

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

Section A – Description of project

Section B – Application of approved Gold Standard Methodology (ies) and/or demonstration of SDG Contributions

Section C – Duration and crediting period

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Appendix 1 – Safeguarding Principles Assessment (mandatory)

Q – Contact information of Project participants (mandatory)

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Q – Summary of Approved Design Changes (project specific)

KEY PROJECT INFORMATION

GS ID of Project	GS1199
Title of Project	Micro Scale Biogas CDM Project of CROSS
Time of First Submission Date	2-04-2012
Date of Design Certification	04-03-2014
Version number of the PDD	05
Completion date of version	25/02/2021
Project Developer	Community Reconstruction of Social Service (CROSS)
Project Representative	Mr. Bhupathi Puvvani
Project Participants and any communities involved	N/A
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	
Methodology (ies) applied and version number	AMS.I.E. Switch from non-renewable biomass for thermal applications by the user, Version 11.0
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 Error! Reference source not found.)	Estimated Annual Average	Units or Products
13 Climate Action (mandatory)	GHG emission reductions per year	16,119 tCO ₂ /annum	
SDG 3: Good health and well-being	i. Continued improved indoor air condition and reduced respiratory problems especially for women and children.	i. 100% reduction in indoor air pollution.	
	ii. Reduction of pathogens in slurry compared to that of dung	ii. At least 50% reduction in pathogen load.	
SDG 5: Gender Equality	i. Reduction in Hours for collection of woody biomass and cooking	i. 50% reduction in hours for collection of woody biomass and cooking	
	ii. Women in monitoring of the project activity	ii. at least 50% of Women in monitoring of the project activity	
	iii. Income generation activities promoted due to the time saved for women	iii. At least 2 type of Income generation activities promoted due to the time saved for women	
SDG 7: Affordable and Clean Energy	i. Construction of biogas units for rural communities.	i. 5000 number of biogas units constructed	
	ii. Maintenance of constructed biogas units and elimination of use of firewood.	ii. 100% number of units operational	
SDG 8: Decent work and economic growth	Number of jobs created	At least 10 number of permanent and temporary jobs created due to the project activity	
SDG 17: Partnerships for the Goals	i. Access to domestic or international carbon funding	Domestic/international carbon funding to construct and maintain	

to implement clean
technologies

biogas units

SECTION A. DESCRIPTION OF PROJECT

A.1. Purpose and general description of project

>> The project "Micro Scale CDM project of CROSS" is a registered CDM project activity. The details of the registered project are as follows:

UNFCCC Project Number: 8784
Registration date: 18th December 2012
Crediting Type: Renewable
First Crediting Period: 01 Jan 14 - 31 Dec 20

Through the submission of this PDD, the project proponent intends to renew the crediting period in line with the Standard CDM project standard for project activities, Version 2, CDM-EB93-A04-STAN and the PDD has been accordingly updated.

Community Reconstruction of Social Service (CROSS) is located in Chittoor District of Andhra Pradesh State. Established in 1994, they work for the upliftment of economically backward section of the district. CROSS have programs for economically backward communities, especially for women and children focussing on education, environment, health, human rights, gender justice, and women and youth empowerment. Skill training is also part of the programme towards achieving economic development.

Purpose of the project activity: The purpose of the project activity is to set up 5,000 biogas plants (digesters) of 2m³ capacity each for single households having minimum of two cows and place to build biogas digester in Chittoor district where the NGOs is working, and in this way replace Non-Renewable Biomass with biogas for cooking and heating water. This will contribute strongly to sustainable development of the rural households involved in the project. A biogas plant of 2 m³ capacity is

sufficient to provide cooking fuel to a family of four to five¹. Chittoor is a biomass deficit region² which has relatively low per capita forest area and is a drought prone area. The district is dominated by dry deciduous and scrub forest with low forest cover. The climatic conditions are very dry during large part of the year and the forests are subjected to high anthropogenic pressure³. Fuel wood scarcity has an impact directly on rural households, which are highly dependent on this fuel. Demand for fuel wood and logs from commons and forests have caused resource degradation to the extent that collection exceeds sustainable yield⁴. The project activity will attenuate the rural thermal energy needs used for cooking and water heating.

Each household will install a 2 m³ biogas plant and feed cattle dung, into the anaerobic digester. The technology is tried and tested in India⁵, and has been in use for many years. By utilizing cattle dung in a controlled anaerobic digestion and combustion system, biogas will be available for cooking energy and heat water for bath. Biogas will be used on a two-ring gas stove having 4" burner with a flame temperature of 870° C⁶, supplied as part of the project activity. The biogas slurry will be used as bio-manure. Implementation of the project depends was on the successful validation and registration of the project as a CDM project activity since the project is financed completely from carbon revenues. After the project was registered as a CDM activity, carbon forward funding enabled the construction of domestic bio-digesters. The project was implemented in phases. End user agreements was signed between the NGO CROSS and the end user after construction, wherein the end user is aware of emission reductions from the use of biogas, and are willing to give up their rights and transfer the credit ownership to CROSS.

¹ <http://www.techno-preneur.net/technology/new-technologies/Energy/biogas.htm> ,
<http://pubs.iied.org/pdfs/G02989.pdf>

² FSI, 2011. Chapter 7: Socio-economic contribution of forests: Production and consumption of forest resources in India. State of Forest Report. Forest Survey of India, Ministry of Environment and Forests, Government of India. Page numbers 72, 74 and 77.

³ <http://forest.ap.nic.in/JFM%20CFM/CFM/Special%20Reports/NTFPs%20in%20AP%20%20by%20TERI/NTFP%20Final%20Report%20July-04.pdf> (Pg no 46 and 55)

⁴ <http://fes.org.in/download.php?file=ZG93bmxxvYWQvd3AxMC5wZGY=>

⁵ <http://www.mnre.gov.in/schemes/decentralized-systems/schems-2/>

⁶ B.T. Nijaguna. 2002. Biogas Technology, New Age International Publishers, New Delhi. (Page no 36)

Hence the project replaces baseline emissions from use of traditional inefficient cook stoves that used non-renewable woody biomass by households for their thermal energy. The annual emission reductions from 5,000 project households are 16,119 tCO₂ and are 112,833 tCO₂ for the second crediting period of 7 years.

Sustainable Development of the project activity: There are social, environmental, economic and technological benefits which contribute to sustainable development.

Social benefits:

- ✓ Reduces drudgery to women and children who spend long hours and travel long distances to collect fuel wood.
- ✓ Reduces indoor air pollution, thus eliminating health hazards for women and children.
- ✓ The project provides security of energy supply
- ✓ It leads to better manure management thus keeping the surroundings clean and reduce some of the disease causing pathogens
- ✓ Children will be able to attend school in time as food will be cooked in time.

Environmental benefits:

- ✓ Improves the local environment by reducing uncontrolled deforestation in the project area
- ✓ Avoids local environmental pollution through better waste management
- ✓ Will lead to soil improvement by providing high quality manure
- ✓ Avoided global and local environmental pollution and environmental degradation by switching from non-renewable biomass to renewable energy, leading to reduction of GHG emissions
- ✓ Reduces deforestation, reduces indoor air pollution, and increases use of manure rather than chemical fertilizers.

Economic benefits:

- ✓ Higher productivity of family members as they have adequate cooking fuel supply

- ✓ Will provide employment to local communities through construction and maintenance of biogas units.
- ✓ The project will reduce cooking time, thus providing women to take up income generating activities.

Technological benefits:

- ✓ Better technology for cooking compared to currently used traditional mud/clay/3-stone stoves.
- ✓ Better biogas digester models.
- ✓ Training of local masons for construction of biogas units for the project activity.
- ✓ Demonstrations and training programs will be carried out for the masons and end users on maintenance and other related aspects of biogas units.

A.1.1. Eligibility of the project under Gold Standard

>> Meeting Eligibility Principles:

Principle 1: (a) The project is renewable energy and is pre-identified by GS4GG; (b) the baseline and project scenario is defined in section B.4 of the PDD and B.4. of this document.; (c) The project activity was promoted through forward funding of carbon revenues for implementation and thus mitigate climate change.

The project activity generates credible greenhouse gas (GHG) emission reductions and is contributing to environmental integrity and local sustainable development. The project is contributing to 6 SDGs that are included in section B.6 of this document.

Principle 2: The safeguarding principle assessment is included in section D of the document and confirm to GS safeguarding principles and requirements.

Principle 3: The project is implemented for the NGO CROSS. Stakeholders' inclusivity has been promoted throughout the project through involvement of end users at every stage of the project activity. Even before initiation of the project and during the project, stakeholders meetings were conducted to get their feedback. This is an ongoing process, which is institutionalized in the working of the NGO, CROSS.

Principle 4: This is a registered project and now seeks the first renewal of crediting period of the project activity. The project has also applied for renewal to the UNFCCC. The start date of the project is 01/04/2013. The monitoring and reporting plan is included in the CDM PDD and also in Section B.7 of this document.

Principle 5: This is the renewal of crediting period. The project was registered with a UNFCCC approved additionality tool at the time of registration, which need not be re-visited for renewal of crediting period. The project was implemented with upfront carbon revenues to construct, monitor, verify, and repair and maintenance of the units. The issued GS CERs are being retired on behalf of the carbon investor against the ERPA signed. The upfront carbon revenue is sustaining the project by providing for repair, maintenance and transaction costs.

General Eligibility Criteria

- (a) Type of project: The project activity is a Renewable Energy Supply category, wherein it is generation and delivery of heat energy services for cooking and water heating.
- (b) Location of the Project: The project is in Non-Annex I Country, India and is eligible as a GS CDM project
- (c) Project Area, Project Boundary and Scale: The project area is Chittoor District, Andhra Pradesh State, India. It is a micro-scale project activity according to the project definition of the UNFCCC (< 15 MW_{th} renewable energy)

The project is not included in any other voluntary or compliance standards programme. The end user agreement transfers the generated emission reduction ownership to the PP, CROSS. Each of the units has a unique ID on the units which makes in unique to this project activity. The project will not claim any other certificate and thus there is no double counting arising from the issuance of Gold Standard carbon credits. The project has been implemented only with upfront carbon revenues.

- (d) Host Country Requirements: The project is in compliance with host country's legal, environmental, ecological and social regulations.
- (e) Contact Details: The contact details are as provided in Appendix 1 of the PDD.
- (f) Legal Ownership: The full and uncontested legal ownership to issued carbon credits is with the NGO CROSS. The end-users have signed an end user

agreement, where in it is stated that CROSS has the legal ownership to the issued CERs. There are no other rights involved in the project activity.

- (g) Other Rights: the uncontested legal title and ownership of the project is with CROSS. The carbon rights from the project is with CROSS. An end user agreement between CROSS and the beneficiary was signed after the commission of biogas unit. The end user has transferred the rights of the emission reductions to CROSS. There are no other rights to the project activity.
- (h) Official Development Assistance Declaration: The project activity did not use ODA funding. The project implementation, monitoring, service and maintenance is only through carbon funding.

Thus based on the above, the project activity is eligible as a GS CDM 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

>> The product generated from the project is GS CERs. The legal ownership of products is with the project proponent CROSS. An end user agreement was signed after the construction of biogas with every family. The end user has transferred the rights to the CERs to CROSS. Thus the project owner, CROSS has full and uncontested legal ownership of GS CERs that are generated under CDM and Gold Standard Certification.

A.2. Location of project

>> Country: India
 State: Andhra Pradesh
 District: Chittoor
 Mandals: All Mandals of Chittoor District

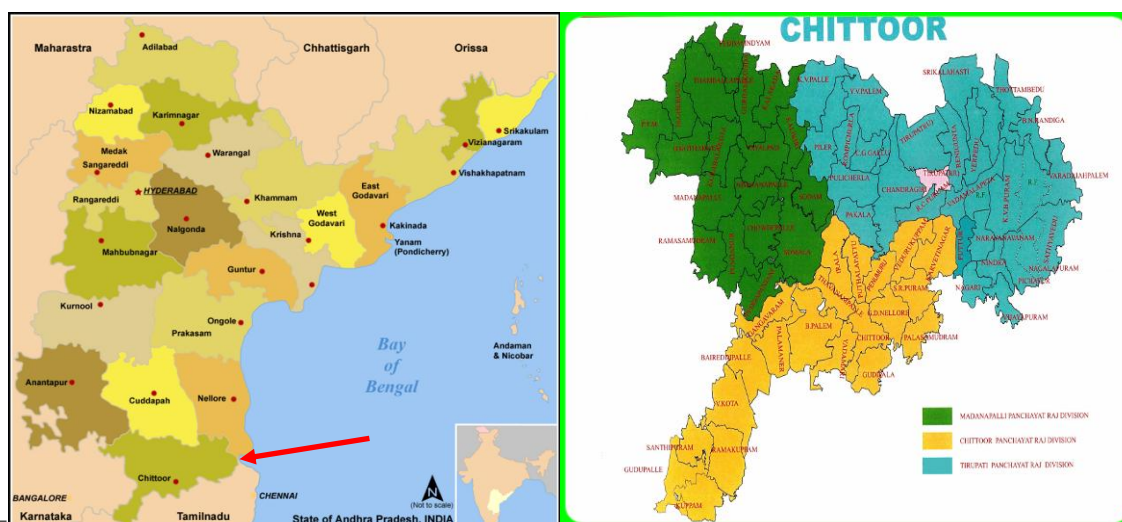


Fig 1: Map of Andhra Pradesh State showing Chittoor District and District Map showing all the Mandals where the project will be implemented

Chittoor district is located in the extreme South of Andhra Pradesh, between 12°37' - 14°8' North latitudes and 78°33' - 79°55' East longitudes. It is bound by Anantapur District to the northwest, Cuddapah District to the north, Nellore District to the northeast, Vellore & Tiruvallur districts of Tamil Nadu state to the south, and Karnataka state to the southwest⁷.

A.3. Technologies and/or measures

>> Biogas is a mixture of methane and carbon dioxide. It also has traces of hydrogen sulphide (3%), ammonia, oxygen, hydrogen, water vapour etc., depending upon feed materials and other conditions. Biogas is generated by fermentation of cellulose rich organic matter under anaerobic conditions. In anaerobic conditions, the methane-producing bacteria become more active. Thus, the gas produced becomes rich in methane. The optimum utilization depends upon the successful physical installations, which in turn depend upon plant design and its selection. The basic conversion principle is that when a non-ligneous biomass is kept in a closed chamber for a few days, it ferments and produces an inflammable gas. The anaerobic digestion consists of three stages: I Hydrolysis; II Acid formation and III Methane fermentation.

