Gold Standard®

Gold Standard for the Global Goals
Transition Annex
(To be used by all GS CDM/VER stand alone projects and PoAs, Micro Scale stand alone projects and Micro PoAs)

Version 1 – September 2017

Gold Standard

KEY PROJECT INFORMATION

Title of Project/PoA/Activity:	Arakalagudu Biodigester Project II
GS ID of the project/PoA/activity:	GS 817
GS Version:	2.1
Brief description of Project:	The proposed project activity aims to provide a clean and convenient cooking fuel by producing biogas from animal and agricultural waste to rural households in Arakalagudu, Karnataka State, India. A total of 755 rural households were provided with the biogas unit in 2010 in the Arakalaguddu taluk of the Hassan district in Karnataka. The biodigester produces on an average of 3hours of biogas, which is enough for the family to meets its dauly energy needs for cooking. The use of biogas thus replaces the non-renewable firewood, which was earlier used to satisfy the cooking needs. On the other hand the biogas slurry along with other organic wastes, is used as an organic fertilisers reducing the use of chemical fertilisers for agriculture. The project activity has resulted in improved health conditions of the women and children. The women now spend less time for collecting firewood and for cooking, as biogas stoves are more efficient than firewood.
Project type: Energy/Land Use	Biogas - Heat
For Renewable Energy Projects – intention to apply RECs Labels (y/n)	N/A
GS Stream (CDM/VER):	GS-VER
Scale (large/scale/micro):	Micro-scale
GS Registration Date:	18/02/2011
GS Crediting period start date:	01/02/2010
CDM Registration Date:	N/A
CDM Crediting period start date:	N/A
Project Developer:	GoodPlanet Fondation
Project Representative:	GoodPlanet Fondation
Project Participants and any communities involved:	N/A
Host Country/Location:	India
Methodologies applied:	Indicative programme, baseline, and monitoring methodology for Small Scale Biodigester
SDG Impacts:	▪ SDG 1 – No poverty ▪ SDG 3 – Good health and well-being ▪ SDG 7 – Affordable and clean energy ▪ SDG 13 – Climate Action
Estimated amount of SDG Impact (GSVERs and others)	4674 GS-VER's (estimated in the registered PDD)

NOTE: *This Annex shall be used for all PoAs if the sustainable development assessment is conducted at PoA level. In case sustainable development assessment is conducted at activity level, then this Annex shall be filled for each of the activities.*

SECTION A Sustainable Development Goals (SDG) outcomes

A.1 Relevant target for each of the three SDGs

Sustainable Development Goals (SDG)	Relevant target	SDG Indicators	Comments
SGD 1 : End poverty in all its forms everywhere	By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance	1.4.1 Proportion of population living in households with access to basic services	The project activity will provide proportion of project population having continuous access to biogas technology (clean and renewable energy for daily cooking needs). The second indicator (1.4.2) related to the land tenure rights is not relevant to the project activity and therefore not included here..
SGD 3: Ensure healthy lives and promote well-being for all at all ages	By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.	3.9.1 Mortality rate attributed to household and ambient air pollution	The project activity will provide the proportion of the project households benefiting from clean indoor environment while cooking and reduction in fire related accidents while cooking. The other indicators (3.9.2 & 3.9.3) are not relevant to the project activity and therefore not included here.
SGD 7 : Ensure access to affordable, reliable, sustainable and modern energy for all	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	the project activity will provide the total number of beneficiaries of the project activity, who have continuous access to biogas for daily cooking needs. The other indicators (7.1.1) is not relevant to the project activity since the project only provides access to biogas technology.
SGD 13 : Take urgent action to combat climate change and its impacts	The project activity will provide data on the total tCO2eq reduced by the project activity during each crediting year.		

A.2 Explanation of methodological choices/approaches for estimating the SDG outcome

>> (Explain how the methodological steps in the selected methodology(ies) or proposed approach for calculating baseline and project outcomes are applied. Clearly state which equations will be used in calculating net benefit.)

For the first three SDG's (1, 2,3 & 7) the SDG outcome are analysed based on a interview with the project beneficiaries. These interviews are carried out once a year during the monitoring surveys and the data is compared with the baseline situation.

