methods and procedures	Calculation of the fraction of non-renewable biomass, version 03 (Methodological tool)
Purpose of data	Estimation of Baseline

Additional comment	NIL

Data/parameter	$NCV_{biomass}$
Unit	TJ/tonne
Description	Net calorific value of the non-renewable woody biomass that is substituted
Source of data	Default value from the methodology, AMS-I.E - Switch from non-renewable biomass for thermal applications by the user, Version 12.0.
Value(s) applied	0.0156 TJ/tonne
Choice of data or Measurement methods and procedures	Default value from the methodology, AMS-I.E - Switch from non-renewable biomass for thermal applications by the user, Version 12.0.
Purpose of data	Estimation of Baseline
Additional comment	NIL

Data/parameter	$EF_{projected\_fossilfuel}$ (SDG-13)
Unit	tCO_2/TJ
Description	Emission factor for the substitution of non-renewable woody biomass
Source of data	Default value from the methodology, AMS-I.E - Switch from non-renewable biomass for thermal applications by the user, Version 12.0.
Value(s) applied	64.4 tCO_2/TJ
Choice of data or Measurement methods and procedures	Default value from the methodology, AMS-I.E - Switch from non-renewable biomass for thermal applications by the user, Version 12.0.
Purpose of data	Estimation of Baseline

Additional comment	NIL

SDG 7:	
Baseline estimation: All users used fire-wood based cooking system which is not clean energy.	It is assumed that with 100% operational status all users, i.e.11,000 biogas plants users are accessed to clean energy source.
SDG 3:	
Prone to illness due to smoke released from burning of fire-wood.	Reduction in smoke related illness due to use of biogas instead of firewood. Since, biogas is smokeless; 100% users i.e. 11,000 biogas plant users are expected to get rid of kitchen smoke related illness.
SDG 8:	
Less local employment opportunities for youth.	10 employments
Unskilled local villagers; and less employability.	2 trainings per year. More trained/skilled youth.

B.6.3 Ex ante estimation of SDG Impact

>>

SDG 13

Baseline Emissions:

$$BEy = By \times fNRB,y \times NCVbiomass \times EFprojected\_fossil\_fuel$$

Where,

$$By = NHH \times (BCBL,HH,y - BCPJ,HH,y)$$

Total population (N_{HH}) = 11,000nos.
Avergae firewood consumption ($BC_{BL,HH,y}$) = 5.34tonne/year

BCPj,HH,y (if it is found that pre-project devices were not completely displaced but continue to be used to some extent, average annual consumption of woody biomass per household in the pre-project devices during the project activity, tonnes/household/year) is considered zero during design certification stage. The same shall be monitored ex-post certification.

By = 11,000 × 5.34 = 58, 740 tonne/year

Fraction of woody biomass that can be established as non-renewable for Punjab ($fNRB$,) = 95.61 %

BEy would be:

$$BEy = By \times fNRB,y \times NCVbiomass \times EFprojected\_fossil\_fuel$$

By = 58, 740 tonne/year

$fNRB$, = 95.61 %

$NCVbiomass$ = 0.0156 TJ/tonne

$EFprojected\_fossil\_fuel$ = 64.4 tCO_2/TJ

Therefore, BEy = 56,426 tCO_2e

Project Emissions (PEy): As explained in above, project emission is zero.

Leakage Emissions: By is multiplied by a net to gross adjustment factor of 0.95 to account for leakages.

Emission reductions = BEy – PEy – LEy
= 56,426 * 0.95
= 53,605 tCO_2e

SDG 7:	
Baseline estimation: All users used fire-wood based cooking system which is not clean energy.	11,000 users are accessed to clean energy sources. This shall be monitored. It is assumed that with 100% operational status all users are accessed to clean energy source.
SDG 3:	
Prone to illness due to smoke released from burning of fire-wood.	Reduction in smoke related illness due to use of biogas instead of firewood. Since, biogas is smokeless; 100% users i.e. 11,000 biogas plants users are expected better health condition.
SDG 8:	
Less local employment opportunities for youth.	10 permanent employments.
Unskilled local villagers; and less employability.	2 trainings per year. More trained/skilled youth.