⁷ <http://en.wikipedia.org/wiki/Chittoor>

The processes are carried out by two sets of bacteria namely acid forming bacteria and methane formers. The acidogenic phase I is the combined hydrolysis and acid formation stages in which the organic wastes are converted mainly into acetate, and phase II is the methanogenic phase in which methane and carbon dioxide are formed. The better the three stages merge with each other, the shorter the digestion process.

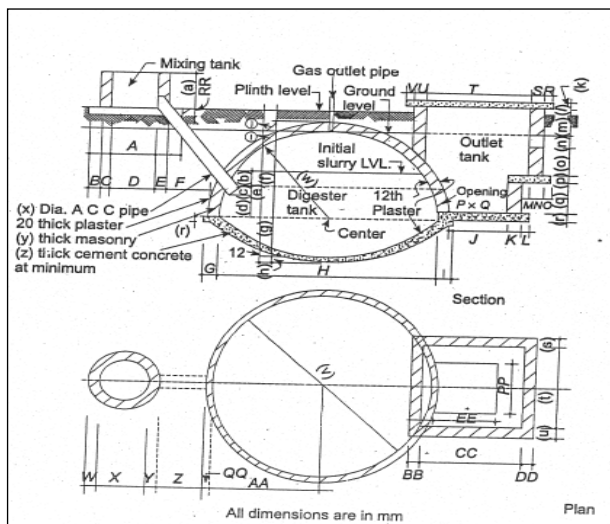
The technical specifications of the Deenabandhu model bio-digester are as follows⁸

Specification	Value
Capacity	2 m ³
Mixing Proportion (Water: Dung)	1:1
Feed Material	Cattle Dung
Biogas Flow rate	0.47 m ³ /hr
Number and size of burners	2 burners of 4" size

In the project activity users prepare batches of slurry in the mixing tank, before allowing the final mixture to flow into the digester for methane formation phase. After digestion, evacuated spent slurry will be used as manure in the agriculture fields. The recovered gas is combusted and used for cooking and water heating. The chosen methane recovery and combustion system is the time tested Deenabandhu model biogas technology which is well-known in India⁹. The project activity will organize the 5,000 users to use cattle dung and organic wastes in individual household methane recovery systems of biogas for cooking and water heating. The 5,000 individual plants consist of a mixing chamber where water and cattle dung are mixed in 1:1 ratio, an inlet pipe to feed the slurry into the reactor, the main biogas reactor / digester where methane formation / recovery takes place, a slurry outlet pipe, an outlet chamber, and a slurry platform. The outlet pipe and tank are provided to remove the digested / treated sludge or fermentation residue and the slurry platform is provided to maintain the treated slurry in clean condition. A pipe leading from the top of the dome to the stove will be provided to supply biogas to a 2-ring stove inside the house.

⁸ B.T. Nijaguna. 2002. Biogas Technology, New Age International Publishers, New Delhi.

⁹ Approved design by the Ministry of New and Renewable Energy. National Biogas and Manure Management Programme (NBMMMP), Section 3, Technology. <http://www.mnre.gov.in/schemes/decentralized-systems/schems-2>



Plan of Deenabandhu Model Biogas Plant



Construction of Biogas Plant



Constructed Deenabandhu Biogas Unit



Biogas Stove used for Cooking

Fig 2: Biogas Plant (Plan and constructed biogas plant)

A.4. Scale of the project

>> It is a Micro scale Project Activity. Kindly see section B.5. for the justification of the scale of the project activity.

A.5. Funding sources of project

>> There will be no public funding involved in the project activity. The project would be financed completely with carbon revenues.

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

B.1. Reference of approved methodology (ies)

>> AMS.I.E. Switch from non-renewable biomass for thermal applications by the user,
Version 11

B.2. Applicability of methodology (ies)

>>

Applicability Criteria	Applicability fulfilled by the Project Activity
2. This methodology comprises of activities to displace the use of non-renewable biomass by introducing renewable energy technologies to households, communities, and/or institutions such as schools, prisons or hospitals (hereinafter referred as end-users).	The project activity is biogas cook stoves and provides thermal energy from cattle dung that is renewable. It replaced the baseline technology mud/clay, three-stone traditional cook stove that used non-renewable biomass.
3. Project participants 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.	As shown in section B.4, the communities are using non-renewable biomass since 31 st December 1989. This is based on using published literature, official reports and statistics.
4. 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 conditions specified in the methodology.	Not Applicable, The project activity does not use renewable biomass. The renewable source is cattle dung.
5. For electric cookstoves with integrated	Not Applicable.

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 activity is biogas cook stove and is not electric cook stoves.
6. 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.	Not Applicable. The project activity is biogas cook stove and is not electric cook stoves.
7. Under this methodology, emission reductions cannot be claimed only due to fuel-switch aspect and proposed project activities shall introduce new renewable energy based technologies, i.e. technology switch is also involved.	There is a technology switch from traditional stove to biogas stove.
8. 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	Each of the biogas unit is constructed by the PP close to the household. Each biogas unit has a unique ID, which is visible on the biogas unit. The Emission Reduction Calculations Sheet has the details of the end user's name and the location i.e. District, Mandal, village in which it is constructed along with the Unique ID. Also, the PP, CROSS, and end user has signed an end-user agreement that states that the end user transfers the emission reductions generated from the

renewable energy, producers of processed renewable biomass).	project activity to the PP, CROSS and is not transferable to any other entity preventing double counting.
9. For project activities introducing bio-ethanol cookstoves, project participants shall demonstrate that the bioethanol cookstoves 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 organisation may also be used.	Not Applicable. The project activity is biogas cook stove and is not bio-ethanol cook stoves.

B.3. Project boundary

>>

In accordance with Paragraph 16 of the chosen methodology, *The project boundary is the physical, geographic site of the use of biomass or the renewable energy.*

The projects boundary will therefore encompass the sum of the 5,000 physical geographical sites of all individual biogas plants (digester system, pipe leading to the stove and the stove itself) realized by the project activity.

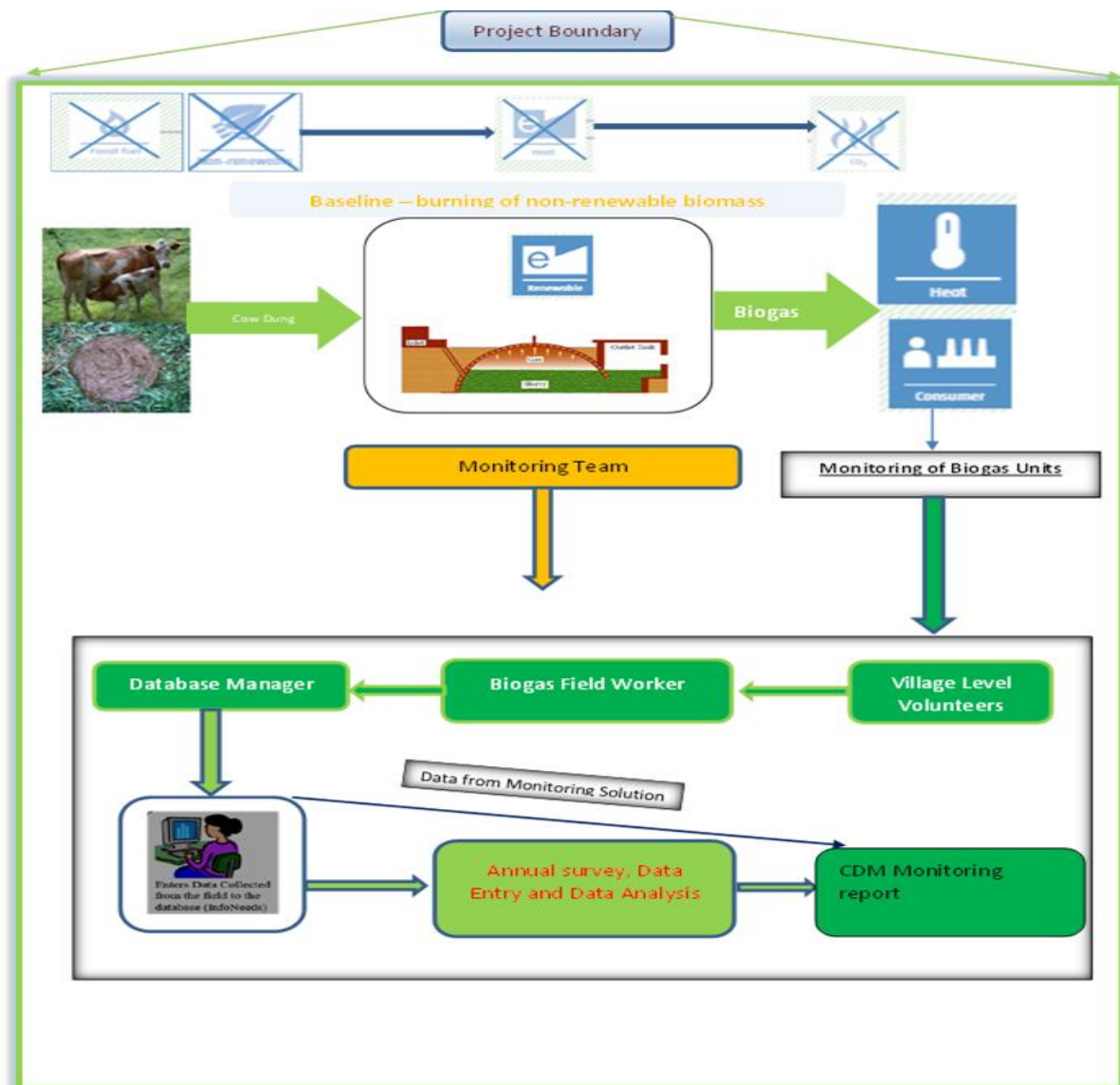
Based on the methodology, the GHGs included are as follows:

Source	GHGs	Included?	Justification/Explanation
Baseline scenario	CO ₂	Included	Major source of emission
	CH ₄	Included	Included in the methodology as emission factor of fossil fuel mix
	N ₂ O	Included	Included in the methodology as emission factor of fossil fuel mix
Project Scenario	Emissions from use of non-renewable wood by non-project	CO ₂ Included	Leakage from use of non-renewable woody biomass by non- project households/users that previously used renewable

household/users
that previously
used renewable
energy

energy is a source
according to AMS I.E.

CH ₄	Excluded	Not a source
N ₂ O	Excluded	Not a source



B.4. Establishment and description of baseline scenario

>> According to the Standard CDM project standard for project activities, Version 2, (CDM-EB93-A04-STAN), the project participants has to demonstrate the validity of the original baseline or update it in accordance to the following (Paragraphs 283–286).

Para 283. To demonstrate the validity of the original baseline or its update, the project participants are not required to reassess the baseline scenario. Instead, the project participants shall assess the GHG emission reductions or net anthropogenic GHG removals that would have resulted from that scenario.

The baseline scenario is not assessed. The GHG emission reductions are reassessed that would have resulted from the scenario.

Para 284. The project participants shall assess and incorporate the impact of national and/or sectoral policies and circumstances, existing at the time of requesting renewal of crediting period, on the current baseline GHG emissions, without reassessing the baseline scenario.

This is also the Step 1.1 of the methodological Tool to assess the validity of the original/current baseline and update of the baseline at the renewal of the crediting period:

There are no relevant national and/or sectoral policies and circumstances ever since the project was registered that have an impact on the baseline. The Ministry has been supporting programmes for the deployment of renewable energy systems and devices such as biogas plants, in rural areas of the country¹⁰. But the implementation of biogas is still very low. The baseline scenario remains unchanged and is the same as that determined during the start of the project activity.

According to step 1.2 of the tool, *Assess the impact of circumstances*

The baseline scenario identified at the validation of the project activity was thermal energy from fuel wood, of which a large part of it was non-renewable for domestic cooking and water heating. Thus, this project activity was a voluntary investment which replaced equivalent amount of thermal energy from renewable source, the biogas. The project proponent was not bound to incur this investment as it was not mandatory by national and sectoral policies. Thus, the continued operation of the project activity would continue to replace thermal energy from fuel wood, hence the same baseline as identified in the previous crediting period is still valid for the project.

¹⁰ <https://www.bioenergyconsult.com/biogas-india/>

Therefore, the assessment of the changes in market characteristics is not required for the renewal of the project's crediting period under CDM.

Step 1.3. Assess whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested.

The target population are the rural households of Chittoor District. The rural households are primarily dependent on fuel wood for cooking and heating water. According to NSS Report, in India, 44.5% of households still use firewood for cooking, and in Andhra Pradesh, State, 18.4% of rural households still predominantly only use fuelwood for cooking¹¹. Based on a national family health survey for Chittoor District, 2015-16, which is the project region, households using clean fuel for cooking accounts for only 47%, thus making 53% of households in rural areas still using solid fuels for cooking¹². Based on a study conducted in Chittoor, though LPG is promoted by the Government under the Deepam Scheme, easy access to firewood without additional costs significantly contributes to continued use of firewood for cooking. Fuel usage correlates with income levels and lower income households tend to use more fuelwood as cost is still a barrier for use of LPG in rural areas¹³. Based on a survey conducted during November 2021 in Chittoor in the project region, 35% of the surveyed household were using LPG, but all the households were still using fuelwood as the dominant fuel for cooking and heating water for bath on inefficient mud/clay wood stoves that do not have chimney and grate and hence has an efficiency of 10% according to the methodology. Majority of the firewood users believed that cooking with this fuel improved their financial wellbeing because selling firewood generated income, whilst collecting the fuel gave them an opportunity to socialise and is a tradition they would like to continue¹⁴. They viewed LPG as a financial burden that

¹¹ http://mospi.nic.in/sites/default/files/publication_reports/Report_584_final_0.pdf, Page 47 and page 165.

¹² National Family Health Survey – 4, 2015-16. District fact sheet, Chittoor, Andhra Pradesh. International Institute of Population Sciences, Mumbai. http://rchiips.org/nfhs/FCTS/AP/AP_FactSheet_554_Chittoor.pdf.

¹³ Smitha Rao, Sanjeev Dahal, Sophia Hadingham and Praveen Kumar. Dissemination Challenges of Liquefied Petroleum Gas in Rural India: Perspectives from the Field. Sustainability 2020, 12, 2327.

<https://www.mdpi.com/2071-1050/12/6/2327/pdf>

¹⁴ <https://www.sciencedaily.com/releases/2020/11/201109120642.htm>

gave food an undesirable taste and feared a fatal canister explosion.¹⁵ This shows that though LPG has been provided with subsidy to the rural communities, the refill is very expensive and rural households are still using traditional stove for cooking. Result of a study in Chittoor, Andhra Pradesh shows that disparities in LPG adoption owing to affordability, accessibility, and awareness. Easy availability of biomass, affordability and concerns of safety issues deter households from adopting LPG and continue using fuelwood¹⁶. The region is scarce of biomass and non-renewable biomass is part of the biomass used for cooking and heating water. In 5,000 households, the fuel wood has been replaced with biogas, a renewable source of thermal energy through this CDM project activity.