The estimation of the SDG 13 (emission reductions) are based on the emission reductions calculations as per the applied GS methodology – "*Indicative programme, baseline, and monitoring methodology for Small Scale Biodigester".*

- **SDG 13 – Climate Action**
  - ⇨ Target: CO_2 emission reductions occurring due to the avoided use of firewood for cooking and use of the animal dung in the biodigester.

For the SDG 13 : a step by step approach has been provided below : -

The Emission Reductions have been calculated by selecting the relevant formula's to be used as per the baseline and project scenario.

In order to determine total baseline emissions, the baseline emissions per household are calculated as:

$$BE_h = BE_{th,h} + BE_{aw,h}$$

Where:

BE_h = Baseline emissions of household h (tCO_2e/yr)

$BE_{th,h}$ = Baseline emissions from fuel consumption for thermal energy needs of household h (tCO_{2e}/yr)

$BE_{aw,h}$ = Baseline emissions from animal waste handling of household h (tCO_2e/yr)

Baseline emissions from fuel consumption for thermal energy needs of household h.

The baseline estimation from fuel consumption is calculated as per the below mentioned formulae and is adjusted for the share of non-renewable biomass. The non-renewable biomass for the project has been carried out as mentioned in the GS methodology. The Fossil fuel and biomass use has been determined through a survey in sample of the total population and the survey has been carried out before the implementation of the biodigesters for each beneficiaries. The calculation of baseline emissions is based on the results of the questionnaire. After collecting the questionnaires at all households included in the sample group, the mean and standard deviation of household project CO_2 emissions from fuel consumption should be calculated. These variables will be inputs for calculating total CO_2 emission from fuel consumption for the total number of households in the baseline situation as per formulas:

$$BE_{th,h,option1} = \Sigma\left(\left(F_{i,bl,h}\right) \cdot NCV_i \cdot EF_{CO2i}\right)$$

Where:

BEth,h, option1 = The baseline emissions used to meet the thermal energy need of one household

Fi,bl,h = The total amount of fuel i in the baseline situation (mass or volume) of one household

NCVi = T he ne t calorific value (energy con tent) per mass or volume unit of a fuel i,

EFCO2,i = T he CO_2 emission fac tor per unit of energy of the fuel i.

The mean of the household baseline CO_2 emissions is calculated as follows:-

$$\mu BE = \frac{\sum BE_h}{n_{bl}}$$

Where:

μBE = Mean of CO2 emission of households included in the baseline sample group
BEh = The amount of CO2 emission in household h included in the baseline situation
nbl = Total number of households included in the baseline sample group

The standard deviation of CO2 emission in the baseline situation is calculated as follows:

$$\sigma_{BE,th} = \sqrt{\frac{\sum \left(BE_{th,h} - \mu BE_{th}\right)^2}{n_{bl} - 1}}$$

Where:
σ BE,th = Standard deviation of CO2 emission in the baseline situation
μBeth = Mean of CO2 emission of households included in the baseline sample group
BEth,h = The amount of CO2 emission in household h included in the baseline sample group in the baseline situation
nbl = Total number of households included in the baseline sample group

The total CO2 emission in the pre-project situation can then be calculated as follows:

$$BE = n_{hh,y}\left(\mu_{BE} - z \cdot \frac{\sigma_{BE}}{\sqrt{n_{bl}}}\right)$$

Where:

BE	=	The total amount of CO2 emission in the pre-project situation
nhh,y	=	Total number of households participating in the program for the monitoring interval y
σBE	=	Standard deviation of CO2 emission in the baseline situation
μBE	=	Mean of CO2 emission of households included in the baseline sample group
nbl	=	Total number of households included in the baseline sample group
z	=	Standard normal for a confidence level of 95% (1.96)