B.6.4 Summary of ex ante estimates of each SDG Impact

Year	Estimation of project activity Emissions(tCO2)	Estimation of Baseline Emissions(tCO2)	Estimation of Leakage Emissions(tCO2)	Estimation of overall emission reductions(tCO2)
Year 1	0	56,426	2821	53,605
Year 2	0	56,426	2821	53,605
Year 3	0	56,426	2821	53,605
Year 4	0	56,426	2821	53,605
Year 5	0	56,426	2821	53,605
Total estimated reductions (tonnes of CO_{2e})	0	282,130	14,105	268,025
Total number of crediting years	5			
Annual average over the crediting period of estimated reductions (tonnes of CO_{2e})	**0**	**56,426**	**2,821**	**53,605**

B.7. Monitoring plan

B.7.1 Data and parameters to be monitored

Greneity infocom Service Pvt Ltd (hereafter Greneity) facilitates the End User families to set up village level institutions to take care of repairs, maintenance and the social controls/peer support needed to cope with various exigencies that crops up.

Biogas Project Management Unit

A dedicated team is set up within Greneity for management and monitoring of the Biogas Project. This Project Management & Monitoring Unit consist of the following staff:

Biogas Field Workers/RETs:

Biogas field workers oversee the operation & maintenance of biogas units.
Each field worker is in-charge of approximately 500 unit. They report to the Project Manager and their tasks are to:

- Inspect the bio-digesters in periodic intervals to ensure proper functioning of all the plants
- Identify local suppliers of material for village clusters
- Record the working of bio-digesters in specially designed formats and handover the data to manager on a regular basis
- Assist in selection of Volunteers, train and support them
- Contract Masons and attend to major repairs that cannot be handled by the village level institutions

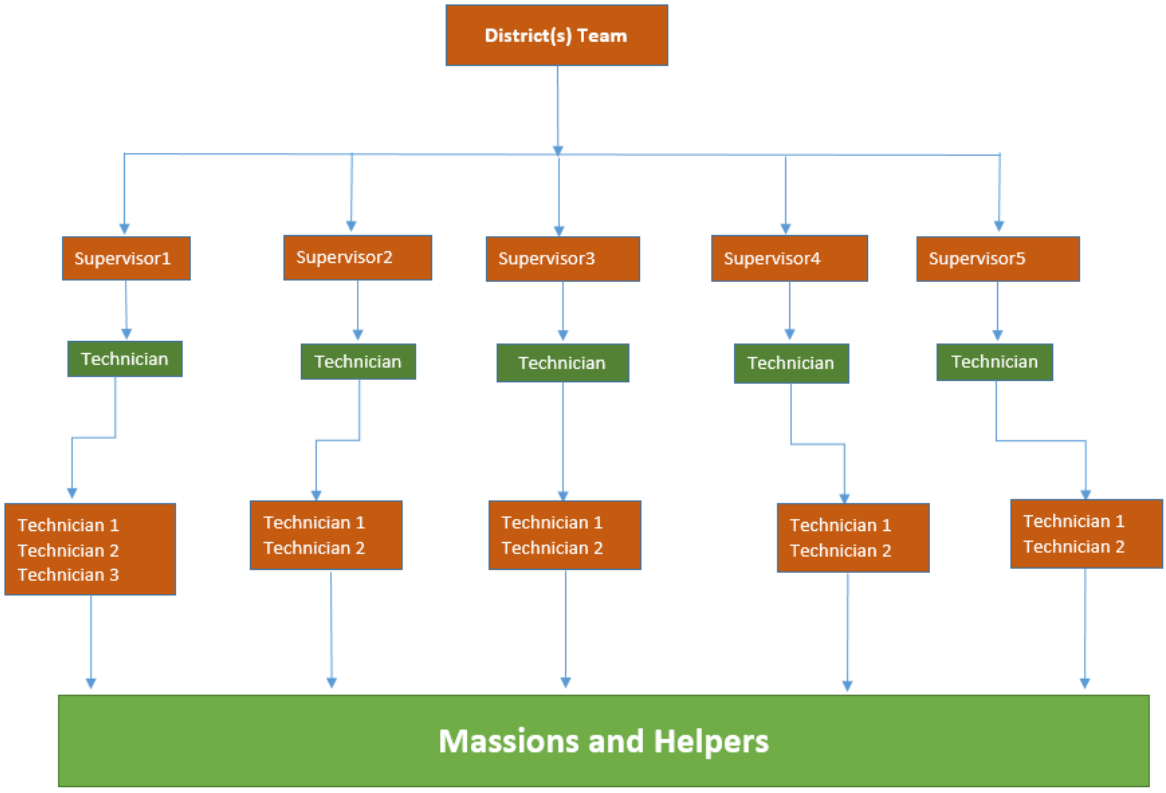
Management system at village level:

Village level Volunteers maintain the Monitoring log Books where the reasons for non-usage are recorded. Every participating village have a Volunteer to monitor usage of biogas units. Volunteer(s)/mason(s) will be responsible for monitoring of usage and is the first to identify dysfunctional units. The Volunteer either prompts the End User to set right a problem or bring it to the notice of the Biogas Technician.

Each Biogas Unit is marked with a unique Identification Number and date of construction.

A Monitoring log Book is maintained for the project activity. If any Biogas Unit is faulty or not functional, the problem report is automatically passed on to Volunteer(s)/mason(s). There is a continuous database maintained of all the Biogas Units not operational on a regular basis where number of non-operational days, and the reasons of non-operation are recorded. Mostly, volunteers are able to handle the problem arises, in case of major issues, Biogas technicians are informed to handle the situation.

Information flow diagram is as follows;



SDG 13

Data / Parameter	$BC_{PJ,HH,y}$
Unit	tonnes/household/year
Description	Average annual consumption of woody biomass per household in the pre-project devices during the project activity, if it is found that pre-project devices were not completely displaced but continue to be used to some extent.
Source of data	Survey
Value(s) applied	To be monitored
Measurement methods and procedures	Monitoring shall consist of estimation of all project devices or a representative sample thereof, at least once every two years.
Monitoring frequency	At least once in every two years.
QA/QC procedures	Third party survey to be conducted following standard sampling approach.
Purpose of data	Estimation of Baseline Emissions.
Additional comment	Nil

Data / Parameter	N_{HH}
Unit	Number
Description	Number of households (biogas system) in the project activity in operational per year
Source of data	Survey
Value(s) applied	To be monitored
Measurement methods and procedures	Monitoring consist of checking of representative sample, to ensure that bio-digesters operating. Calculated as NHH*Py, where NHH is the number of biodigesters installed in the project and Py is Proportion of Bio-digesters operational estimated based on the sample survey.
Monitoring frequency	At least once in every two years.
QA/QC procedures	Third party survey to be conducted following standard

	sampling approach
Purpose of data	Estimation of Baseline Emissions.
Additional comment	

SDG 8

Data / Parameter	Unemployment rate, by sex, age and persons with disabilities
Unit	Numbers
Description	Provided training for improving employability. Thereby improving Quality of Employment.
Source of data	Records of the training programmes, awareness generation activities, photographs, interviews etc.
Value(s) applied	2
Measurement methods and procedures	-
Monitoring frequency	Annual
QA/QC procedures	Continuation of regular trainings/workshops.
Purpose of data	Assessment of contribution towards 'Safeguarding Principles' and to monitor the contribution to SDG 8
Additional comment	

Data / Parameter	Quantitative employment and income generation (8.5)
Unit	Numbers
Description	Number of people employed for the maintenance and servicing of bio digesters.
Source of data	Attendance Sheet, employment records, employment contracts maintained by Project Developer
Value(s) applied	10 local permanent employment
Measurement methods and procedures	Manually by Project Developer

Monitoring frequency	Annual
QA/QC procedures	Income generation to be enhanced by creating job opportunities through training and capacity building.
Purpose of data	To monitor the contribution to SDG 8
Additional comment	

SDG 7

Data / Parameter	Access to affordable and clean energy services (7.1.2)
Unit	Numbers
Description	Number of biogas system operational under the project activity
Source of data	Biogas User Survey
Value(s) applied	11000
Measurement methods and procedures	Sample survey to confirm if project biogas systems are operational. Operational status will confirm that the users are accessed to affordable and clean energy
Monitoring frequency	At least once in two years
QA/QC procedures	Required sample size shall be determined following UNFCCC sampling standard
Purpose of data	To monitor the contribution to SDG 7
Additional comment	Nil