Hence, the new circumstances do not have an impact on the baseline emission. The conditions used to determine the baseline emissions in the previous crediting period are still valid even now. In the absence of the project activity, the baseline scenario in the project boundary is the use of non-renewable biomass for cooking and heating water on traditional cook stoves with low efficiencies. There are no mandatory national and sectoral policies or regulations for use of biogas (renewable energy) at household level. Thus, the GHG emissions under the baseline condition comprise CO₂ emissions from the use of non-renewable biomass for thermal energy.

285. The requirements contained in paragraph 284 above are not applicable to a registered CDM project activity applying the valid version of an applicable approved standardized baseline that standardizes baseline scenario in accordance with paragraph 281 above.

Not Applicable

286. If data and parameters used for determining the original baseline, that were determined ex ante and not monitored during the crediting period, are no longer valid, the project participants shall update such data and parameters in accordance

¹⁵ <https://www.sciencedaily.com/releases/2020/11/201109120642.htm>

¹⁶ Praveen Kumar, Robert Ethan Dover, Antonia Díaz-Valdés Iriarte, Smitha Rao, Romina Garakani, Sophia Hadingham, Amar Dhand, Rachel G. Tabak, Ross C. Brownson and Gautam N. Yadama. Affordability, Accessibility, and Awareness in the Adoption of Liquefied Petroleum Gas: A Case-Control Study in Rural India. Sustainability 2020, 12, 4790; <https://www.mdpi.com/2071-1050/12/11/4790/pdf>

with the "Methodological tool: Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period".

Based on Step 1.4 of the Tool, Assessment of the validity of the data and parameters

The data and parameters that were determined at the start of the crediting period and not monitored during the crediting period were updated during this crediting period.

Step 2: Update the current baseline and the data and parameters

As per step 1.4, the data and parameters that were determined at the start of the crediting period and not monitored during the crediting period is updated.

Step 2.1 Update the current baseline

Based on this step, the baseline emissions for the 2nd crediting period is updated without reassessing the baseline scenario based on the latest approved methodology applicable to the project activity.

The data and parameters that were determined ex-ante and updated are as follows:

The data and parameters that were determined ex-ante and updated are as follows:

$BC_{BL,HH,y}$ = Quantity of woody biomass that is substituted or displaced in year y (tonnes)

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

$NCV_{biomass}$ = Net calorific value of the non-renewable woody biomass that is substituted

$EF_{projected_fossil\ fuel}$ = Emission factor of fossil fuels projected to substitute non-renewable woody biomass by similar consumers tCO_{2e}/TJ).

NCV_{biomass} = 0.0156 TJ/tonne as given by AMS I.E. methodology, Version 11.

EF_{projected_fossilfuel} – The default regional value given for South Asia in Table 2 of AMS I.E. methodology is considered for the project activity, which is in India. Accordingly, the value is 64.4 tCO_{2e}/TJ.

Determining B_y

A household level questionnaire survey and kitchen test was conducted in November 2020 for the renewal of the crediting period in the project region. Based on the survey conducted during validation, and the mean and standard deviation of fuelwood use for the project region, the sample size was calculated using the equation as shown below. At a mean of 3.58 kg/capita/day and standard deviation of 0.73, the sample size at 90/10 confidence/precision level and @80% response rate for infinite sample population it is 14 households.

$$n = \frac{1.645^2 V}{0.1^2}; \text{ where } V = \left(\frac{SD}{mean} \right)^2$$

	Value
Mean (kg/capita/yr)	3.58
Standard Deviation	0.73
V	0.04158
N	11
@80% response rate	14

The fuelwood use in the baseline was determined by conducting a Kitchen Test in November 2020 to estimate the fuelwood use. Kitchen test was done in 155 non-project households for 3 days to assess the fuel wood use at household level. A total of 155 households were interviewed and kitchen test conducted for the following households:

Taluk	Village	Total
G.D.Nellore	Etteri HW	12

	Etteri Village	5
	Mukklathur HW	24
	N.Venkatapuram	1
Karvetnagaram	Gangamambapuram	24
Narayanavanam	Kailasakona	6
	Srinivasa ST colony	27
Nindra	Vedanthapuram	32
S.R.Puram	Mangunta AAW	15
	Mangunta HW	5
	Mangunta ST Colony	4
Grand Total		155

Weighted amount of fuelwood was given to the households from which they used it for cooking and other activities. These are non-project households who are using traditional cook stove and other fuels. The start and end weight was taken for each day to assess the fuelwood used per day. A mean of the value is considered as the baseline fuelwood use in the project area. The per capita fuelwood use per day was determined. In addition the household size was also determined from the survey. The results of the study are as follows:

	HH Size	Average fuelwood use (kg/capita/day)
Mean	5.65	2.695
Standard Deviation	1.72	1.155
Count	155	155
Standard error of mean	0.138	0.093

Confidence level (90%)	0.23	0.15
Reliability	4.02%	5.66%

Based on the study conducted, the fuelwood use is 2.695 kg/capita/day and the household size is 5.65 persons and is within 90/10 confidence/precision level. The family size of households in which the project is implemented (3095 HHs), is 3.77, while based on the district statistics for Chittoor, 2016, the family size is rural area is 4¹⁷. To adopt a conservative approach, 3.77 is considered for the estimation of B_y and emission reduction calculations. Accordingly the fuelwood use is 2.695 kg/capita/day x 3.77 household size x 365 days = 3.71 t/household/year. This is a conservative value compared to 3.97 considered during the first crediting period.

The value considered is 3.71 t/household/yr. This is fixed ex-ante, as the project is for rural households.

Determining Non-renewable biomass (f_{NRB})

The value of f_{NRB} is calculated using the *ex-ante* option as follows:

Ex ante: the f_{NRB} value is determined once at the validation stage, thus no monitoring and recalculation of the f_{NRB} value during the crediting period is required;

The f_{NRB} is calculated based on CDM TOOL30, Methodological Tool for calculation of the fraction of non-renewable biomass. Version 3. The fraction of woody biomass that can be established as non-renewable is

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

Where

f_{NRB} = Fraction of non-renewable biomass in the country/region or project area

¹⁷ Handbook of Statistics, Chittoor District, 2016. Page XI.

<http://14.139.60.153/bitstream/123456789/13007/1/Handbook%20of%20Statistics%202016%20Chittoor%20District%20Andhra%20Pradesh.pdf>

NRB = Quantity of non-renewable biomass (t/yr) in the country/region or project area

RB = Quantity of renewable biomass in the country/region or project area

The data/parameter determined to assess f_{NRB} are as follows:

Consumption of wood in Andhra Pradesh – H		
Activity Data	Value	Source
Fuelwood (Mt)	24.30	Wood is Good, Is India doing enough to meet its present and future needs? A status report by CSE, 2017
Timber (Mt)	22.59	
Total (Mt)	46.89	
Determination of RB		
Area of Forest (ha) (F_{forest})	3,739,224	Chapter 11.1, Page 5, FSI, 2019
Protected forests (ha) (P_{forest})	506,900	Chapter 11.1, Page 3, FSI, 2019
Mean Annual Increment (t/ha/yr) (MAI_{forest})	0.763	Kaul et al, 2008., Page 9
Total Biomass Increment (t/yr) in Forests	2,466,263	Calculated
Mean Annual Increment in Forests (Mt/yr)	2.47	Calculated
Mean Annual Increment from TOF (Trees outside Forests) of Andhra Pradesh		

Growing Stock in TOF (Million cum)	67.68	Chapter 11.1, Andha Pradesh, Page 10, State of Forest Report 2019 ¹⁸
Mean Annual Increment (Million cum)	1.69	Calculated using Von Mantel's Method ($t=2GS/R$) ¹⁹ ; where GS is the growing stock and R is the rotation period; Rotation period is 80 years based on the dominant species (long term trees) planted in TOF ²⁰
Mean annual Increment in TOF (Million t)	1.34	Conversion of cum to t-wood density of 0.79 for Andhra Pradesh (Kaul <i>et al.</i> , 2008)
RB	3.80	From Forests and TOF

Parameter	Notation	Value	Source of data
Total annual consumption of wood (Million t/yr)	H	46.89	CSE, 2017
Quantity of renewable biomass in Andhra Pradesh State	RB	3.80	From FSI, 2019 and Kaul., et al, 2008 + From trees

¹⁸ <http://fsi.nic.in/isfr19/vol2/isfr-2019-vol-ii-andhra-pradesh.pdf>

¹⁹ Guidelines for the management of tropical forests 1. The production of wood (FAO forestry paper 135); <http://www.fao.org/3/w8212e/w8212e07.htm>

²⁰ Chapter 11.13, FSI, 2019 for relative abundance of tree species and average rotation period of tree species

(Million t/yr)			outside forest (TOF) based on data from State of Forest Report, 2019 for Andhra Pradesh)
Quantity of non-renewable biomass in Andhra Pradesh State (Million t/year)	NRB	43.09	= H – RB
Fraction of Non-renewable Biomass	f_{NRB}	0.91	Calculated NRB/NRB+RB

The f_{NRB} considered for Andhra Pradesh is 0.91.

Hence the fraction of non-renewable woody biomass used in the absence of the project activity considered for the project is 0.91.

The updated data and parameters to determine Emission Reduction Calculations during this first renewal is as follows:

Paramter	Value	Source
$BC_{BL,HH,y}$ (t)	3.71	Based on sample survey in the project area
$f_{NRB,y}$	0.91	Calculated based on Tool 30, Version 3.
$NCV_{biomass}$ (TJ/tonne)	0.0156	I.E. Methodology, Version 11
$EF_{projected_fossil\ fuel}$ (t CO _{2e} /TJ)	64.4	I.E. Methodology, Version 11

Use of non-renewable biomass since 31st December 1989.

Andhra Pradesh, the state in which the project will be implemented, is a forest scarce state with less than a critical minimum of 0.1 hectares per person during 1989. Though forest cover has stopped declining further, its quality however is still declining in terms of lowered growing stock and annual incremental rates depicting a lowered volume of the forest's stock and of the productivity of India's forest covered areas. Between 1989-1997, there has been a decrease of 10% change in the crown cover in Andhra Pradesh. Thus not only at the national level, even at the state level of Andhra Pradesh there has been non-renewable biomass used since 31st December 1989²¹. Based on the FSI, 1989 (Fig 4)²², at the level of consumption of forest produce and the productivity of forests, the country needed a minimum of 0.47 ha of forests per capita to meet their needs which includes fuel wood. Andhra Pradesh had forest cover of 0.05 – 0.1 ha per capita, below the critical minimum required for sustainable production and extraction of forest produce including fuel wood.

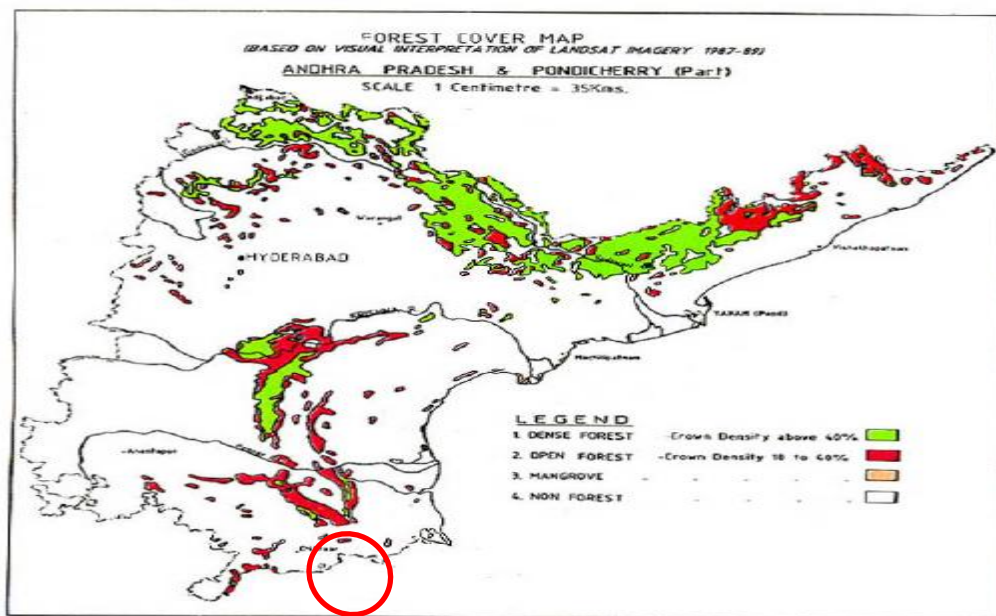


Figure 4: Forest Map of Andhra Pradesh for 1989 showing the project area.

²¹ Population pressure and deforestation in India. S.C. Gulati and Suresh Sharma. Population Research Centre, Institute of Economic Growth, University Enclave, Delhi.(Page no 10 and 11)

²² State of Forest Report, 1989. Forest Survey of India, Ministry of Environment and Forests, Government of India.(Page no 15)

Thus non-renewable biomass is being used since 1989.

According to para 31-35, the loss in efficiency of the project device type due to ageing shall be accounted for during the monitoring period. Biogas stoves do not change in thermal efficiency due to ageing as the efficiency the biogas burner is designed to provide good mixing of air and fuel, increase the volumetric heat release rate, combustion efficiency and heat transfer efficiency²³. Also, burner efficiency is a strong function of biogas flow pressure, pan-size and its position over the burner head. The efficiency is adjusted by the knob of the stove by regulating the air supply. Hence the loss of efficiency of the project device is not accounted.

B.5. Demonstration of additionality

According to the Standard CDM project standard for project activities, Version 2, (CDM-EB93-A04-STAN) Para 280, for renewal of crediting period of a registered CDM project activity, the project participants are not required to reassess the additionality of the project activity nor update the section of the PDD relating to additionality. Hence the additionality demonstration provided during the registration of the project is retained as is below.

The project activity by CROSS is, substituting the use of non-renewable fuel wood by using biogas which is renewable to meet the thermal requirements for cooking and heating water with the primary aim of reducing carbon dioxide emissions.

The additionality is demonstrated based on the Micro-scale CDM project activities approach using the **"Guidelines for demonstrating additionality of micro scale project activities"** Version 04, EB 68, Annex 26.

The project activity falls under the category– Type I

²³ Biogas Technology. By B.T. Nijaguna. New Age International Private Limited Publishers. 2002.