Baseline emissions from handling of animal waste:
The baseline emissions, from animal waste handling have been estimated using the IPCC TIER 2 approach (households with distinctive animal waste management systems where animals are kept in a confined area and the manure is collected following a specifically deigned system). The formulae are:

$$BE_{aw,h,T2} = \sum_{T}\left(EF_{(T)} \cdot LC_{T,h}\right)$$

Where:
BEaw,h,T2, = the baseline emission from handling of animal waste for household h for TIER 2 in tCO2 per year
LCT,h = Number of animals of livestock category Tin household h

$$EF_{(T)} = VS_{(T)} \cdot 365 \cdot GWP_{CH4}\left[Bo_{(T)} \cdot 0.67 kg/m^3 \cdot \sum_{k}\frac{MCF_{BL,k}}{100} \cdot MS_{(T,k)}\right]$$

Where:
EF(T) = annual CH4 emission fac tor for livestock ca tegory T, tCO2eq animal-1 yr-1
VS(T) = daily volatile solid excre ted for livestock ca tegory T, kg dry mat ter animal-1 day-1
365 = basis for calculating annual VS production, days yr-1
GWPCH4 = Global Warming Po ten tial (GWP) of methane
Bo(T) = maximum me thane producing capacity for manure produced by livestock ca tegory T, m3CH4 kg-1of VS excreted
0.00067 = conversion factor of m3 CH4 to tonne CH4
MCF(BL,k) = methane conversion fac tors for the animal waste handling system in the baseline situation by clima te zone k, %

MS(T,S,k) = fraction of livestock category T's manure trea ted in the animal waste management system, in climate region k, dimensionless

Formulae used to estimate project emissions:

The formula used to estimate the project estimations is as defined in the GS Small scale Biodigester methodology. The project emissions involve emission from household fuel consumption after installation of the biodigester and emission from the biodigester in the statistically significant sampling group. Emission from the biodigester includes physical leakage of the biodigester and incomplete combustion of biogas, which are both calculated as percentage of the produced methane.

PE y ,h = PEth,h, y + PEbiodigester ,h, y

Where:
PE,y,,h = Project emissions per household h in year y (tCO2e/yr).
PE,th,,h,y = Project emissions from fuels used to meet the thermal energy need per household h in year y (tCO2e/yr).

PE,biodigester,,h, y= Project emission from the biodigester per household h in year y (tCO2e/yr).

PEth,h, y = $\sum$(Fi,pj, y). NCVi . EFCO 2i)

Where:
PE,th,,h,y = Project emissions from fuels used to meet the thermal energy need per household h in year y (tCO2e/yr).
Fi,pj,y = The total amount of fuel i in the project situation (mass or volume) per household in year y
NCVi = The net calorific value (energy content) per mass or volume unit of a fuel i,
EFCO2,I = The CO2 emission factor per unit of energy of the fuel i.

For the assessment of EFCO2,i for Fi,pj,y where Fi,pj,y is a biomass source, the assessment of non-renewable biomass (NRB), as elaborated in the section on baseline emissions will be applied.

$$PE_{biodigester,y} = \sum (LC_{T,h,y} \cdot EF_T) \cdot PL_y + \sum (LC_{T,h,y} \cdot EF_T) \cdot (1 - \eta_{biogastove})(1 - PL_y)$$

LCT,h,y = Number of animals of livestock category T in year y in household h
EFT = Annual CH4 emission fac tor for livestock ca tegory T, (tCH4/animal/year)
PL = Physical Leakage of the biodigester in year y (%).
ηbiogastove = Combustion efficiency of the most commonly used type of biogas stove.

EFT is estimated using the IPCC TIER 2 approach as below: -

$$EF_{(T)} = VS_{(T)} \cdot 365 \cdot GWP_{CH4} \left[Bo_{(T)} \cdot 0.67 kg/m^3 \cdot \sum_k \frac{MCF_{BL,k}}{100} \cdot MS_{(T,k)} \right]$$

Where:
EF(T) = annual CH4 emission fac tor for livestock ca tegory T, tCO2eq animal-1 yr-1
VS(T) = daily volatile solid excre ted for livestock ca tegory T, kg dry mat ter animal-1 day-1
365 = basis for calculating annual VS production, days yr-1
GWPCH4 = Global Warming Po ten tial (GWP) of methane
Bo(T) = maximum me thane producing capacity for manure produced by livestock ca tegory T, m3CH4 kg-1of VS excreted

0.00067 = conversion factor of m3 CH_4 to tonne CH_4
MCF(BL,k) = methane conversion fac tors for the animal waste handling system in the project situation by clima te zone k, %
MS(T,S,k) = fraction of livestock category T's manure trea ted in the animal waste management system, in climate region k, dimensionless

The physical leakage of 10% from the biodigester has been considered using the IPCC guidelines. Apart from the direct physical from the plant, the incomplete combustion of methane in the biogas stoves has been taken 98 % (default value as per the methodology).