SDG 3

Data / Parameter	Improvement in health and decrease in illness (3.9)
Unit	Numbers
Description	Indoor air quality at usage point
Source of data	Biogas User Survey
Value(s) applied	11000
Measurement methods and procedures	Improvement in health and decrease in illness will be assessed through survey interviews with end users due to project implementation. Users opinion on indoor air

	quality due to biogas usage shall be collected during monitoring survey. In addition, training to the operation and maintenance technicians and field supervisors to be provided to increase awareness in safe operation and handling emergency situations.
Monitoring frequency	At least once in two years
QA/QC procedures	Required sample size shall be determined following UNFCCC sampling standard
Purpose of data	To monitor the contribution to SDG 3
Additional comment	Nil

B.7.2 Sampling plan

>>

A third party sample survey has performed. The survey is conducted in line with the methodology and following UNFCCC sampling standard 'Sampling and surveys for CDM project activities and programmes of activities' version 09 and guideline 'Sampling and surveys for CDM project activities and programmes of activities' version 04. A 90% confidence interval and 10% error margin applied for sample calculation.

B.7.3 Other elements of monitoring plan

>>N/A

SECTION C. DURATION AND CREDITING PERIOD

C.1. Duration of project

C.1.1 Start date of project

>>01/06/2021

C.1.2 Expected operational lifetime of project

>>20 Years

C.2. Crediting period of project

C.2.1 Start date of crediting period

>>01/06/2021 or two years prior to the date of project design certification whichever is later.

C.2.2 Total length of crediting period

>> The project falls under GS community service activity and hence eligible for total 15 years issuance with two times certification renewal every 5 years. So the length of crediting period will be 15 years

SECTION D. SUMMARY OF SAFEGUARDING PRINCIPLES AND GENDER SENSITIVE ASSESSMENT

D.1 Safeguarding Principles that will be monitored

A completed Safeguarding Principles Assessment is in Appendix 1, ongoing monitoring is summarised below.

Principles	Mitigation Measures added to the Monitoring Plan
Principle 9.4 Release of pollutants	Bio slurry obtained from the anaerobic process will be applied to the fields. Same can be verified during monitoring period.

D.2. Assessment that project complies with GS4GG Gender Sensitive requirements

Question 1 - Explain how the project reflects the key issues and requirements of Gender Sensitive design and implementation as outlined in the Gender Policy?	The project is aimed to replace conventional wood fired mud stoves technology with biogas primarily for cooking. This will result in reducing use of firewood consumption or replacement of complete firewood usage at user place. Primarily in rural areas of India, cooking activity at household level is managed by women. Therefore, women are more exposed to the indoor air pollution and the associated hazard. Women in rural areas in most cases are also responsible for taking care of their children specially infants who need mother's support most of the time are bound to accompany their

	mother in kitchen. This situation leads to enhanced exposure of the women and children to kitchen smoke and associated health consequences. Since the project aims to replace the polluting traditional cooking stoves with biogas cooking system, the primary beneficiary would be the women and children. Furthermore, the project is focused to the economically disadvantaged group of people, which also justifies the dimension of social inclusion in the project design.
Question 2 - Explain how the project aligns with existing country policies, strategies and best practices	Ministry of women & child development, Govt. of India has taken various measures for gender equality/socio-economic development/empowerment of women. Out of these, the project positively contributes towards the national mission for empowerment of women through improvement of health and attaining vision for empowerment of wowen under national policy for women 2016 (Women participation will be ensured in the efficient use and spreading the use of solar energy, biogas, smokeless chulas and other technological applications to have positive influence on their life styles and a long term impact on meeting sustainable development goals).
Question 3 - Is an Expert required for the Gender Safeguarding Principles & Requirements?	N/A
Question 4 - Is an Expert required to assist with Gender issues at the Stakeholder Consultation?	N/A

SECTION E. SUMMARY OF LOCAL STAKEHOLDER CONSULTATION

The below is a summary of the 2 step GS4GG Consultation for monitoring purposes. Please refer to the separate Stakeholder Consultation Report for a complete report on the initial consultation and stakeholder feedback round.