As per Para 2 Applicability Condition:

Project activities up to five megawatts that employ renewable energy technology are additional if any one of the conditions below is satisfied:

(a) The geographic location of the project activity is in one of the least developed countries or the small island developing States (LDCs/SIDS) or in a special underdeveloped zone (SUZ) of the host country;

(b) The project activity is an off-grid activity supplying energy to households/communities (less than 12 hours grid availability per 24 hrs is also considered off-grid for this assessment);

(c) The project activity is designed for distributed energy generation (not connected to a national or regional grid) with both conditions (i) and (ii) satisfied;

(i) Each of the independent subsystems/measures in the project activity is smaller than or equal to 1500 kW electrical installed capacity;

(ii) End users of the subsystems or measures are households/communities/small and medium enterprises (SMEs).

(d) The project activity employs specific renewable energy technologies/measures recommended by the host country designated national authority (DNA) and approved by the Board to be additional in the host country. The following conditions shall apply for DNA recommendations:

(i) Specific renewable energy technologies/measures refers to grid connected renewable energy technologies of installed capacity equal to or smaller than 5 MW;

(ii) The ratio of installed capacity of the specific grid connected renewable energy technology in the total installed grid connected power generation capacity in the host country shall be equal to or less than 3 per cent;

Project Case:

- The project activity is implementation of 5,000 biogas units of 2 m³ capacity. The project activity falls under Type I project activity, methodology I.E., which is renewable energy technology. Each biogas unit generates thermal energy of 1.69 kW_{th}. Thus 5,000 biogas units that will be constructed under the project

activity will have an installed capacity of 8460 kW_{th} or 8.46 MW_{th}. This is less than 15 MW_{th}²⁴. According to the guidelines for micro scale projects, definitions provided for output capacity and guidelines provided for conversion from electrical to thermal units in the most recent version of General Guidelines to SSC CDM methodologies shall be used. According to this guidelines, multiply by 3 to derive thermal units from electrical units irrespective of the type of project or methodology applied.

- Thus the project activity having thermal capacity 8.46 MW is less than fifteen megawatts (thermal) that employ renewable energy technology.
- The project activity is domestic household level biogas units designed for purposes of cooking and heating water. Thus it is distributed energy generation which produces thermal energy at the individual household level.

The project activity fulfils the condition (c) of Para 2 Applicability condition as follows:

- The project activity is domestic household level biogas units designed for purposes of cooking and heating water. Thus it is distributed energy generation which produces thermal energy at the individual household level.
- Each of the independent biogas unit in the project activity has a thermal energy installed capacity of 1.69 kW_{th} (kindly see section B.2. for rating each of the unit) and thus smaller than 4500 kW_{th} (1500 kW (installed electrical capacity) x 3 = 4500 kW_{th}).
- The end users of each of the biogas units are individual households.

²⁴ 5 MW_(e) x 3 = 15 MW_{th}. As per General Guidelines to SSC CDM methodologies. Multiply by 3 to derive thermal units from electrical units irrespective of the type of project or methodology applied.

Thus Para 2, condition (c) of the "Guidelines for demonstrating additionality of micro-scale project activities", Version 04, Annex 26, EB 68 is satisfied by the project activity.

As per Para 8, Applicability Condition:

The eligibility of project activities as micro-scale CDM project activities will be determined in accordance with the principles laid out in paragraph 3 and paragraph 4 of the General Guidelines to SSC CDM methodologies. (Version 16 or its update), i.e.:

(a) Project activities remain under the thresholds defined above during each year of the crediting period and in cases where ex ante projected emissions reductions show an increase during the crediting period; project activities that go beyond the micro-scale limits in any year of the crediting period are not eligible;

(b) Renewable energy projects that produce electrical, thermal and mechanical energy, and cogeneration projects are covered. Definitions provided for output capacity and guidelines provided for conversion from electrical to thermal units in the most recent version of General Guidelines to SSC CDM methodologies shall be used. Where applicable, additional guidelines provided in relevant methodologies shall be followed, e.g. eligibility of cogeneration projects as currently defined in AMS-I C;

(c) A project activity with more than one component, where each component meets the micro-scale threshold, is eligible. The sum of the size of components of a project activity belonging to the same type (capacity for Type I, energy savings for Type II and emission reductions for Type III) shall not exceed the limits for micro-scale project activities (e.g. the limit for the methane recovery component is 20 ktCO₂e/yr and the limit for the electricity production component is 5 MW output capacity).

Project Case:

The project activity will remain under the thresholds of 15 MW_{th} installed capacity during each year of the crediting period as the installed capacity of the project activity is 8.46 MW_{th}.

The project activity produces thermal energy and hence covered under micro-scale project activity.

According to the micro-scale guidelines, where applicable, additional guidelines provided in relevant methodologies shall be followed. As shown in section B.2, guidelines provided by the methodology I.E is followed and thus eligible.

According to Para 9, micro-scale CDM project activities shall apply the Guidelines on the demonstration and assessment of prior consideration of the CDM. (EB 57, paragraph 12).

The project activity is conceived as a CDM project, wherein the construction of biogas digesters will be only after successful CDM registration and obtaining forward carbon fund for construction of biogas units. CDM revenues are indispensable for the project activity.

For the proposed project activity, the evidence to support awareness of CDM prior to the project activity start date, and that the benefits of the CDM were a decisive factor in the decision to proceed with the project is the board resolution dated 30th June 2011 in which CROSS has decided to implement the project activity considering CDM revenue.

The project schedule is as follows:

SI No.	Chronicle of Events	Dates
1.	First CDM Training programme to SCINDeA NGO groups (SACRED, BEST, WORD and CROSS) by Fair Climate Network (FCN)	10 th November-2010
2.	Second CDM Training programme to the staff of participating NGOs by FCN	23 rd May 2011
3.	Board Resolution of CROSS to take up CDM project activity	30 th June2011
4.	Consultancy contract between SCINDeA/CROSS and FCN Technical Team	1 st July 2011
5.	Demographic survey and Baseline survey of the project area	01 st Jul-2011 to 30 th December 2011
6.	Stakeholders' Meetings	9 th January 2012
7.	Contract with DOE for Validation of the project activity	29 th February 2012
8.	Submission of "Prior Consideration of CDM Form" to	06 th March 2012

	UNFCCC and DNA	
9.	Likely start date of biogas construction after CDM registration, sign ERPA and procure carbon revenue	1 st April 2013

Thus the start date of the project activity is much after the PDD is submitted, project registered as a Gold Standard CDM project activity and forward carbon funding will be obtained.

According to Para 10, micro-scale CDM project activities shall demonstrate that they are not a debundled component of a small-scale (SSC) CDM project activity by applying the criteria in the Guidelines on assessment of debundling for SSC project activities., for example by suitably considering micro-scale thresholds in the place of SSC thresholds (EB 62, para 48).

Applying micro-scale thresholds in place of SSC thresholds, a proposed micro-scale project activity shall be deemed to be a debundled component of a small scale project activity if there is a registered micro-scale CDM project activity or an application to register another micro-scale CDM project activity:

- (a) With the same project participants;
- (b) In the same project category and technology/measure; and
- (c) Registered within the previous 2 years; and
- (d) Whose project boundary is within 1 km of the project boundary of the proposed small- scale activity at the closest point.

CROSS does not have any CDM projects registered in the same project category and technology. This is the first CDM project activity of the NGO, CROSS.

Thus the project is not a debundled component of a small scale project activity.

From the above analysis it can be concluded that the additionality of the project activity is justifiable since the project activity meets all the applicability conditions as discussed above.

Thus based on “Guidelines for demonstrating additionality of micro scale project activities” Version 04, EB 68, Annex 26, the project activity proves to be additional.

The table below is only applicable if the proposed project activity is a type of project activity which is deemed automatically additional, as defined by the applied approved methodology, tool, standardized baseline or specific renewable technologies/measures conferring automatic additional microscale CDM project activities proposed by a DNA and approved by the Board.

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).	Tool 21, Demonstration of additionality of small-scale project activities, Version 11, Para 11 (c).
Describe how the proposed project meets the criteria for deemed additionality.	According to latest Tool 21, demonstration of additionality of small-scale project activities, Version 10, according to Para 11 (c), the project activity solely is composed of isolated units where the users of the biogas units are households. The size of each of the unit is no larger than 1% (450 kWthermal) of the small-scale CDM threshold. Each units is 1.78 kWthermal

B.5.1. Prior Consideration

>> This is renewal of crediting period. The prior consideration during the registration of the project was demonstrated as stated in the above section.

B.5.2. Ongoing Financial Need

>> The project was implemented with upfront carbon revenues to construct, monitor, verify, and repair and maintenance of the units, and transaction costs for certification by UNFCCC and GS4GG. There are no other revenues from the project. CROSS is still under ERPA period with the Carbon Investor. After the ERPA period, the carbon revenues are required for monitoring, repair and maintenance of biogas units. Depending on carbon revenues generated from the project, a percent of carbon revenue will also be distributed to the women using biogas units for their environmental services to address climate change. Hence carbon revenues are essential for continuation and sustainability of the project activity.

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)	13.3. Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning	GHG emission reductions per year
SDG 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.	i. Continued improved indoor air condition and reduced respiratory problems especially for women and children.
		ii. Reduction of pathogens in slurry compared to that of dung
SDG 5: Gender Equality	5.4. Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared	i. Reduction in Hours for collection of woody biomass and cooking
		ii. Women in monitoring of the project activity

	responsibility within the household and the family as nationally appropriate	iii. Income generation activities promoted due to the time saved for women
SDG 7: Affordable and Clean Energy	7.2. By 2030, increase substantially the share of renewable energy in the global energy mix	i. Construction of biogas units for rural communities. ii. Maintenance of constructed biogas units and elimination of use of firewood.
SDG 8: Decent work and economic growth	8.5. By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value	Number of jobs created
SDG 17: Partnerships for the Goals	17.1. Strengthen domestic resource mobilization, including through international support to developing countries	i. Access to domestic or international carbon funding to implement clean technologies

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

>>

SDG 13

Baseline emissions

It is assumed that in the absence of the project activity, the baseline scenario would be the use of fossil fuels for meeting similar thermal energy needs.

Baseline emissions are calculated as:

$$BE_y = B_y \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected_fossil_fuel} \quad \text{Equation (1)}$$

Where:

BE_y	=	Baseline emissions in the year y (tCO ₂ e)
B_y	=	Quantity of woody biomass that is substituted or displaced in year y (tonnes)
$f_{NRB,y}$	=	Fraction of woody biomass used in the absence of the project activity in year y that can be established as non-renewable biomass (fraction or %)
$NCV_{biomass}$	=	Net calorific value of the non-renewable woody biomass that is substituted (TJ/tonne)
$EF_{projected_fossil\ fuel}$	=	Emission factor of fossil fuels projected to substitute non-renewable woody biomass by similar consumers (tCO ₂ e/TJ).

According to Para 29, B_y is determined by following option (a) as follows:

Calculated as the product of the number of households using cookstoves distributed under the project activity multiplied by the estimate of average annual consumption of woody biomass per household that is displaced by the project activity:

$$B_y = N_{HH,y} \times (BC_{BL,HH} - BC_{PJ,HH,y}) \quad \text{Equation (3)}$$

Where:

$N_{HH,y}$	=	Number of households with functional cookstoves distributed under the project activity in year y (number)
$BC_{BL,HH}$	=	Average annual consumption of woody biomass per household before the start of the project activity or at the renewal of each crediting period, whichever is later (tonnes/household/year)
$BC_{PJ,HH,y}$	=	Average annual consumption of woody biomass per household in the pre-project devices during the project

activity (tonnes/household/year). This parameter shall be considered if it is found that pre-project devices were not completely displaced but continue to be used to some extent

Project emissions

According to Para 36 of the methodology, if the project cook stoves use biomass, the sources of project emissions as detailed in Para 36 (a), i, ii, iii and iv and 36 (b) has to be considered as applicable, bearing in mind that some sources may be only relevant for specific fuels (e.g. production of bioethanol):

- Project Emissions is not applicable as the cook stoves do not use biomass.

*According to Para 37 of the methodology, in case of electric cook stoves, if back up diesel generators are used in compliance with paragraph **Error! Reference source not found.**, project emissions due to use of diesel shall be accounted for, using the latest version of "TOOL03: Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion".*

- Project Emissions is not applicable as the project cook stoves are not electric stoves.

Leakage emissions

If the cookstoves distributed under the project activity involve the use of biomass, leakage emissions (LE_y) shall be calculated using the latest version of "TOOL16: Project and leakage emissions from biomass", including leakage emissions due to production of processed renewable biomass and bioethanol (e.g. CO₂ emissions due to consumption of fossil fuels and electricity).

- Leakage Emissions is not applicable as the project cook stoves do not use biomass.

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 end-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 end-users that is attributable to the project activity, then B_y is adjusted to account for the quantified leakage. Alternatively, B_y is multiplied by a net to gross adjustment factor of 0.95 to account for leakages, in which case surveys are not required.

- B_y will be multiplied by a net to gross adjustment factor of 0.95 to account for leakages. Hence survey will not be conducted to assess leakage related to non-renewable woody biomass saved by the project activity.

Project activities switching from baseline device using woody biomass to efficient project device using charcoal or switching from woody biomass to processed renewable biomass (briquette, pellets, and woodchips), shall take into account the leakage effects related to the charcoal or processed biomass production.

- Leakage Emissions is not applicable as the project cook stoves are not switching to charcoal or processed renewable biomass.

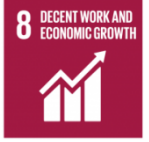
Other SDGs

The baseline scenario is the continued use of traditional inefficient cook stoves for cooking and heating water.

The project scenario is the use of biogas from cattle dung to produce biogas which is used for cooking and heating water. This renewable source of energy substitutes fuelwood of the baseline, thus reduction GHG emissions.

Hence the net benefit is due to the implementation of biogas units at the household level by the NGO, CROSS which is absent in the baseline scenario.