Project emissions will be determined for each household in the sample group. The mean of household project CO_2 emission is calculated as follows:

$$\mu PE = \frac{\sum PE_h}{n_{pj}}$$

Where

μPE	=	Mean of CO_2 emission of households included in the project sample group.
PE,h	=	The amount of CO_2 emission in household h included in the project sample group
npj	=	Total number of households included in the project sample group.

$$\sigma_{PE} = \sqrt{\frac{\sum (PE_h - \mu PE)^2}{n_{pj} - 1}}$$

Where:

$\sigma_{,PE,}$	=	Standard deviation of CO_2 emission in the project situation.
$\mu_{PE,}$	=	Mean of CO_2 emission of households included in the project sample group.
PE_{th}	=	The amount of CO_2 emission in household h included in the project sample group.
Npj	=	Total number of households included in the project sample group.

$$PE = n_{hh,y}\left(\mu_{PE} + z \cdot \frac{\sigma_{PE}}{\sqrt{n_{pj}}}\right)$$

Where:

PE =		The total amount of CO_2 emission in the project situation.
nhh,y	=	Total number of households participating in the program for the monitoring interval y.
σPE,th	=	Standard deviation of CO_2 emission in the project situation.
μPE,	=	Mean of CO_2 emission of households included in the project sample group.
nbl	=	Total number of households included in the project sample group.
z	=	Standard normal for a confidence level of 95% (1.96).

Total Emission reductions are then calculated as follows:

ERy = BE - PEy

Where:

ERy	=	Emission reduction in total household population in year y (tCO_2e/yr)
BE	=	Baseline emissions of total household population (tCO_2e/yr)
PEy	=	Project emissions of total household population in year y (tCO_2e/yr)

A.3 Data and parameters fixed ex ante for monitoring contribution to each of the three SDGs

(Include a compilation of information on the data and parameters that are not monitored during the crediting period but are determined before the design certification and remain fixed throughout the crediting period like IPCC defaults and other methodology defaults. Copy this table for each piece of data and parameter.)

Relevant SDG Indicator	**SDG 13 – Climate Action**
Data/parameter	$NCV_{firewood}$
Unit	TJ/Gg
Description	Net calorific value of wood
Source of data	IPCC Guidelines 2006 – Vol:2 Energy, chapter 1, page 1.19-Table1.2
Value(s) applied	15.6
Choice of data or Measurement methods and procedures	As per the guidelines provided in the applied GS methodology
Purpose of data	Emission reduction calculations
Additional comment	

Relevant SDG Indicator	**SDG 13 – Climate Action**
Data/parameter	$EF_{firewood}$
Unit	TCO_2eq/TJ
Description	Emission factor for firwood
Source of data	IPCC default value
Value(s) applied	112
Choice of data or Measurement methods and procedures	As per the guidelines provided in the applied GS methodology
Purpose of data	Emission reduction calculations
Additional comment	

Relevant SDG Indicator	**SDG 13 – Climate Action**
Data/parameter	GWP_{CH_4}
Unit	-
Description	Global warming potential of CH_4
Source of data	IPCC default value
Value(s) applied	25
Choice of data or Measurement methods and procedures	As per the guidelines provided in the applied GS methodology
Purpose of data	Emission reduction calculations
Additional comment	

Relevant SDG Indicator	**SDG 13 – Climate Action**
Data/parameter	NRB
Unit	%
Description	Non-renewable biomass
Source of data	Calculated – Reference registered PDD (Annex 2)
Value(s) applied	53.90%
Choice of data or Measurement methods and procedures	As per the guidelines provided in the applied GS methodology
Purpose of data	Emission reduction calculations
Additional comment	