E.1 Summary of stakeholder mitigation measures

>>

Greneity and its partner NGOs invited all the relevant stake holders like Gold standard supporting NGOs, DNA, local Government officials, elected representatives, and the villagers for this meeting. The local stake holder consultation meeting was successfully held at different places in Punjab which are detailed below:

Date of Meeting Place
5th June 2022, 10 AM onwards Village Deepgarh, District Barnala Punjab, India
5th June 2022, 10 AM onwards Village Dekh, District Bathinda Punjab, India

The project idea and its components were thoroughly discussed, feedback from the participants has been documented and sustainable development aspects were discussed during the proceedings. Participants got clarification on many of the project aspects.

Village Sarpanch and Pradhan explained about the biogas program of the Government and its limitations and implementation style. They stated that the present project is much useful to the farming community in general and women. Further, the positive impact on the women health by using the clean fuel technology is also explained.
RET's introduced the present project to the participants and clarified many of their queries. The RET, also explained the transfer of ownership of Carbon credits, to provide free operation and maintenance of the biogas plant. Staff members of the Green Mission Welfare Society recorded attendees details in a special register. Further, RET's explained how this Project activity is supporting the installation of biogas plants to rural households and provide participating households with clean, convenient, and efficient means for cooking and heating purposes. They also provided insights on how the

monitoring of installed domestic biogas units could lead to positive sustainable development goals.

They had distributed feedback forms among the participants and collected once they were duly filled. The minutes of the meeting were recorded, and meeting photos were taken to document the event.
The following were the sample questions raised in the meeting:
How long the project will be monitored and maintained?
Basic qualification required to be technician?

The following were the sample comments from the feedback forms:
1. The meeting is well organized and very informative.
2. The project is a needed and useful for both farmers and women.
3. There is nothing to dislike in the project.
The participants overwhelmingly supported the project, and no negative comments were raised.

E.2 Final continuous input / grievance mechanism

	Method Chosen (include all known details e.g. location of book, phone, number, identity of mediator)	Justification of Choice (best practice)
Continuous Input / Grievance Expression Process Book (mandatory)	The logbook has been maintained in the panchayat office.	The panchayat office is the most accessible place for all the villagers
GS Contact (mandatory)	help@goldstandard.org	
Telephone access (optional)	+91 9886252062	As the project is spread across a huge area hence telephone access has also been provisioned.
Internet/email access (optional)	shivani.garg@greneity.com	The stakeholders with internet access has an option of contacting Greneity through the email id provided.
Nominated Independent Mediator (optional)	N/A	N/A
Other		

APPENDIX 1 - SAFEGUARDING PRINCIPLES ASSESSMENT

Complete the Assessment below and copy all Mitigation Measures for each Principle into SECTION D above. Please refer to the instructions in the Guide to Completing this Form.

Assessment Questions/ Requirements	Justification of Relevance (Yes/potentially/no)	How Project will achieve Requirements through design, management or risk mitigation.	Mitigation Measures added to the Monitoring Plan (if required)
Principle 1. Human Rights			
1. The Project Developer and the Project shall respect internationally proclaimed human rights and shall not be complicit in violence or human rights abuses of any kind as defined in the Universal Declaration of Human Rights 2. The Project shall not discriminate with regards to participation and inclusion	No	1. The Project is not in conflict with the economic livelihood or other issue of the local community. Thus, the Project does not cause any human rights abuse and respects internationally proclaimed human rights issue. 2. Project activities are not expected to cause any human rights abuse. As a member of	Not Required

		United Nations[5] and part of UN Agreement on Human Rights[6] , it is ensured by law in India that no action can be taken against human rights.	
Principle 2. Gender Equality			
1. The Project shall not directly or indirectly lead to/contribute to adverse impacts on gender equality and/or the situation of women 2. Projects shall apply the principles of nondiscrimination, equal treatment, and equal pay for equal work 3. The Project shall refer to the country's national gender strategy or equivalent national	No	1. The project is implemented at households. It does not involve any women workforce which may lead to sexual harassment. The project does not restrict of women's rights or access to resources. The project recognizes women's ownership rights regardless of marital status. 2. Yes. The project involves construction of biogas digesters at households. Trained labors are used for the same. Local people are engaged for the same. No	Not Required