SDG	Parameter	Baseline	Project	Net Benefit
 SDG 3: GOOD HEALTH AND WELL-BEING	i. Continued improved indoor air condition and reduced respiratory problems especially for women and children. ii. Reduction of pathogens in slurry compared to that of dung	i. Use of traditional cookstove causing indoor smoke and health hazards. (0% of HHs having clear indoor air) ii. Pathogens in dung	i. Reduction in indoor air pollution (100% of HHs) ii. Pathogens in Biogas Slurry	i. Project Scenario - % of households responding to reduction in air pollution ii. % Reduction in pathogen load in project scenario over baseline scenario.
 SDG 5: GENDER EQUALITY	i. Reduction in Hours for collection of woody biomass and cooking ii. Women in monitoring of the project activity iii. Income generation activities promoted due to the time saved for	Women spent time and effort in fetching, processing and storing fuelwood for cooking and cooking on traditional stoves	i. Reduction in Hours for collection of woody biomass and cooking ii. Women in monitoring of the project activity iii. Income generation activities promoted due to the time saved for	i. (Hours spent in Baseline scenario – Project scenario)/Hrs spent in baseline scenario x 100% ii. Number of Women in monitoring of the project activity iii. Type of Income

	women		women	generation activities promoted due to the time saved for women
 SDG 7: AFFORDABLE AND CLEAN ENERGY	i. Construction of biogas units for rural communities. ii. Maintenance of constructed biogas units and elimination of use of firewood.	No Biogas Units	i. Number of biogas units constructed ii. Number of units operational	i. Number of biogas units constructed ii. Number of units operational
 SDG 8. Decent work and economic growth	Number of jobs created	No project related jobs created	Project related temporary or permanent jobs created for men and women	Number of permanent and temporary jobs created due to the project activity
 SDG 13: CLIMATE ACTION	GHGs emissions reduction per year	Emissions in tCO ₂ emitted by using traditional cook stoves by 5,000 households	Emissions in tCO ₂ emitted by using biogas	Baseline Emissions – Project Emissions – Leakage as shown above

 SDG 17: PARTNERSHIPS FOR THE GOALS	i. Access to domestic or international carbon funding to implement clean technologies	No funding in the baseline scenario	Domestic/international carbon funding to construct and maintain biogas units	Domestic/international carbon funding in Indian Rupees to construct and maintain biogas units
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B.6.2. Data and parameters fixed ex ante

SDG13

Data/parameter	Rating Biogas
Unit	kW _{th} /digester
Description	Thermal capacity of a digester
Source of data	Calculated as shown in Section B.2
Value(s) applied	1.69
Choice of data or Measurement methods and procedures	Calculated as shown in Section B.2
Purpose of data	To establish that it is within the small-scale limit
Additional comment	Qualifies as a micro-scale project activity. This parameter is fixed for the entire crediting period

Data/parameter	$BC_{BL,HH,y}$
Unit	Tonnes /household/year
Description	Average annual consumption of woody biomass per household before the start of the project activity
Source of data	Survey and Kitchen test conducted in the project area

Value(s) applied	3.71 tonnes/year/family
Choice of data or Measurement methods and procedures	Based on survey conducted during the renewal of crediting period to estimate the average annual consumption of woody biomass. The average annual consumption of biomass is 2.695 kg/capita/day. The adult equivalent per family in the project area is considered as 3.77 based on the household size of all the 3095 households in which the project is implemented. By = 2.695 kg/capita/day x 365 days x 3.77/family = 3.71 t/family/yr.
Purpose of data	Estimation of Baseline Emissions
Additional comment	This parameter is fixed for the entire crediting period

Data/parameter	$f_{NRB, y}$
Unit	-
Description	Fraction of woody biomass used in the absence of the project activity in year y that can be established as non-renewable biomass
Source of data	Calculated based on following sources of data: 1. State of Forest Report, Forest Survey of India, 2019. 2. Kaul, M., Mohren, G.M.J., and Dadhwal, V.K., Phytomass carbon pool of trees and forests in India, Climatic Change, DOI 10.1007/s10584-010-9986-3, 2011 3. Wood is Good, Is India doing enough to meet its present and future needs? A status report by Centre for Science and Environment, CSE, 2017.
Value(s) applied	0.91
Choice of data or Measurement methods and procedures	As per "TOOL30: Calculation of the fraction of non-renewable biomass, Version 3"
Purpose of data	Estimation of Baseline Emissions
Additional comment	This parameter is fixed for the entire crediting period

Data/parameter	NCV _{biomass}
Unit	TJ/tonne
Description	Net Calorific Value of non-renewable woody Biomass
Source of data	AMS_I.E., Version 11 methodology
Value(s) applied	0.0156
Choice of data or Measurement methods and procedures	The baseline fuel replaced is only woody biomass. IPCC default for wood fuel, 0.0156 TJ/tonne, based on the gross weight of the wood that is 'air-dried' may be used if fuel used in project device is also woody biomass given in methodology
Purpose of data	Estimation of Baseline Emissions
Additional comment	This parameter is fixed for the entire crediting period

Data/parameter	EF _{projected_fossilfuel}
Unit	tCO ₂ /TJ
Description	Emission Factor for the substitution of non-renewable woody biomass by similar consumers.
Source of data	AMS-I.E., Version 11 methodology
Value(s) applied	64.4
Choice of data or Measurement methods and procedures	AMS I.E. Methodology, Version 11.
Purpose of data	Estimation of Baseline Emissions
Additional comment	This parameter is fixed for the entire crediting period

Data/parameter	Determination of Leakage
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Unit	t/HH/yr
Description	woody biomass
Source of data	AMS I.E. Methodology
Value(s) applied	0.19 for household fuelwood use of 3.71 t/HH/Yr. Based on the fuelwood use determined ex-post (BCBL,HH,y,-BCPY,HH,y) leakage will be determined by net to gross adjustment factor of 0.95 to account for leakage.
Choice of data or Measurement methods and procedures	By is multiplied by a net to gross adjustment factor of 0.95 to account for leakages
Purpose of data	Leakage
Additional comment	Surveys will not be required to determine leakage.

Other SDGs

There is no SDG Parameters fixed ex-ante.

B.6.3. Ex ante estimation of SDG Impact

>>

SDG 13

$$BE_y = B_y \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected_fossil_fuel}$$

Without Leakage			
Data	Value	Description	Source
BE _y	16,968	Baseline emissions during the year y in t CO ₂ e	Calculated
B _y	18,559.52	Quantity of woody biomass that is substituted or displaced in tonnes	Based on survey value of per capita value and conservative HH size (3.71 t/HH/yr)

$f_{NRB,y}$	0.91	Fraction of woody biomass used in the absence of the project activity in year y that can be established as non-renewable biomass (fNRB)	Calculated
$NCV_{biomass}$	0.0156	Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.0156 TJ/tonne)	Methodology
$EF_{projected_fossil\ fuel}$	64.4	Emission factor for the substitution of non-renewable woody biomass by similar consumers.	Methodology (value for South Asia)

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

By	18,559.52	Quantity of woody biomass that is substituted or displaced in tonnes	Calculated
N_{HH}	5000	Number of households in the project activity, number	PDD
$BC_{BL,HH,y}$	3.71	Average annual consumption of woody biomass per household before the start of the project activity, tonnes/household/year	Based on survey value of per capita value and conservative HH size (3.71 t/HH/yr)
$BC_{PJ,HH,y}$	0	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	Assumed as zero for ex-ante calculations; For ex-post calculations, will be based on surveys conducted in the project area

After considering Leakage

Activity Data	Value	Description	Source
BE_y	16,119	Baseline emissions during the year y in t CO ₂ e	Calculated
<i>B_y</i>	17,631.54	Quantity of woody biomass that is substituted or displaced in tonnes	Based on survey and third party study
<i>f_{NRB,y}</i>	0.91	Fraction of woody biomass used in the absence of the project activity in year y that can be established as non-renewable biomass (fNRB)	Calculated
<i>NCV_{biomass}</i>	0.0156	Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.0156 TJ/tonne)	Methodology
<i>EF_{projected_fossil_fuel}</i>	64.4	Emission factor for the substitution of non-renewable woody biomass by similar consumers.	Methodology (value for South Asia)

By	17631.54	Quantity of woody biomass that is substituted or displaced in tonnes	Calculated
<i>N_{HH}</i>	5000	Number of households in the project activity, number	PDD
<i>BC_{BL,HH,y}</i>	3.71	Average annual consumption of woody biomass per household before the start of the project activity, tonnes/household/year	Based on survey and third party study
<i>BC_{PJ,HH,y}</i>	0	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	Assumed as zero for ex-ante calculations; For ex-post calculations, will be based on surveys conducted in the project area

PE_y	0	Project Emissions	
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LE_y	849	Leakage as tCO ₂ due to reduction of By by 5%	Calculated as (BE _y -BE _{y,with leakage})
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BE_y	16,968	Baseline emissions during the year y in t CO ₂ e
PE_y	-	Project emissions during the year y in t CO ₂ e
LE_y	849	Emissions due to leakage during the year y in t CO ₂ e
ER_y	16,119	Emission Reduction during the year y in tCO ₂ e for 5,000 households

Other SDGs

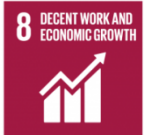
The baseline scenario is the continued use of traditional inefficient cook stoves for cooking and heating water.

The project scenario is the use of biogas from cattle dung to produce biogas which is used for cooking and heating water. This renewable source of energy substitutes fuelwood of the baseline, thus reduction GHG emissions.

Hence the net benefit is due to the implementation of biogas units at the household level by the NGO, CROSS which is absent in the baseline scenario.

SDG	Parameter	Baseline	Project	Net Benefit
 SDG 3: GOOD HEALTH AND WELL-BEING	i. Continued improved indoor air condition and reduced respiratory problems	i. Use of traditional cookstove causing indoor smoke and health hazards.	i. Reduction in indoor air pollution (100% of HHs) ii. Pathogens	i.100% reduction in indoor air pollution.

	especially for women and children. ii. Reduction of pathogens in slurry compared to that of dung	(0% of HHs having clear indoor air) ii. Pathogens in dung	in Biogas Slurry	ii. At least 50% reduction in pathogen load.
 SDG 5: GENDER EQUALITY	i. Reduction in Hours for collection of woody biomass and cooking ii. Women in monitoring of the project activity iii. Income generation activities promoted due to the time saved for women	Women spent time and effort in fetching, processing and storing fuelwood for cooking and cooking on traditional stoves	i. Reduction in Hours for collection of woody biomass and cooking ii. Women in monitoring of the project activity iii. Income generation activities promoted due to the time saved for women	i. 50% reduction in hours for collection of woody biomass and cooking ii. at least 50% of Women in monitoring of the project activity iii. At least 2 type of Income generation activities promoted due to the time saved for women
 SDG 7: AFFORDABLE AND CLEAN ENERGY	i. Construction of biogas units for rural communities. ii. Maintenance of constructed biogas units and elimination of use of firewood.	No Biogas Units	i. Number of biogas units constructed ii. Number of units operational	i. 5000 number of biogas units constructed ii. 100% number of units operational

 SDG 8. Decent work and economic growth	Number of jobs created	No project related jobs created	Project related temporary or permanent jobs created for men and women	At least 10 number of permanent and temporary jobs created due to the project activity
 SDG 13: CLIMATE ACTION	GHGs emissions reduction per year	16,119 tCO ₂ emitted by using traditional cook stoves by 5,000 households	0 tCO ₂ emitted by using biogas	16,119 tCO ₂ /annum
 SDG 17: PARTNERSHIPS FOR THE GOALS	i.Access to domestic or international carbon funding to implement clean technologies	No funding in the baseline scenario	Domestic/international carbon funding to construct and maintain biogas units	Domestic/international carbon funding to construct and maintain biogas units

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

Year	Baseline estimate	Project estimate	Net benefit*
2021 (From 1 st Jan 2021)	16,968	0	16,119
2022	16,968	0	16,119
2023	16,968	0	16,119
2024	16,968	0	16,119
2025	16,968	0	16,119
2026	16,968	0	16,119
2027	16,968	0	16,119
Total	118,776	0	112,833

Total number of crediting years	7		
Annual average over the crediting period	16,968	0	16,119

*This includes an annual leakage of 849 tCO₂ and a total of 5,943 tCO₂ for 7 years, that is deducted to arrive at the net benefit.

Other SDGs

SDG	Parameter	Net Benefit (for the 7 Years Period)
 SDG 3: GOOD HEALTH AND WELL-BEING	i. Continued improved indoor air condition and reduced respiratory problems especially for women and children. ii. Reduction of pathogens in slurry compared to that of dung	i. 100% reduction in indoor air pollution. ii. At least 50% reduction in pathogen loads.
 SDG 5: GENDER EQUALITY	i. Reduction in Hours for collection of woody biomass and cooking ii. Women in monitoring of the project activity iii. Income generation activities promoted due to the time saved for women	i. 50% reduction in hours for collection of woody biomass and cooking ii. at least 50% of Women in monitoring of the project activity iii. At least 2 type of Income generation activities promoted due to the time saved for women
 SDG 7: AFFORDABLE AND CLEAN ENERGY	i. Construction of biogas units for rural communities. ii. Maintenance of constructed biogas units and elimination of use of firewood.	i. 5000 number of biogas units constructed ii. 100% number of units operational

 SDG 8. Decent work and economic growth	Number of jobs created	At least 10 number of permanent and temporary jobs created due to the project activity
 SDG 13: CLIMATE ACTION	GHGs emissions reduction per year	16,119 tCO ₂ /annum
 SDG 17: PARTNERSHI PS FOR THE GOALS	i.Access to domestic or international carbon funding to implement clean technologies	Domestic/international carbon funding to construct and maintain biogas units

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

SDG 13

Data / Parameter	Date of commissioning of biogas units
Unit	Date
Description	Actual date of commissioning of the project device.
Source of data	Monitoring Solution
Value(s) applied	As and when commissioned
Measurement methods and procedures	The construction processes were monitored on a day to day basis and database maintained from its initiation to completion dates for each of the biogas unit. Thus the start date of each of the unit installed recorded on the

	online monitoring solution.
Monitoring frequency	As and when commissioned and fixed and recorded in the monitoring solution
QA/QC procedures	This can be triangulated with the End User Agreement.
Purpose of data	To estimate baseline emissions.
Additional comment	The date of commissioning is reported during verification in the ER calculations sheet.

Data / Parameter	N_{HH}
Unit	Number
Description	Number of households in the project activity in year y
Source of data	Monitored on a daily basis and entered into the monitoring database.
Value(s) applied	5,000
Measurement methods and procedures	The construction processes are monitored on a day to day basis and database maintained from its initiation to completion dates for each of the biogas unit. Thus the start date of each of the unit installed is fixed for each of the unit. In case of replacement of any unit due to demolition will be recorded and the loss days accounted for. This could be for the same user or new users, in which case the baseline is the users were using fuel wood. A new end user agreement will signed with them and recorded.
Monitoring frequency	As and when the unit is commissioned and updated into the monitoring solution
QA/QC procedures	All activity processes, including financial transactions for construction of biogas units, are digitally monitored using the online monitoring solution. This provides verification for the construction of biogas units. All data will be archived and stored throughout the crediting period and an additional 2 years.

Purpose of data	Baseline Emissions
Additional comment	ERs are calculated for only the installed and operational biogas units.