Relevant SDG Indicator	**SDG 13 – Climate Action**
Data/parameter	$VS_{(T)}$
Unit	kg dry matter $animal^{-1}$ day^{-1}
Description	daily volatile solid excreted for livestock category T
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories & "Biogas Technology by BT Nijaguna, ISBN: 81-224-1380-3 Page: 29"
Value(s) applied	$VS_{\text{dairy cow}} – 3.8$ $VS_{\text{buffalo}} – 3.1$ $VS_{\text{other cattle}} – 1.4$
Choice of data or Measurement methods and procedures	As per the guidelines provided in the applied GS methodology
Purpose of data	Emission reduction calculations
Additional comment	Reference registered PDD (Annex 2)

Relevant SDG Indicator	**SDG 13 – Climate Action**
Data/parameter	$Bo_{(T)}$
Unit	m^3CH_4 kg^{-1} of VS excreted
Description	maximum methane producing capacity for manure produced by livestock category T
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value(s) applied	$Bo_{\text{dairy cow}} – 0.13$ $Bo_{\text{buffalo}} – 0.10$ $Bo_{\text{other cattle}} – 0.10$
Choice of data or Measurement methods and procedures	As per the guidelines provided in the applied GS methodology
Purpose of data	Emission reduction calculations
Additional comment	Reference registered PDD (Annex 2)

Relevant SDG Indicator	SDG 13 – Climate Action
Data/parameter	$MCF_{(S,k)}$
Unit	%
Description	methane conversion factors for each manure management system S by climate region k
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value(s) applied	$MCF_{\text{solid storage}}$ – 4% $MCF_{\text{slurry w/o crust}}$ – 60 % $MCF_{\text{slurry with crust}}$ – 37%
Choice of data or Measurement methods and procedures	As per the guidelines provided in the applied GS methodology
Purpose of data	Emission reduction calculations
Additional comment	

Relevant SDG Indicator	SDG 13 – Climate Action
Data/parameter	$\eta_{\text{biogastove}}$
Unit	%
Description	Incineration efficiency of the biogas stove
Source of data	GS methodology default value (page 12)
Value(s) applied	98
Choice of data or Measurement methods and procedures	As per the guidelines provided in the applied GS methodology
Purpose of data	Emission reduction calculations
Additional comment	

Relevant SDG Indicator	SDG 13 – Climate Action
Data/parameter	PL
Unit	%
Description	Physical Leakage of the biodigester
Source of data	default values of 2006 IPCC Guidelines for National Greenhouse Gas Inventories is 10%
Value(s) applied	10
Choice of data or Measurement methods and procedures	As per the guidelines provided in the applied GS methodology
Purpose of data	Emission reduction calculations
Additional comment	

SECTION B Safeguarding Principles Assessment

B.1 Analysis of social, economic and environmental impacts

>> (Refer the GS4GG Safeguarding Principles and Requirements document for detailed guidance on carrying out this assessment. The assessment of following Safeguarding Principles Assessment is required to be carried out by GS Version 2.0, 2.1 and 2.2 projects. GS v1.0 projects will carry out assessment of all the safeguarding principles discussed in the GS4GG Safeguarding Principles and Requirements document.)

Safeguarding principles	Assessment questions	Assessment of relevance to the project (Yes/potentially/no)	Justification	Mitigation measure (if required)
3.2 Gender Equality and Women's Rights	Is there a possibility that the Project can adversely affect men and women in marginalised or vulnerable communities (e.g., potential increased burden on women or social isolation of men)? Is there a possibility that the Project might not take into account gender roles and the abilities of women or men to participate in the decisions/designs of the project's activities (such as lack of time, child care duties, low literacy or educational levels, or societal discrimination)? Does the Project design contribute to an increase in women's workload that adds to their care responsibilities or that prevents them from engaging in other activities? Would the Project potentially reproduce or further deepen	No	The project aims to provide access to the clean and affordable energy to communities who are largely depend on firewood for cooking in the project area. The project activity has taken into account the gender roles by inviting and promoting both men and women to activitely participate in the Local stakeholder consultation. The project activity doe not contribute to an increase in womens workload but has reduced the burden of collecting firewood from the forests, which has resulted in more time available for the women for other activities. No the project does not reproduce any form of discrimination against	None