[5] https://labour.gov.in/lcandilasdivision/india-ilo
[6] https://www.ilo.org/newdelhi/lang--en/index.htm

commitment to aid in assessing gender risks 4. (where required) Summary of opinions and recommendations of an Expert Stakeholder(s)		discrimination either in gender or any other form is followed to engage local people. 3.. India ratified the International Convention on the Elimination of All Forms of Racial Discrimination[7] on 03/12/1968 with certain reservation. The project activity is in line with strategy of elimination of discrimination.	
Principle 3. Community Health, Safety and Working Conditions			
1. The Project shall avoid community exposure to increased health risks and shall not adversely affect the health of the workers and the community	No	The project leads to safe working condition and improvement in health as it will replace firewood as fuel with biogas which is clean and safe.. All the participants/staffs are well trained and are well aware of the in operational and	Not Required

[7] https://nhrc.nic.in/documents/india_ratification_status.pdf

		maintenance issues as well as health & safety related topics.	
Principle 4.1 Sites of Cultural and Historical Heritage			
Does the Project Area include sites, structures, or objects with historical, cultural, artistic, traditional or religious values or intangible forms of culture? >>	No	The project area covers households which does not have any structures, or objects with historical, cultural, artistic, traditional or religious values or intangible forms of culture. No cultural heritage/ indigenous people are replaced by the project. Hence, not applicable.	Not Required
Principle 4.2 Forced Eviction and Displacement			
Does the Project require or cause the physical or economic relocation of peoples (temporary or permanent, full or partial)? >>	No	The project activity takes place within individual households. Therefore, no relocation of people takes place.	Not Required
Principle 4.3 Land Tenure and Other Rights			
a. Does the Project require any change, or have any uncertainties related to land tenure arrangements and/or	No	There are no uncertainties regarding land tenure, access	Not Required

access rights, usage rights or land ownership? b. For Projects involving land use tenure, are there any uncertainties with regards to land tenure, access rights, usage rights or land ownership? >>		rights, usage rights or land ownership. The biogas digesters are developed for the users and will belongs to them. They will have the all the rights to use and maintain the same.	
Principle 4.4 - Indigenous people			
Are indigenous peoples present in or within the area of influence of the Project and/or is the Project located on land/territory claimed by indigenous peoples? >>	No	No. The project involves household biogas digesters in the states of Punjab. Therefore, it does not involve any negative influence towards indigenous people	Not Required
Principle 5. Corruption			
1. The Project shall not involve, be complicit in or inadvertently contribute to or reinforce corruption or corrupt Projects	No	Project activity is an installation of biogas digesters at households in the state of Punjab, India and does not contribute to or reinforce corruption of any kind. Indulgence in corruption is an illegal activity in the host country and the local labor	Not applicable

		compliance takes into account of the same. PP does not involve and is not complicit in any kind of corruption. India has ratified UN convention against Corruption in 2011[8].	
Principle 6.1 Labour Rights			
1. The Project Developer shall ensure that all employment is in compliance with national labour occupational health and safety laws and with the principles and standards embodied in the ILO fundamental conventions 2. Workers shall be able to establish and join labour organisations	No	1. The project proponent is committed to the employee's workplace health & safety during all phases of the project. All employees will attend health & safety trainings. This is issued in the Labour code on Occupational Safety, Health and Working Conditions and UN Agreement on Human Rights[9]. 2. The project respects fundamental right of employee. There is law in India	Not applicable

[8] https://treaties.un.org/Pages/ViewDetails.aspx?src=IND&mtdsg_no=XVIII-14&chapter=18&clang=_en#EndDec
[9] https://www.ohchr.org/en/countries/india

3. Working agreements with all individual workers shall be documented and implemented and include: a) Working hours (must not exceed 48 hours per week on a regular basis), AND b) Duties and tasks, AND c) Remuneration (must include provision for payment of overtime), AND d) Modalities on health insurance, AND e) Modalities on termination of the contract with provision for voluntary		since 1926 by The Trade Unions Act, 1926[10] which protects rights of industrial trade unions and their members. PP and appointed contractors will not involve in any form of forced or compulsory labour. India has ratified ILO "C029 – Forced Labor Convention"[11]. 3. PP and their subcontractors complying with all relevant national laws regarding child labor. PP will not employ children in any shape or form for their works. India has ratified ILO "C138 – Minimum Age Conventions" and "C182 – Worst Forms of Child Labor Convention"[12]. 4. PP and their subcontractors complying with	