Data / Parameter	Number of biogas plants operating
Unit	Number
Description	Number of plants operating in year
Source of data	Log books maintained and entered in the digitized monitoring database for biogas units operating
Value(s) applied	5,000
Measurement methods and procedures	In every village, the women Volunteer monitors the biogas units that are non-operational. The days other than that non-operational will determine the biogas units which are operational. For the monitoring period, the operational days of installed biogas units will be calculated by subtracting the non-usage days. The emission reduction will be estimated only for operational days.
Monitoring frequency	The data of non-operational units are done on a regular basis as and when a unit is dysfunctional. As and when biogas units are not operational, it is recorded. The remaining days are considered operational.
QA/QC procedures	Log books and digitized database will be checked regularly by project staff and CDM coordinator.
Purpose of data	Baseline Emissions
Additional comment	All data will be archived and stored throughout the crediting period and an additional 2 years. This is to ensure that the units are repaired and provide sustainable thermal energy to the end user.

Data / Parameter	$BC_{PJ,HH,y}$
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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	1. The days not used from the daily monitoring report for each of the unit done at the village level and data maintained on the digitized monitoring database. 2. Surveys for parallel use of traditional stoves.
Value(s) applied	0 for ex-ante calculations
Measurement methods and procedures	1. As and when biogas units are not functional, the beneficiaries report to the village level women volunteer, who in turn reports to the Case Worker of the project for the repair of the unit. A log book is maintained for the reason of non-function and days under repair. The data is entered into the monitoring solution for each of the unit. The appropriate fuelwood use for non-operational days of biogas units will be accounted. 2. For parallel use of pre-project devices, monitoring shall consist of estimation of a representative sample thereof, at least once every two years (biennial). A statistically determined sample size will be sampled to determine the quantity of fuelwood used on pre project devices. A household level questionnaire survey will be conducted.
Monitoring frequency	1. It will be monitored on a day to day basis by the Village level volunteers, which is then entered into the monitoring solution for all the biogas units. 2. At least once every two years (biennial)
QA/QC procedures	The two pronged approach to determine the data/parameter will result in emission reduction calculations that are based on real time data and have less uncertainty.

Purpose of data	Baseline Emissions
Additional comment	The objective to monitor the non-functional days is to ensure prompt operation and maintenance of the units so that the rural communities can continuous use biogas and are rid of drudgery they are facing using traditional biomass cook stove.

Data / Parameter	Confirmation that non-renewable biomass has been substituted
Unit	-
Description	Confirmation that non-renewable biomass has been substituted
Source of data	Sample survey
Value(s) applied	100% of non-renewable biomass is replaced
Measurement methods and procedures	A household level sample survey will be conducted to confirm that non-renewable biomass has been substituted.
Monitoring frequency	At least once every two years (biennial) simple random Sample Survey
QA/QC procedures	This survey will be done for a statistically determined number of households at 95/10 precision confidence level.
Purpose of data	Confirmation of replacement of non-renewable biomass
Additional comment	



SDG 3: GOOD HEALTH AND WELL-BEING

Target 3.9. By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.

Data / Parameter	i. Continued improved indoor air condition and reduced
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	respiratory problems especially for women and children. ii. Reduction of pathogens in slurry compared to that of dung
Unit	i. % of respondents ii. % reduction in bacterial count
Description	i. % of biogas-users responding positively to improved indoor air condition and reduced health problems during sample survey ii. Animal waste carries high level of microorganisms and pathogens, which cause health related problems to human and animals. Anaerobic digestion of such animal waste is considered to be an effective way to destroy pathogens as proved by various studies.
Source of data	i. Based on experience by the communities for reduction in health problems. through sample survey. ii. Laboratory Analysis
Value(s) applied	i. 100% of the surveyed families ii. Percent reduction in bacterial count
Measurement methods and procedures	i. Sample survey and record the experience by the communities for reduction in health problems compared to baselines. ii. Laboratory Analysis of dung and biogas slurry
Monitoring frequency	i. Once in 2 years. ii. Once during the beginning of crediting period
QA/QC procedures	A minimum of 30 households will be sample surveyed.
Purpose of data	To determine the impact of the project to the SDG 3
Additional comment	



SDG 5: GENDER EQUALITY

Target 5.4. Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate

Data / Parameter	Reduction in drudgery of cooking – Save time
Unit	Hrs
Description	i. Reduction in Hours for collection of woody biomass and cooking ii. Women in monitoring of the project activity iii. Income generation activities promoted due to the time saved for women
Source of data	i and iii. Sample survey ii. Data base of CROSS
Value(s) applied	i. Atleast reduction of 50% of time ii. Atleast 50% women involved in the project iii. based on sample survey – direct or indirect benefit
Measurement methods and procedures	i and iii. Sample survey and record the experience of women for reduction in time spent and other activities undertaken compared to baseline. ii. Database of CROSS
Monitoring frequency	Once in 2 years
QA/QC procedures	A minimum of 30 households will be sample surveyed.
Purpose of data	To determine the impact of the project to the SDG 5
Additional comment	

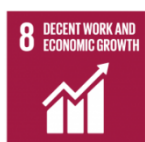


SDG 7: Affordable and Clean Energy

Target 7.2. By 2030, increase substantially the share of renewable energy in the global energy mix

Data / Parameter	i. Construction of biogas units for rural communities. ii. Maintenance of constructed biogas units and elimination of use of firewood.
Unit	i.No. of biogas systems constructed ii. Number of units operational
Description	Number of biogas units constructed for the rural

	communities thereby reducing the use of fuelwood. ii. Number of biogas units repaired and maintained for continuous use of biogas units making them operational
Source of data	Based on data from online monitoring solution
Value(s) applied	No fixed value. Will depend on the number of units repaired
Measurement methods and procedures	The village level volunteers/biogas case workers collect data of the units that are non-operational and needs repairs. This information is entered into the monitoring solution for the project. As and when the units are repaired, it is entered in the monitoring solution. This data provides information of the parameter.
Monitoring frequency	Continuous
QA/QC procedures	Real time data of all the units ensure high reliability and low uncertainty as every unit is monitored
Purpose of data	To assess the contribution to the SDG 7, with regard to affordable, reliable, and sustainable thermal energy to the rural communities
Additional comment	



SDG 8. Decent work and economic growth

Target 8.5. By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value

Data / Parameter	Employment created due to the project activity
Unit	Number
Description	Number of permanent and temporary jobs created due to the project activity
Source of data	Financial transactions
Value(s) applied	Will vary depending on the stage of the project. A minimum total of 7 temporary and permanent jobs
Measurement methods	Based on financial statements of the project

and procedures	
Monitoring frequency	Continuous
QA/QC procedures	Is based on salaries provided as proof
Purpose of data	To assess the contribution to the SDG 8 with regard to jobs created
Additional comment	CDM Staff and Village level volunteers are involved in the monitoring, repair and maintenance of the project



SDG 13: Climate Action

Target: Emission Reduction

Data / Parameter	GHGs emissions reduction per year
Unit	tCO ₂ eq per year
Description	Reduction in GHG emissions due to the project activity that is determined applying the approved UNFCCC methodology I.E.
Source of data	PDD
Value(s) applied	16,119 tCO ₂
Measurement methods and procedures	The measurement methods and procedures are as described in the registered PDD
Monitoring frequency	Annual
QA/QC procedures	Emission Reduction calculations is based on real time monitoring of all the households
Purpose of data	To determine the following SD Indicators that contributes to the SDG: Climate Action i. GHGs emissions reduction per year
Additional comment	



SDG 17: Partnerships for the goals

Target: **17.3.** Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning

Data / Parameter	i. Access to domestic or international carbon funding to implement clean technologies
Unit	Rs.
Description	Domestic/international carbon funding to construct and maintain biogas units
Source of data	Audited statement for the project
Value(s) applied	The value will be assessed as and when carbon finance is generated
Measurement methods and procedures	Carbon fund received for construction, repair and maintenance to the project
Monitoring frequency	Continuous
QA/QC procedures	The carbon revenue will be accessible to the rural women, which can be transparently tracked through bank transfers.
Purpose of data	To assess the contribution to the SDG 17, with regard to strengthening domestic/international support to projects in developing countries
Additional comment	

B.7.2. Sampling plan

>> The parameters that need to be monitored through sample surveys are:

- (i) Confirmation that non-renewable biomass has been substituted
- (ii) Average annual consumption of woody biomass per household in the pre-project devices during the project activity, used in parallel.
- (iii) SDG Parameters other than SDG 13

In consideration of occupancy and demographics of the location there is no difference among the households. The socio-economic and cooking patterns of households are similar. All the households are from rural region of Chittoor District. Simple random

sample will be conducted to determine the parameter of interest. As a biennial inspection is chosen a 95 per cent confidence interval and a 10 per cent margin of error requirement will be achieved for the sampling parameter.

In cases where survey results indicate that 95/10 precision is not achieved, the lower bound of a 95 per cent confidence interval of the parameter value will be chosen as an alternative to repeating the survey efforts to achieve the 95/10 precision.

The sampling plan to monitor the parameters is described here based on "Guidelines for sampling and surveys for CDM project activities and programme of activities, Version 4", which details information relating to: (a) sampling design; (b) data that will be collected; and (c) implementation plan.

(a) Sampling Design

(i) Objectives:

The objective of the sampling effort is to

- (i) Confirmation that non-renewable biomass has been substituted
- (ii) Average annual consumption of woody biomass per household in the pre-project devices during the project activity, used in parallel.
- (iii) SDG Parameters other than SDG 13

The sampling frequency will be once in every two years (biennial).

As a biennial inspection is chosen a 95 per cent confidence interval and a 10 per cent margin of error requirement will be achieved for the sampling parameter.

The population is homogeneous in terms of cooking patterns and socio-economic strata. The biogas units implemented in the region is also of single type – 2 cum deenabhandu model. Hence simple random sample will be conducted for the project activity.

(ii) Target Population: The target population is the rural households for which biogas was constructed and operational in the Mandals of Chittoor District, Andhra Pradesh, India.

(iii) Sampling Method: The sampling method chosen for the project area will be simple random sampling. Households with operational units will be the population from which the sampling will be randomly selected.

(iv) Sample Size:

The sample will be drawn at random from the sampling frame. This will be done using random number tables or using the random number generator of appropriate software. A pilot study will be conducted based on which, the sample size will be assessed. Subsequently, the value of the previous survey will be considered.

The largest of sample size for the 2 parameters of interest will be considered to gather information.

i) The sample size will be determined for "Confirmation that non-renewable biomass has been substituted" as follows:

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

Where

n = sample size

N = Total number of households

p = expected proportions

1.96 = Represents the 90% confidence required

0.1 = Represents the 10% relative precision

Checking Reliability

The reliability will be estimated as

The standard error of proportion is calculated as

$$\sqrt{(1-f)\frac{pq}{n}},$$

Where p is the sample proportion and q = (1-p)

Precision associated with proportion is z-value x standard error of the proportion.

z-value is 1.96

The ratio of precision to the proportion gives the relative precision, which needs to be within 10%

ii) For the parameter Average annual consumption of woody biomass per household in the pre-project devices during the project activity, used in parallel, the sample size will be determined as follows:

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

Where:

$$V = \left(\frac{SD}{mean} \right)^2$$

n Sample size

N Total number of households

Mean Expected mean

SD Expected standard deviation

1.96 Represents the 95% confidence required

0.1 Represents the 10% relative precision

Checking Reliability

The standard error of mean is calculated as

$$\sqrt{(1-f)\frac{s^2}{n}},$$

where

f is the sampling fraction – the proportion of the population that is sampled,
 s^2 is the sample variance (s is the sample standard deviation).

Precision associated with mean is t -value $\times$ standard error of the mean.

t value will be derived in Microsoft Excel using the TINV function. =TINV(0.10,
 (sample minus 1))

The ratio of precision to the mean gives the relative precision, which needs to be within 10%.

A minimum of 30 household will be sampled, if a value of less than 30 is returned.

(v) Sampling Frame: The sampling frame to be used is the complete listing of all the rural households for which biogas has been built and operational under the project activity in the Mandals of Chittoor District, Andhra Pradesh State. Each of the household will have a unique identify number with all the required details of the family.

(b) Data:

(i) Field Measurements: The variable to be recorded/measured on field is Confirmation that non-renewable biomass has been substituted and the average annual consumption of woody biomass per household in the pre-project devices during the project activity, used in parallel.

A household level questionnaire will be designed to collect information for the parameter of interest. The questionnaire that is administered is given in Appendix 5. It will be field tested when administered for the first time and modified accordingly based on its ease of getting information on the field and its analysis. The frequency of measurement will be once two years. The parameter of interest is not subject to seasonal fluctuations. Hence it will be conducted at 2 years interval.

(ii) Quality Assurance/Quality Control: The QA/QC procedure will be to achieve good quality data through field measurements. The household level questionnaire will be designed and field tested before administering the actual questionnaire survey. Oversampling will be done to replace non-respondents, if any. The data collected will be entered, checked and verified further for any typographic mistakes.

(iii) Analysis: The data entry will be done in Microsoft excel sheet. The data will be cross checked with the filled in questionnaire as QA/QC procedure. The data will be analyzed for the parameter.

(c) Implementation:

(i) Implementation Plan: The implementation of sampling effort will be done by the NGO in consultation with CDM Team of Fair Climate Network (FCN). The FCN has the skill and resources to implement the sampling procedure. The team is experienced with rural energy CDM projects implemented for the rural poor for more than 15 years. The collected data will be analysed by the FCN for inclusion in the monitoring report.

B.7.3. Other elements of monitoring plan

>>1. Implementation Plan

The project activity was implemented only after registration as a GS CDM project activity and upfront carbon money was available for implementation of the project under an ERPA drawn up for the purpose. Revenues are in a completely open and transparent manner to construct the 5,000 biogas units. Orders to various local entrepreneurs for construction of biogas units i.e. bricks, cement, sand, stoves, pipes, nozzle was placed after procuring the advance CER revenues as the project was funded only from CER revenues.

A CDM Team was appointed to facilitate construction and maintenance of the biogas units as described below.

2. Project Management and Monitoring

This Biogas CDM project is implemented and monitored by CROSS. CROSS facilitates the End User families to set up village level institutions to take care of minor repair, maintenance and the social controls/peer support needed to cope with various exigencies that will crop up. These will be participatory mutual support systems in each and every village. The sudden loss of animals, destruction of fodder, family illness and other exigencies that lead to a non-functioning of biogas units will be considerably reduced due to the operation of these grassroots structures and systems.