	discrimination against women based on gender, for instance, regarding their full participation in design and implementation or access to opportunities and benefits? Is there a likelihood that the proposed Project would expose women and girls to further risks or hazards?		women based on gender. The women are principal beneficaires of the proposed project activity by ganing access to biogas (clean and renewable energy) The project activity does not expose the women to any hazardous or other risks due to the use of biogas. The biogas use has completely reduced air pollution providing a clean and healthy environement for daily cooking.	
3.4.3 Land Tenure and Other Rights	Does the Project require any change to land tenure arrangements and/or other rights?	No	The project activity does not require any kind of land tenure arrangements.	None
3.6.2 Negative Economic Consequences	. 1. The Project Developer shall demonstrate the financial sustainability of the Projects implemented, also including those that will occur beyond the Project Certification period. 2. The Projects shall consider economic impacts and demonstrate a consideration of potential risks to the local economy and how these have been taken into account in Project design, implementation, operation and after the Project. Particular focus shall be given to vulnerable and marginalised social groups in targeted communities and that benefits are socially-inclusive and sustainable.	No	The project activity provides access to free and renewable form of energy for daily cooking needs. The access to free energy has lead to income savings for the project beneficiaries. And secondly, the use of biogas slurry for agriculture has reduced their expenses on chemical fertilisers. Therefore the project activity does not have any negative economic consequences.	None
4.1.1 Emissions	Will the Project increase greenhouse gas emissions over the Baseline Scenario?	No	The regular suppy of the biogas replaces the use of firewood for daily cooking needs and a continuous monitoring is carried	None

			out to assure that the households have continuous acess to biogas, therefore the increase in GHG is unlikely over the baseline scenario.	
4.1.2 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 fuel resource (such as wood, biomass) that provides for other local users?	No	The project activity involves providing biogas units to rural households, and therefore does not use energy from a local grid or power supply or other fuel resources such as wood biomass. The biogas is produced with the help of the animal-dung owned by each household in the project activity.	None
4.2.1 Impact on natural water patterns and flow	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 doesn't have any kind of impact on the natural water patterns/flows.	None
4.2.1 Erosion and/or water body stability	Could the Project directly or indirectly cause additional erosion and/or water body instability or disrupt the natural pattern of erosion?	No	The project is not linked to any other kind of activity other than implementation of the biogas units and vermicompost which might lead to erosion and/or water body instability.	None
4.2.3 Landscape modification and soil	Does the Project involve the use of land and soil for production of crops or other products?	No	No the project does not involve in the use of land and soil for production of crops.	
4.3.2 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	The project is not susceptible nor lead to increased vulnerability to extreme climatic conditions.	None
4.3.3 Genetic Resources	Could the Project be negatively impacted by the use of genetically modified organisms or GMOs (e.g., contamination, collection and/or	No	The project activity is not linked to any activity related to genetic resources.	None

	harvesting, commercial development)?			
4.3.4 Release of pollutants	Could the Project potentially result in the release of pollutants to the environment?	No	The project activity is not linked to any activity that would lead to release of pollutants.	None
4.3.5 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 does not involve in the manufacture, trade, release, and/ or use of hazardous and non-hazardous chemicals and/or materials.	None
4.3.6 Pesticides and fertilizers	Will the Project involve the application of pesticides and/or fertilisers?	None	The project activity promotes and trains the project beneficiaries to use the the biogas slurry along with other agricultural wastes as an organic fertilisers on their agricultural lands, and therefore reducing the use of chemical fertilisers during the year.	None
4.3.7 Harvesting of forests	Will the Project involve the harvesting of forests?	No	The use of biogas has reduced the use of firewood for cookings and therefore reducing the deforestration rate in the project area.	None
4.3.8 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	No, the project activity does not relate to crop regime alteration or export or economic incentives.	None
4.3.9 Animal Husbandry	Will the Project involve animal husbandry?	No	The project activity is not linked to any activity related to animal husbandry.	None

SECTION C Monitoring plan

C.1 Data and parameters to be monitored

(Include specific information on how the data and parameters that need to be monitored in the selected methodology(ies) or proposed approaches or as per mitigation measures from safeguarding principles assessment or as per feedback from stakeholder consultations would actually be collected during monitoring. Copy this table for each piece of data and parameter.)