[10] http://ncw.nic.in/acts/TheTradeUnionsAct1926.pdf
[11] https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:11200:0::NO::P11200_COUNTRY_ID:102691
[12] https://www.ilo.org/dyn/normlex/en/f?p=1000:11200:0::NO:11200:P11200_COUNTRY_ID:102691

resignation by employee, AND f) Provision for annual leave of not less than 10 days per year, not including sick and casual leave. 4. No child labour is allowed (Exceptions for children working on their families' property requires an Expert Stakeholder opinion) 5. The Project Developer shall ensure the use of appropriate equipment, training of workers, documentation and reporting of accidents and incidents, and emergency		all relevant national laws regarding child labor. PP will not employ children in any shape or form for their works. India has ratified ILO "C138 – Minimum Age Conventions" and "C182 – Worst Forms of Child Labor Convention"[13] . The project owner is committed to the safe and healthy working conditions all phases of the project. All employees will attend trainings health & safety. This issue is protected by Labor code[14] and UN Agreement on Human Rights[15] .	

[13] https://www.ilo.org/dyn/normlex/en/f?p=1000:11200:0::NO:11200:P11200_COUNTRY_ID:102691
[14] https://www.ohchr.org/en/countries/india
[15] https://www.ohchr.org/en/countries/india

preparedness and response measures			
Principle 6.2 Negative Economic Consequences			
1. Does the project cause negative economic consequences during and after project implementation? >>	No	The project has lifetime of 20 years and expected to run beyond the project certification period. With carbon finance it is further strengthen to operate 100% project systems with continuous maintenance. Thus, there is no negative economic consequences during and after project implementation.	Not Required
Principle 7.1 Emissions			
Will the Project increase greenhouse gas emissions over the Baseline Scenario? >>	No	No. The project will replace firewood use with biogas. Hence, it will reduce greenhouse gas emissions over the Baseline Scenario.	Not Required
Principle 7.2 Energy Supply			
Will the Project use energy from a local grid or power supply (i.e., not connected to a national or regional grid) or	No	No. The project uses inhouse cattle dung only. Cowdung and other household waste shall be used as a feed source for the	Not Required

fuel resource (such as wood, biomass) that provides for other local users? >>		digesters. There is no use of Wood or Biomass in the project activity.	
Principle 8.1 Impact on Natural Water Patterns/Flows			
Will the Project affect the natural or pre-existing pattern of watercourses, ground-water and/or the watershed(s) such as high seasonal flow variability, flooding potential, lack of aquatic connectivity or water scarcity? >>	No	The project activity is installation of biogas digesters for energy generation to meet domestic requirements. Individual household based biogas digesters are planned to be installed which are small in size and will not have any impact on the natural or pre-existing patter of water courses.	Not Required
Principle 8.2 Erosion and/or Water Body Instability			
a. Could the Project directly or indirectly cause additional erosion and/or water body instability or disrupt the natural pattern of erosion? b. Is the Project's area of influence susceptible to excessive erosion and/or water body instability?	No	No. The risk of erosion is unlikely by the project.	Not Required

>>			
Principle 9.1 Landscape Modification and Soil			
Does the Project involve the use of land and soil for production of crops or other products?	No	The project will not involve use of land and soil for production of crops or other products.	Not Required
>>			
Principle 9.2 Vulnerability to Natural Disaster			
Will the Project be susceptible to or lead to increased vulnerability to wind, earthquakes, subsidence, landslides, erosion, flooding, drought or other extreme climatic conditions?	No	No. The project happens at individual households. There is no activity which can affect adversely the natural system to cause earthquake, landslides, erosion, flooding, draught or other extreme climatic conditions.	Not Required
>>			
Principle 9.3 Genetic Resources			
Could the Project be negatively impacted by or involve genetically modified organisms or GMOs (e.g., contamination, collection and/or harvesting, commercial development, or take place in facilities or farms	No	Not applicable. The project does not involve any crop production or cultivation.	Not Required

that include GMOs in their processes and production)? >>			
Principle 9.4 Release of pollutants			
Could the Project potentially result in the release of pollutants to the environment? >>	No	The project activity is installation of biogas digesters for energy generation to meet domestic requirements. The project would lead to improving of indoor air pollution that occurs due to use of wood based chula's or cookstoves in the baseline. However, Bio Slurry is managed in appropriate manner as a manure. Beneficiaries using bio slurry on their land to improve soils fertility.	Not Required
Principle 9.5 Hazardous and Non-hazardous Waste			
Will the Project involve the manufacture, trade, release, and/ or use of hazardous and non-hazardous chemicals and/or materials? >>	No	The project activity is installation of biogas digesters for energy generation to meet domestic requirements. There are no hazardous waste generated due to the project.	Not Required