2.1. Biogas Project Management Unit within CROSS

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

- **One Biogas CDM Project Manager:** A biogas CDM project manager is in overall in-charge of the project activity. The CDM project manager is responsible for overall project implementation in the first 4 years and meeting the requirements of monitoring protocol thereafter. He is directly appointed by CROSS Board of Trustees and reports to the Director, CROSS. The main function are as follows:
 - To deal with CDM issues (DOE, DNA, CDM Consultants),
 - Coordinate Biogas CDM Staff and village functionaries,
 - Ensure quality from material supply, through construction, to commissioning of units
 - Set up a repair and maintenance system to attend to issues that cannot be locally addressed through the Village level systems
- **IT Professional:** An IT professional appointed directly reports to the Director, CROSS. He is responsible for the following:
 - Maintain the digitized monitoring solution and monitoring sheets for CDM Verification
 - Ensure that authentic data is entered into the solution and make spot checks to verify

- Deal with the IT Company, TRISTLE that prepared the solution.
- Peruse the analytical reports in the digitized monitoring solution and recognise patterns to predict problem areas and under-performance
- **Accountant:** An accountant for the project activity is responsible for ensuring a strict and diligent spending of CER Revenues and the recording thereof in a computerised accounting package. He reports to the Director, CROSS and administers the following tasks:
 - Arrange for the bulk purchase of cement and hardware and transfer them to the Mandal storehouses
 - Arrange timely payments for material suppliers and masons
 - Inspect quality of material (bricks and sand) before making payments
 - Negotiate for the timely supply of high quality cement and hardware
 - Prepare statutory reports for end of year audit
- **Biogas Field Workers:** Biogas field workers oversee the construction of biogas units. Each field worker is in-charge of construction of approximately 250 units during the construction phase. They report to the Project Manager and their tasks are to:
 - Inspect the number of cattle, distance from kitchen in each household, mark and arrange for excavation of pits
 - Identify local suppliers of material (bricks and sand) for each village, get the price and quality approved by the Project Manager, and arrange for transportation to the villages
 - Transport cement and hardware from the Mandal storehouses
 - Assign Masons to particular villages and oversee the quality of their work and ensure that End User family labour is actively used
 - Record the progress of processes in specially designed formats and enter the data into the digitized monitoring solution on a fixed day every week
- **Local Masons:** They were trained at ongoing Biogas CDM Projects. They were assigned to each Biogas Field Worker. They were paid a piece rate for each unit they built and their personal and contact details are stored in the digitized monitoring solution to fix responsibility.

Similarly, the personal and contact details of each Material Supplier is recorded, along with their bank account numbers. Payments are made only by crossed cheque.

Post construction of the biogas units for the initial four years, the biogas field workers will continue to be responsible to:

- Form and support village level institutions; assist in selection of Volunteers, train and support them
- Record the monthly totals from the Daily Monitoring Books maintained by Volunteers and, once a month, enter the data into the digitized monitoring solution
- Contract Masons and attend to major repairs that cannot be handled by the village level institution.

2.2. Management system at village level:

Volunteers: Every participating village has a Volunteer, preferably women staff with either minimum SSLC or PUC qualification, to monitor usage of about 20 - 25 biogas units. She is a young woman, selected by the End User Group of her Village.

She is responsible for post construction monitoring of usage and identifies dysfunctional units. The Volunteer will either prompt the End User Group to set right a problem or bring it to the notice of the Biogas Field Worker.

Volunteers are paid by their respective End User Groups from the maintenance fund given to them.

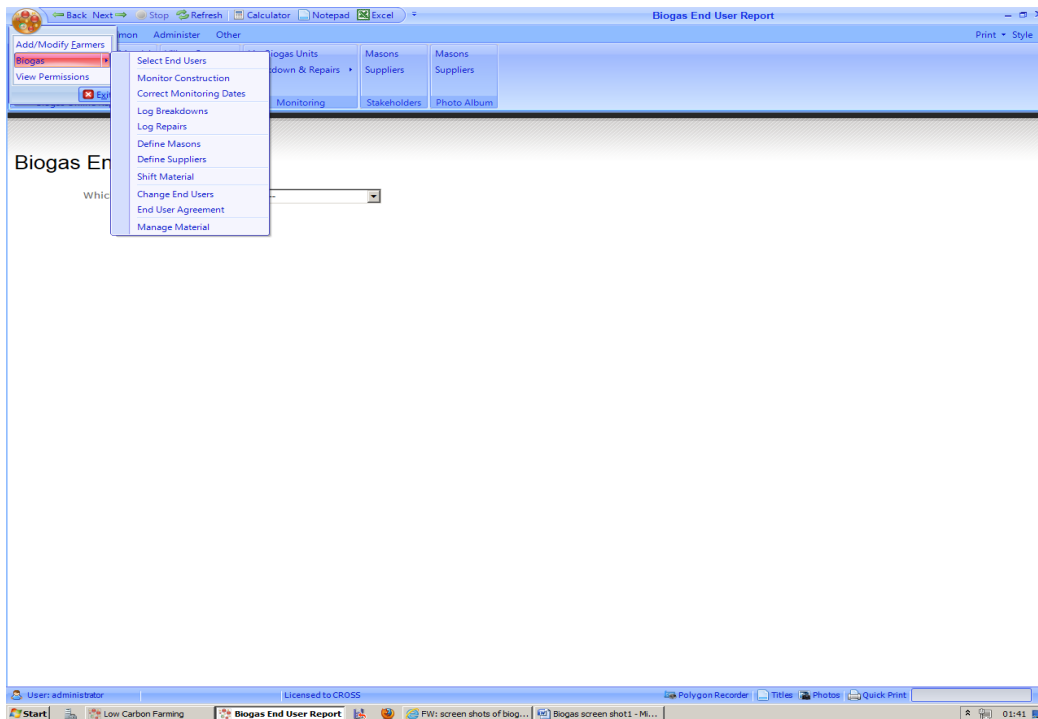
2.3 Digitized Monitoring system

A customised Biogas CDM Monitoring database Solution developed and tested by Tristle Technologies Pvt. Ltd. for CROSS, is used to maintain demographic data, construction processes, and the regular monitoring of the project activity. Tristle Technologies Pvt. Ltd. has developed a database which is permission driven, intuitive and easy to use by Project Staff and Volunteers. All activity processes, including financial transactions, are digitally entered and monitored at the CROSS head office. Open and transparent online reports are used by all the Project Staff and secondary

stakeholders to know the Progress and Results. Reports are generated at all levels – Project, Mandal, Gram Panchayat, Village and Participating Family. The database will be updated on an everyday basis, as and when Project Staff return from their respective villages.

Progress Reports: Real-time Progress Reports are available to everyone in an open and transparent manner for the following:

- Implementation Progress (overall project to village reports) on
 - Construction progress, time line & efficiency
 - Gender disaggregated analysis & dwelling details of participating families
 - Daily usage resume, Audit & Maintenance & CER generation to date
 - Total expenditure & average cost per unit
- Participating Families
 - Demographic details
 - Mason, Commissioned Date & Usage Days
 - Construction Details with Date, Process, & Who Monitored
- Construction Overview
 - Village-wise Progress
 - Output, Outcome & Results
- Monitoring of operating units
- Masons & Suppliers
 - Masons
 - Suppliers
 - Photo Albums of Masons and Suppliers
- Reports that meet CER Verification requirements
 - Monitoring operating units
 - Full List of all the Commissioned Units
 - Non-usage days



Snapshot of the TRISTLE Monitoring Database Solution

Processes: The solution is used to:

- Record the Mandals, Gram Panchayats and Villages where the CDM project is implemented
- Enter demographic details on participating Families
- Select Villages & Families
- Assign Staff and Volunteer responsibilities during the actual construction and monitoring phases, respectively

Monitoring during Construction Phase

The various processes involved in the implementation of the technology are as follows:

- Selection of Participating Families
- Defining Masons & Material Suppliers
- Monitoring Construction Progress
 - Marking
 - Excavation
 - Supplying crushed Stone Jelly, Sand, Bricks and Cement
 - Supplying Hardware

- Concreting, Brick Work & Plastering
- Filling dung
- Supplying & Fixing Pipes and Stove
- Fixing the Safety Grill
- Commissioning the Biogas Units
- Generating End User Agreements
- Monitoring operating units
- Logging Breakdowns & Repairs – Non usage days

Project Staff ensure quality of installed Biogas Units. They check the quality and ensure that the required quantities of material are used during construction. All payments are made by cheque and Suppliers irrefutably identified with personal data and digital photographs fed into the computerized databank.

Each Biogas Unit is marked with a unique Identification Number. Along with the Village Code and Family Code, these irrefutably identify each of the 5,000 Biogas Units on the digitized monitoring database.

After commissioning and satisfactory functioning of the Biogas Unit for a minimum of 2 weeks, an End User Agreement is signed with the Participating Family. Full account of emission reduction is considered from Day 1 of commissioning.

Monitoring after Commissioning of biogas units

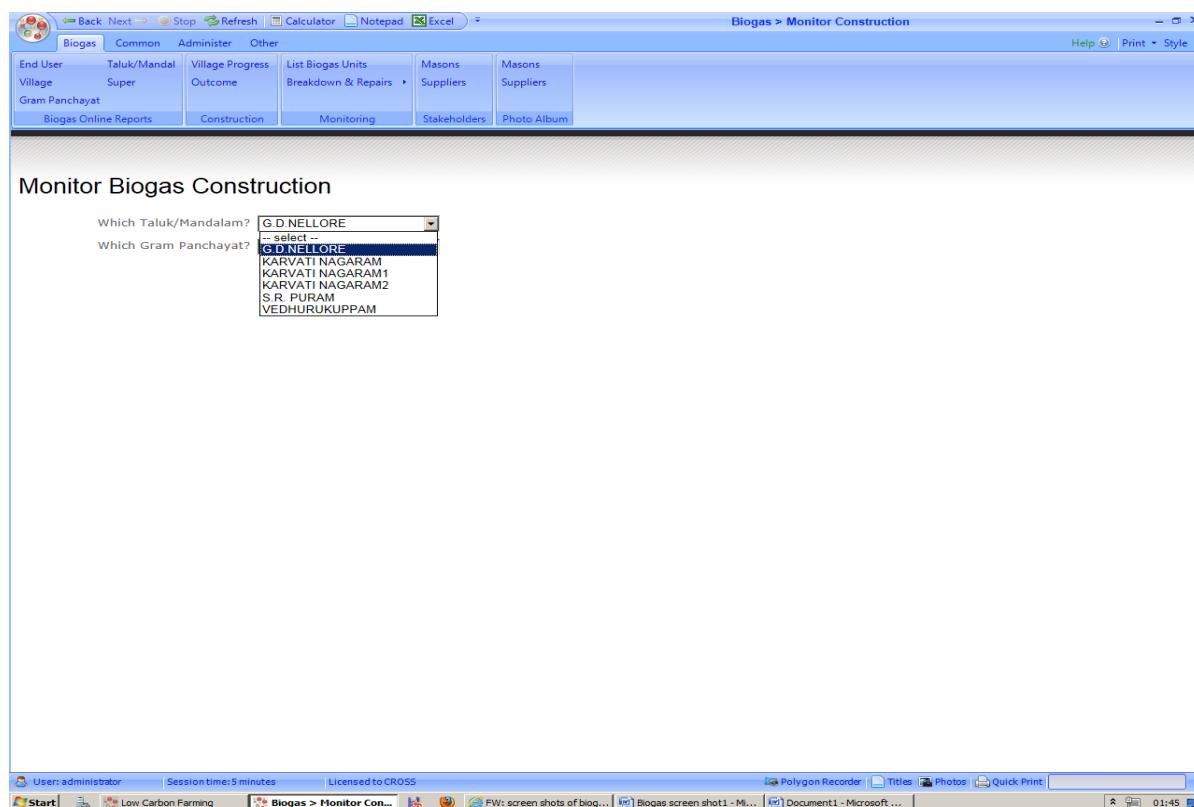
A Daily monitoring book is maintained in each of the villages where the volunteers record number of non usage days. This data is fed into the individual Biogas User's monitoring database solution, once a month, for days not used and reasons.

If any Biogas Unit is faulty or not functional, the problem report is automatically passed on to the Area Team for action. There is a continuous database maintained of all the Biogas Units not operational on a day-to-day basis. The computerized solution provides all the details at the Participating Family level for the number of non-operational days, and the reasons of non-operation. This monitoring gives the operational Biogas Units and serve to triangulate the data.

This monitoring solution positively impacts Staff and Volunteers to enhance Performance and produce good Results.

- The features, organisation and ordering accurately mirror the implementation plan and serve as unambiguous job descriptions for secondary stakeholders. Project processes are sequentially ordered into jobs and tasks. Project staff know exactly where they stand in terms of progress and results. They will be comfortable in the knowledge that objective standards like number of commissioned Units, recording of breakdowns, conducting timely repairs, etc. are used to measure their performance.
- The totally open and transparent reports track progress from marking to commissioning. These, along with budget realisations, keep a wider audience constantly informed on progress and financial health. They also give up-to-date information on the volume of CERs generated and thereby serve as an indicator on financial viability and feasibility.
- Verification data needed by the DoE is generated as Excel files from the monitoring solution.

All data will be archived and stored throughout the crediting period and an additional 2 years.



Snapshot of the TRISTLE Monitoring Database Solution

3. Participation Agreements

Farmer families have been educated on project dynamics, CDM mechanism and the carbon market. This has ensured an informed participation right from the planning state of the CDM Project.

4. End User Agreements

About 15 days after commissioning each Biogas Unit (i.e. after the satisfactory functioning of the unit), a legally binding End User Agreement is signed between the Project Proponent (CROSS) and every single End User. These will formally spell out the roles, entitlements and responsibilities of both parties.

Once the farmers are ready for participating in the project, an End User Agreement on stamp paper was signed by each participating farmer with CROSS.

5. Maintenance, Servicing & dealing with Emergencies

From the forward sale of CERs mentioned earlier, money is kept aside for maintenance and servicing.

Volunteers will have about 25-30 units and record Daily Monitoring data. They are therefore be the point persons who immediately identify problems. Minor repairs will be done either by the End User family or the Volunteer herself, since she is trained and given a kit with tools and spare parts.

If the repair involves the expenditure of monies for the purchase of material, it is discussed in the End User Group and resources obtained. If the problem is beyond their scope, the Biogas Field Worker is informed and the problem attended to at the earliest.

Other emergencies like the sudden loss of cattle and fodder, etc. is dealt with by the End User Groups as described earlier.

A serious and well thought bottom-up plan is chalked out to ensure maximum functionality of the 5,000 biogas units that is built under this CDM Project.

Trainings were conducted before project implementation at various stages. The types of trainings imparted were:

- Orientation to end users on the effects of climate change, CDM processes and biogas.
- Training beneficiary farmers on quality aspects to be ensured while constructing the units.
- Training beneficiary farmers, particularly women on use and maintenance of bio-gas units.
- Training the masons on construction parameters and quality of construction, including assessment of the quality of materials like bricks, cement etc.
- Training the Volunteers and End User Groups (EUGs) on maintaining Monitoring Records of usage of bio-gas stoves by the families.
- Training the beneficiary families and Volunteers on the "Repair and Maintenance" of Bio-gas units.
- Any other training as need arises.