Relevant SDG Indicator/Safeguarding Principle	SGD 1: Indicator - 1.4.1 Proportion of population living in households with access to basic services
Data / Parameter	Number of households using biogas for cooking
Unit	%
Description	The project activity will provide the proportion of the project population living in households with access to biogas (clean and renewable energy for daily cooking needs)
Source of data	Monitoring survey
Value(s) applied	-
Measurement methods and procedures	The access to clean and renewable energy services to the beneficiaries in the project area is monitored by evaluating the total number of households having access to continous supply of the biogas for daily cooking needs. This indicator is being assessed on three different scenarios. First, on the supply of biogas. Secondly, if they have stopped using firewood and kerosene for the daily cooking needs, and thirdly if they had any technical issues with the biogas units.
Monitoring frequency	Once a year
QA/QC procedures	The monitoring surveys are carried out by the SKGS team members and the data is evaluated by the project manager. The data is also cross-checked by the GoodPlanet team members and a field visit is organised to check the monitored households.
Purpose of data	To evaluate the SDG impact
Additional comment	-

Relevant SDG Indicator/Safeguarding Principle	SGD 3: Indicator - The project activity will provide proportion of project population having continuous access to biogas technology (clean and renewable energy for daily cooking needs).
Data / Parameter	Number of households
Unit	%
Description	The project activity will provide the proportion of the project households benefiting from clean indoor environment while cooking and reduction in fire related accidents while cooking.
Source of data	Monitoring survey
Value(s) applied	-
Measurement methods and procedures	This indicator is being assessed on different scenarios. First, on continuous supply of the biogas for daily cooking needs. Secondly, if they have stopped using firewood and kerosene for the daily cooking needs, and thirdly if they have less respiratory and other health problems due to the use of biogas.

Monitoring frequency	Once a year
QA/QC procedures	The monitoring surveys are carried out by the SKGS team members and the data is evaluated by the project manager. The data is also cross-checked by the GoodPlanet team members and a field visit is organised to check the monitored households.
Purpose of data	To evaluate the SDG impact
Additional comment	

Relevant SDG Indicator/Safeguarding Principle	SDG 7: Indicator - 7.1.2 Proportion of population with primary reliance on clean fuels and technology
Data / Parameter	Number of households
Unit	%
Description	The project activity will provide the total number of beneficiaries of the project activity, who will have continuous access to biogas and will use the biogas slurry as an organic compost for agriculture
Source of data	Monitoring survey
Value(s) applied	-
Measurement methods and procedures	This indicator is being assessed on two different scenarios. First, on the continuous availibility of biogas for daily cooking needs. And, secondly if the units were repaired incase if they had any technical issues with the biogas units.
Monitoring frequency	Continous
QA/QC procedures	The SKGS team regularly follow-up with the project beneficiary to ensure the good working condition of each installed biogas unit. The annual monitoring surveys are also carried out by the SKGS team members to check the functioning of the units. The collected data is evaluated by the SKGS project manager. The data is also cross-checked by the GoodPlanet team members and a field visit is organised to check the monitored households.
Purpose of data	To evaluate the SDG impact
Additional comment	

Relevant SDG Indicator/Safeguarding Principle	SDG 13 – Climate Action
Data / Parameter	$N_{hh,y}$
Unit	-
Description	Total number of households participating in the programme in year y
Source of data	SKGS Database with all the details of the beneficiaries.
Value(s) applied	-
Measurement methods and procedures	The total number of the households in the project activity is derived from the detailed database in which each unit has been allocated a unique identification corresponding to each beneficiary. This database has been maintained by the SKGS team, and also helps the team to avoid any double counting of the units during the monitoring survey.
Monitoring frequency	Annually

QA/QC procedures	Each household of the project activity has been allocated a separate serial number to avoid any double counting.
Purpose of data	The total VER's are calculated based on the total number of biogas units functioning in the crediting period.
Additional comment	