		The slurry generated as part of the biodigester shall be used as fertilizer.	
Principle 9.6 Pesticides & Fertilisers			
Will the Project involve the application of pesticides and/or fertilisers?	No	The project activity is installation of biogas digesters for energy generation to meet domestic requirements. There are no hazardous waste generated due to the project. The slurry generated as part of the biodigester shall be used as fertilizer.	Not Required
>>			
Principle 9.7 Harvesting of Forests			
Will the Project involve the harvesting of forests?	No	Not applicable. The project happens at individual households.	Not required
>>			
Principle 9.8 Food			
Does the Project modify the quantity or nutritional quality of food available such as through crop regime alteration or export or economic incentives?	No	Not applicable. The project activity is biogas digester installation happens at individual households.	Not required
>>			

Principle 9.9 Animal husbandry			
Will the Project involve animal husbandry? >>	No	Not applicable. The project activity is biogas digester installation happens at individual households.	Not Applicable
Principle 9.10 High Conservation Value Areas and Critical Habitats			
Does the Project physically affect or alter largely intact or High Conservation Value (HCV) ecosystems, critical habitats, landscapes, key biodiversity areas or sites identified? >>	No	Not applicable. The project activity is biogas digester installation happens at individual households.	Not Applicable
Principle 9.11 Endangered Species			
a. Are there any endangered species identified as potentially being present within the Project boundary (including those that may route through the area)? b. Does the Project potentially impact other areas where endangered species may be present through transboundary affects?	No	Not applicable. The project activity is biogas digester installation happens at individual households.	Not Applicable

>>			

APPENDIX 2- CONTACT INFORMATION OF PROJECT PARTICIPANTS

Organization name	Greneity Infocom Service Pvt Ltd
Registration number with relevant authority	CIN-U74900DL2013PTC253219 under Companies Act,1956
Street/P.O. Box	Dilshad Garden
Building	137-B, Pocket-A
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State/Region	Delhi
Postcode	110095
Country	India
Telephone	+91-9886252062
E-mail	Shivani.garg@greneity.com
Website	www.greneity.com
Contact person	Shivani Garg
Title	Managing Director
Salutation	Ms.
Last name	Garg
Middle name	
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Mobile	+91- 9886252062
Direct tel.	
Personal e-mail	Shivani.garg@greneity.com

APPENDIX 3- LUF ADDITIONAL INFORMATION

Risk of change to the Project Area during Project Certification Period:	
Risk of change to the Project activities during Project Certification Period:	
Land-use history and current status of Project Area:	
Socio-Economic history:	
Forest management applied (past and future)	
Forest characteristics (including main tree species planted)	
Main social impacts (risks and benefits)	
Main environmental impacts (risks and benefits)	
Financial structure	
Infrastructure (roads/houses etc):	
Water bodies:	
Sites with special significance for indigenous people and local communities - resulting from the Stakeholder Consultation:	
Where indigenous people and local communities are situated:	
Where indigenous people and local communities have legal rights, customary rights or sites with special cultural, ecological, economic, religious or spiritual significance:	

APPENDIX 4-SUMMARY OF APPROVED DESIGN CHANGES

Please refer to Design Change Requirements for more information on procedures governing Design Changes

Revision History

Version	Date	Remarks
1.2	14 October 2020	Hyperlinked section summary to enable quick access to key sections Improved clarity on Key Project Information Inclusion criteria table added Gender sensitive requirements added Prior consideration (1 yr rule) and Ongoing Financial Need added Safeguard Principles Assessment as annex and a new section to include applicable safeguards for clarity Improved Clarity on SDG contribution/SDG Impact term used throughout Clarity on Stakeholder Consultation information required Provision of an accompanying Guide to help the user understand detailed rules and requirements
1.1	24 August 2017	Updated to include section A.8 on 'gender sensitive' requirements
1.0	10 July 2017	Initial adoption