Frequency of Monitoring

- 100% of plants will be monitored for non-usage of biogas units on daily basis and accordingly calculate emission reduction in the monitoring report for only usage days for verification.

All monitored data required for verification and issuance will be kept for two years after the end of the crediting period or the last issuance of CERs for the project activity, whichever occur later both on paper and electronically.

SECTION C. DURATION AND CREDITING PERIOD

C.1. Duration of project

C.1.1. Start date of project

>> 01/04/2013 (date of construction)

C.1.2. Expected operational lifetime of project

>> 25y-0m²⁵

C.2. Crediting period of project

C.2.1. Start date of crediting period

>> First Crediting Period: 01/01/2014

Second Crediting Period: 01/01/2021

C.2.2. Total length of crediting period

>> 7y-0m

First Crediting Period: 7 years, 0 months – 01/01/2014 to 31/12/2020

Second Crediting Period: 7 years, 0 months – 01/01/2021 to 31/12/2027

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.

There are no mitigation measures added to the monitoring plan as the project does not cause any harm to any of the safeguarding principles.

Principles	Mitigation Measures added to the Monitoring Plan
N/A	N/A

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

²⁵ Dheenabandhu Model 2000 Biogas Units, developed by AFPRO, Action For Food Production, New Delhi.

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 addresses the key issues and requirements of Gender Sensitive design and implementation to address the hardships of women. CROSS is a grassroots level NGO working in the field of rural development of which one of the major activity is gender justice with dedicated women's programmes. CROSS has formed women Self Help Groups (SHGs) and have empowered them at the village level economically and socially. These women SHGs undertake several activities empowering them socially and economically. Village level volunteers to monitor biogas units are also from these SHGs. The foundational gender-sensitive standards were addressed as follows: - The gender equality safeguards and principles is described in the relevant section of this document. - The gender inequalities and gender-related risks have been addressed by making the women as beneficiaries of biogas. The end user agreement is invariably with the women of the family and is also the beneficiary of any products of the project activity. - Women and men participated equitably and meaningfully in the project design and implementation. During construction, man of the house assisted the masons in construction. Women provided food during the construction. The project benefits are experienced by men and women. - The project is constantly monitored by women and also share the status of the unit to CROSS staff periodically for repair and maintenance. - The only criteria followed to implement the project was family having cattle and space to build biogas units. The project was implemented for the marginalized and landless families with whom CROSS works and there is no discrimination of caste, creed or religion for selection of families.
Question 2 - Explain how the project aligns with existing country policies, strategies and best practices	With regard to alignment with existing country policies, strategies and best practices, as gender policy is institutionalized by the NGO, it addresses all the gender policies as set forth in the GS4GG and India National policy (National Policy for the Empowerment of Women (2001)²⁶, which are as follows. - The project provides positive economic and social incentives for full development of women

²⁶ <https://wcd.nic.in/womendevlopment/national-policy-women-empowerment>

	- There is not hindrance to human rights and fundamental freedom by women on equal basis with men - There is equal access to participation and decision making of women in the project - Though not directly associated with the project, the NGO provides equal access to women to health care, quality education at all levels, vocational guidance, employment and equal remuneration, etc. - The NGO is also involved in changing societal attitudes and community practices by active participation and involvement of both men and women. - Mainstreaming a gender perspective in the development process and elimination of discrimination and all forms of violence against women and the girl child; and building and strengthening partnerships with civil society, particularly women's organizations through SHGs are done.
Question 3 - Is an Expert required for the Gender Safeguarding Principles & Requirements?	No, an expert for Gender Safeguarding principles and Requirements are not required. The project does no harm to women, men or children. In fact, the project addresses many of the hardships that were faced in the baseline by them. The safeguarding principles and requirement document is included in the relevant section of the document.
Question 4 - Is an Expert required to assist with Gender issues at the Stakeholder Consultation?	This is the first renewal of crediting period. The project was initiated after stakeholders meeting was conducted during the beginning the project. Stakeholders are involved not just at the beginning of the project, but is a continuous process as the staff of CROSS and the village level volunteers constantly visit the villages and interact with the biogas beneficiaries to address all issues of the communities including the biogas project. No, Expert to assist with gender issues is not required as it is integrated in the objectives of the NGO to empower women and address their issues.

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

>> This is the second crediting period. There are no mitigation measures required for the project activity. As continuous feedback is taken from the end user households through monthly visits to villages by village level volunteers and biogas case workers, it is a continuous process and internalized with the project activity to conduct a separate meeting for the renewal of crediting period.

E.2. Final continuous input / grievance mechanism

Method	Include all details of Chosen Method (s) so that they may be understood and, where relevant, used by readers.
Continuous Input / Grievance Expression Process Book (mandatory)	The village level volunteers at the village level maintain a log book, wherein the details of issues with biogas are recorded. This is also recorded in the online monitoring solution.
GS Contact (mandatory)	help@goldstandard.org
Other	The village level volunteers and biogas case workers visit the biogas users periodically to follow up any grievances and inputs to the project activity. Each of the end users have the phone numbers of their respective village level volunteers and case workers to contact them.

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 below.

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	1. No 2. No	a. The project doesn't involve any activity that affects human right but promotes the human rights to have access to clean energy and environment. Conclusion: The parameter will not be monitored. b. The project shall not discriminate any people to have biogas units . Rather it enhances the participation and inclusion as the NGO CROSS works with marginalized families. Conclusion: The parameter will not be monitored.	N/A
Principle 2. Gender Equality			
1. The Project shall not	1. No	1. The project enhances the	N/A

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 non-discrimination, equal treatment, and equal pay for equal work 3. The Project shall refer to the country's national gender strategy or equivalent national commitment to aid in assessing gender risks 4. (where required) Summary of opinions and recommendations of an Expert Stakeholder(s)	2. No 3. No 4. Yes	women's access and entitlement of benefits. Since the women will be direct user of the technologies, it will benefit women by reducing their exposure to the indoor air pollution thereby improving their health. In addition, the replacement of firewood with biogas will reduce workload of women for the collection of firewood. Reduced workload for firewood collection results in time saving that the women can use for other productive activities. The project will not adversely affect men and women in marginalized or vulnerable communities. Implementation of the project will contribute towards preservation of common resources in form of "firewood". Household duties related to firewood collection, cooking and cleaning utensils remain with women. The project therefore tends to decrease burden on women and	
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		won't result in social isolation of men. The project duly accounts the gender roles. Time saving is one of the key benefits from the project which the beneficiary can utilize to fulfil their gender roles. With the saved time, one can perform the respective gender role more effectively. Conclusion: the parameter will not be monitored 2. The project makes every effort to include the marginalised people in its design. Benefits from the project are expected to culminate in form of creation of entrepreneurial opportunities. While the focus is on capacitating women to take advantage of the entrepreneurial opportunity, the project shall not deprive men from the families of minority groups or the landless people to take advantage of the capacity building activities.	
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		Conclusion: the parameter will not be monitored 3. The project is in line with the gender policy of India²⁷. The project enhances social participation and decision making role of women. Moreover, the women are expected to develop entrepreneurial skills which will enable them economically to deal with the household problems. The potential of the project to enable women economically will help reduce discrimination against women rather than deepening it. The project will not limit women's ability to use, develop and protect natural resources as project is related to only replacement of fuelwood	
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²⁷ <https://wcd.nic.in/womendevlopment/national-policy-women-empowerment#:~:text=The%20principle%20of%20gender%20equality,discrimination%20in%20favour%20of%20women.>

		with renewable source for cooking. The project does the opposite and protects women and girls from risks and hazards of going to the forests and collect fuelwood. Based on the above mentioned project benefits, the project complies with the national gender policy. 4. The project does not have any negative impacts on gender roles and hence an expert opinion is not anticipated for the project. Conclusion: The parameter will not be monitored	
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 does not pose any risks to the workers or the community. Emission reduction and reduction on indoor air pollution is one of the key benefits of the project for community that will improve the health of those communities. Conclusion: health risk of the worker will not be monitored but the	N/A

		emission reduction and improve in health condition will be monitored.	
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 biogas units are built near the house of the end user and the stoves are placed in the kitchen. The project is not involved in regions with historical, cultural, artistic, traditional or religious value or intangible forms of culture.	N/A
>>		Conclusion: The parameter will not be monitored	
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 biogas units are built on space of the end user and the stoves are placed in the kitchen of the household. Hence the project does not cause the physical or economic relocation of people in any way.	
>>			
>>		Conclusion: The parameter will not be monitored	
Principle 4.3 Land Tenure and Other Rights			
Does the Project require any change, or have any	No	The project units are simple and small in dimension. This	N/A

uncertainties related to land tenure arrangements and/or access rights, usage rights or land ownership?		did not involve anything related to removal of sites, objects or structures of cultural significance. Neither does it involve disturbing customary or cultural, ecological, economic or spiritual significance of people. There are no changes in legal arrangements of sites. The biogas units are constructed in the land owned by the end user. The project does not involve land and hence is not of relevance. Therefore the safeguarding principle under discussion is not triggered by the project. Conclusion: The parameter will not be monitored	
>>			
Principle 5. Corruption			
1. The Project shall not involve, be complicit in or inadvertently contribute to or reinforce corruption or corrupt Projects	No	Willing households are part of the project activity. Financial audit ensures that the revenue is contributing to implementation/maintenance of the project. Conclusion: The parameter will not be monitored.	N/A
Principle 6.1 Labour Rights			
1. The Project Developer	No	The project is implemented by	N/A

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 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 resignation by		a NGO. The construction phase is over and there are no labourers involved. The CDM staff only monitors, repair and maintain the biogas units. As it is an NGO, there is no labour organizations and working agreements of labourers involved. The NGO employment is locally and culturally appropriate. Children are not employed in the NGO. The work only involves working on developmental issues of rural communities and does not encompass working with equipments. Conclusion: The parameter will not be monitored.	
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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 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 units are simple and have less moving parts. So, it requires less repair and maintenance. Hence the operational cost is less in comparison to the energy access and the additional benefits that it offers. So, the project implemented is sustainable financially and has	N/A
>>			

		positive economic impacts. Also, the repair and maintenance of biogas units are done by the NGO with upfront carbon money. Conclusion: the parameter will not be monitored	
Principle 7.1 Emissions			
Will the Project increase greenhouse gas emissions over the Baseline Scenario?	No	The project will replace the use of non-renewable biomass. The baseline of the project is the use of firewood for cooking. So, this project will reduce the GHG over the baseline scenario. The project will not increase GHG emissions over the baseline. Any emissions due to the project activity is accounted as project emissions and leakage. These are not above the baseline scenario as shown in the sections above. Conclusion: The parameters will be monitored and calculated based on the operational status of the project units and accounted as mentioned in the above sections.	N/A
>>			

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 fuel resource (such as wood, biomass) that provides for other local users?	No	The project will not use any fuel resources that provides for other local users. Therefore the safeguarding principle under discussion will not be triggered by the project. Conclusion: the parameter will not be monitored	N/A
>>			
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 does not affect the natural or pre-existing water courses. Therefore the safeguarding principle under discussion will not be triggered by the project. Conclusion: the parameter will not be monitored	N/A
>>			
Principle 8.2 Erosion and/or Water Body Instability			
Could the Project directly or indirectly cause additional erosion and/or water body instability or disrupt the natural pattern of erosion?	No	The project units are installed at household level which will not directly or indirectly cause additional erosion or disrupt the water body. Therefore the safeguarding principle under discussion will not be triggered by the project. Conclusion: the parameter will not be monitored	N/A
>>			

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 doesn't involve use of land and soil for production or crops or other products. Therefore the safeguarding principle under consideration will not be triggered by the project. Conclusion: the parameter will not be monitored.	N/A
>>			
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	The project units are household based units and are less susceptible to the natural disasters. Therefore the safeguarding principle under consideration will not be triggered by the project. Conclusion: the parameter will not be monitored.	N/A
>>			
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 that include GMOs in their processes and production)?	No	The project doesn't involve any activity related to GMOs. Therefore the safeguarding principle under consideration will not be triggered by the project. Conclusion: the parameter will not be monitored.	N/A

>>			
Principle 9.4 Release of pollutants			
Could the Project potentially result in the release of pollutants to the environment?	No	The project does not involve release of pollutants to the environment. In fact it reduces indoor air pollution. Therefore the safeguarding principle under consideration will not be triggered by the project. Conclusion: the parameter will not be monitored.	N/A
>>			
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 unit does not require or releases any hazardous and non-hazardous chemicals. Therefore the safeguarding principle under consideration will not be triggered by the project. Conclusion: the parameter will not be monitored.	N/A
>>			
Principle 9.6 Pesticides & Fertilisers			
Will the Project involve the application of pesticides and/or fertilisers?	Yes	The project does not involve the application of pesticides and fertilizers. Conclusion: the parameter will be monitored through the perception survey with the users.	N/A
>>			
Principle 9.7 Harvesting of Forests			

Will the Project involve the harvesting of forests?	No	The project doesn't involve any activity that requires harvesting of forest products. Therefore the safeguarding principle under consideration will not be triggered by the project. Conclusion: the parameter will not be monitored.	N/A
>>			
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?	Yes	The project does not modify the quantity or nutritional quality of food. Conclusion: the parameter will not be monitored.	N/A
>>			
Principle 9.9 Animal husbandry			
Will the Project involve animal husbandry?	No	The project doesn't involve any activity that requires animal husbandry. Conclusion: the parameter will not be monitored.	N/A
>>			
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	The project does not physically affect or alter largely intact or High Conservation Value ecosystems as the project is in Conclusion: the parameter will not be monitored.	N/A

>>			
Principle 9.11 Endangered Species			
Are there any endangered species identified as potentially being present within the Project boundary (including those that may route through the area)? AND/OR Does the Project potentially impact other areas where endangered species may be present through transboundary affects?	No	There are no endangered species that are being disturbed due to the project activity. Conclusion: the parameter will not be monitored.	N/A
>>			

APPENDIX 2- CONTACT INFORMATION OF PROJECT PARTICIPANTS

Organization name	Community Reconstruction of Social Service - CROSS
Registration number with relevant authority	
Street/P.O. Box	Velkur Village & Post,
Building	Gangadhara Nellore Mandal,
City	Chittoor,
State/Region	Andhra Pradesh,
Postcode	517 125
Country	INDIA
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APPENDIX 3- LUF ADDITIONAL INFORMATION

This Appendix is not applicable to the project activity.

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 Annex A of [Principles and Requirements](#) for more information on procedures governing Design Changes

N/A.

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