Relevant SDG Indicator/Safeguarding Principle	SDG 13 – Climate Action
Data / Parameter	$F_{i,y,pj}$
Unit	Kg/day
Description	Amount of fuel wood consumption for cooking needs in the project scenario
Source of data	Monitoring survey
Value(s) applied	-
Measurement methods and procedures	During the survey, the monitoring team will ask each beneficiary the duration and the average firewood consumed per day in case if the unit has been non-functional.
Monitoring frequency	Annually
QA/QC procedures	During the monitoring surveys, the team will weigh the total amount of firewood used for cooking in the absence of the biogas.
Purpose of data	The quantity of the firewood used will help determine the project emissions from the use of firewood for cooking.
Additional comment	

Relevant SDG Indicator/Safeguarding Principle	SDG 13 – Climate Action
Data / Parameter	$MS_{(T,biodigester,k)}$
Unit	%
Description	Fraction of livestock category T's manure fed into the biodigester, S
Source of data	Monitoring survey
Value(s) applied	-
Measurement methods and procedures	It's calculated by the total amount of cow dung that is collected by the beneficiary and fed into the biodigester.
Monitoring frequency	Annually
QA/QC procedures	The fraction of the manure fed into the biodigester is calculated based on the total time the animals spend in the confined shed and for grazing.
Purpose of data	The data will be used to calculate the project emissions from the biodigester
Additional comment	

Relevant SDG Indicator/Safeguarding Principle	SDG 13 – Climate Action
Data / Parameter	$MS_{(S,T,h,p)}$
Unit	%
Description	Fraction of livestock category T's manure not fed into the biodigester and treated according to the animal waste management system S.
Source of data	Monitoring survey
Value(s) applied	-
Measurement methods and procedures	It's calculated by the total amount of cow dung that is collected by the beneficiary everyday from the confined animal shed (total baskets) and dumped into the traditional open composting pits.
Monitoring frequency	Annually
QA/QC procedures	The fraction of the manure not fed into the biodigester is calculated based on the total baskets that are directly dumped into the traditional composting pit.
Purpose of data	The data will be used to calculate the project emissions from the biodigester
Additional comment	

Relevant SDG Indicator/Safeguarding Principle	SDG 13 – Climate Action
Data / Parameter	LC
Unit	Number of livestock per households
Description	Total number livestock category – **Dairy cows, Buffaloes, Other cattle**
Source of data	Monitoring survey
Value(s) applied	-
Measurement methods and procedures	Monitoring survey
Monitoring frequency	Annually
QA/QC procedures	A cross check of the monitoring survey data will be carried out the GoodPlanet team.
Purpose of data	To determine the project emissions from animal waste management systems.
Additional comment	

C.1.1 Other elements of monitoring plan (if applicable)

The project monitoring surveys will carried out for both, the sustainable development and the emission reductions parameters. The required samples size for the survey will be determined by selecting the project households on a random basis and accordingly the selected households will be surveyed in each village. Each

biogas unit in the project activity has been assigned a unique identification number by SKGS, to ensure that there is no double counting either during the monitoring survey or during any other field visits held by the SKGS supervisory staff. The monitoring surveys will be carried out by the senior members of the SKGS along with the help of local entities of some villages.
The SKGS surveying teams have already carried out similar type of monitoring surveys for this project and have improved the methods to collect and record the data with their previous survey experiences.

SECTION D Duration and crediting period

D.1 Duration of project

D.1.1 Start date of project

01/02/2010

D.1.2 Expected operational lifetime of project

25 years (lifetime of the installed biodigester)

D.1 GS Crediting period of the project/activity

10 years

D.2.1 Start date of the ongoing GS crediting period

01/02/2010

D.2.3 End date of the ongoing GS crediting period

31/01/2020

D.2.3 Total length of the GS crediting periods

10 years

SECTION E Stacking of new assets

>> (If project is looking to stack new assets over GSVERs the required information to demonstrate compliance to the relevant methodology, product specification and additionality shall be presented in the new PDD template launched with GS4GG)

Appendix 1. Contact information of project participants

Organization name	Fondation GoodPlanet
Registration number with relevant authority	514 488 295 00015
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Personal e-mail	-