



**Monitoring report form**  
**(Version 05.1)**

*Complete this form in accordance with the Attachment "Instructions for filling out the monitoring report form" at the end of this form.*

**MONITORING REPORT**

<b>Title of the project activity</b>	Micro Scale Biogas CDM Project of CROSS	
<b>UNFCCC reference number of the project activity</b>	UNFCCC Reference Number: 8784	
<b>Version number of the monitoring report</b>	01	
<b>Completion date of the monitoring report</b>	31/05/2017	
<b>Monitoring period number and duration of this monitoring period</b>	Monitoring Period Number: 1 Duration of this monitoring Period: (first and last days included (01/01/2014 - 31/03/2017))	
<b>Project participant(s)</b>	M/s Community Reconstruction of Social Service (CROSS)	
<b>Host Party</b>	India	
<b>Sectoral scope(s)</b>	1. Sectoral Scope 1; TYPE I - RENEWABLE ENERGY PROJECTS	
<b>Selected methodology(ies)</b>	AMS I.E. Switch from Non-Renewable Biomass for Thermal Applications by the User, Version 04, EB 60.	
<b>Selected standardized baseline(s)</b>	N/A	
<b>Estimated amount of GHG emission reductions or net GHG removals by sinks for this monitoring period in the registered PDD</b>	11,275 tCO <sub>2</sub>	
<b>Total amount of GHG emission reductions or net GHG removals by sinks achieved in this monitoring period</b>	GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012	GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards
	0 tCO <sub>2</sub>	11,275 tCO <sub>2</sub>

## SECTION A. Description of project activity

### A.1. Purpose and general description of project activity

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#### a) Purpose of the project activity and the measures taken for GHG emission reductions or net anthropogenic GHG removals by sinks

The purpose of the project activity is to set up 5,000 biogas plants (digesters) of 2m<sup>3</sup> 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 contributes strongly to sustainable development of the rural households involved in the project. Chittoor is a biomass deficit region 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 pressure. 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 yield. The project activity will attenuate the rural thermal energy needs used for cooking and water heating.

#### a) Brief description of the installed technology and equipment

Each household has installed a 2 m<sup>3</sup> biogas plant and feed animal dung into the anaerobic digester. The biogas plant is a small thermal appliance that utilises animal dung and converts it into energy by means of a digester in which the dung substrate undergoes acidification and methanation. An individual biogas plant consist of a mixing chamber where waste water, cow dung and leachate from organic waste are mixed, an inlet pipe to feed dung substrate into the digester, the main biogas digester where methane formation / recovery takes place, a slurry outlet pipe, an outlet chamber, and a slurry platform.

Users prepare batches of dung substrate in the mixing tank, before allowing the final mixture to flow into the digester. By utilizing dung substrate in an anaerobic digestion and combustion system, biogas is made available. The biogas is piped to a two-ring gas stove supplied as part of the project activity. Biogas is combusted and used for cooking and water heating. 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 slurry. The chosen technology is the Deenabandhu biogas model which is well-known, tried and tested in India.

#### b) Relevant dates for the project activity (e.g. construction, commissioning, continued operation periods, etc.)

Date of Registration: 18 Dec 12 (Date of registration action 01 Mar 13)

Start Date of Crediting Period: 1st January 2014

First Unit Commissioned: 22-03-2013

Total Biogas Units Constructed during the monitoring period: 1863

This is the first monitoring report for the first crediting period for the period 1<sup>st</sup> January 2014 to 31<sup>st</sup> March 2017. As on 31<sup>st</sup> March 2017, 1863 biogas units have been commissioned (see *CER Calculations Sheet*). The status of the project as on 31<sup>st</sup> March 2017 is as follows:

Mandal	Number of Villages	Units Commissioned
G.D.Nellore	66	614
Karvetinagaram	24	242
Nagalapuram	10	125
Nagari	9	82
Narayanavanam	8	49

Nindra	5	29
Pichatur	8	96
Puttur	4	68
Ramachandrapuram	5	24
S.R.Puram	24	284
Vadamalapeta	3	10
Vedurukuppam	28	240
<b>Grand Total</b>	<b>194</b>	<b>1863</b>

The year-wise details of the units commissioned are as follows:

<b>Mandal</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>Total</b>
G.D.Nellore	31	157	329	73	24	614
Karvetinagaram	30	61	136	11	4	242
Nagalapuram				118	7	125
Nagari				38	44	82
Narayanavanam				29	20	49
Nindra				27	2	29
Pichatur				96		96
Puttur				62	6	68
Ramachandrapuram				22	2	24
S.R.Puram	1	48	141	59	35	284
Vadamalapeta				6	4	10
Vedurukuppam		29	171	40		240
<b>Total</b>	<b>62</b>	<b>295</b>	<b>777</b>	<b>581</b>	<b>148</b>	<b>1863</b>

Alongside construction of the biogas units, repair and maintenance of constructed units were done during this monitoring period. Of the constructed units, 99.5% units are operational. The remaining 0.5% units become non-operational at various times of the monitoring period.

The operational domestic biogas units are in continuous operation after installation, with minor and major repairs as and when are reported by the end-user. The dates of installation for each of the unit is recorded and included in the excel ER calculations sheet. In between, due to repair and maintenance, some of the biogas units were not in operation. The days not operational is recorded for each of the unit and further repaired to make it functional. This information is included in the excel ER calculations sheet. The dates on which the problem occurred and the problem was fixed is recorded in the village level monitoring sheets and then entered into the online monitoring solution, which is the basis for emission reduction calculations for operational days of the installed and operational units.

**c) Total GHG emission reductions achieved or net anthropogenic GHG removals by sinks achieved in this monitoring period**

The total GHG emission reductions achieved in this monitoring period is as follows:

<b>Summary of the Project Activity and ERs Generated for the Monitoring Period</b>	
Start date of this Monitoring Period	01-Jan-2014
Carbon credits claimed up to	31-March-2017
Total Biogas Units Commissioned till 31 <sup>st</sup> March 2017	1863
<b>Total ERs generated (after considering leakage) for operational biogas units (after subtracting for non-operational days and non-operational units) for this monitoring period (tCO<sub>2</sub>)</b>	<b>11,275</b>

**A.2. Location of project activity**

&gt;&gt;

Host Party; INDIA

Region/state/province, etc.; Andhra Pradesh

City/town/community, etc.; All Mandals of Chittoor

Physical/geographical location:

**Fig 1: Map of Andhra Pradesh and Chittoor District in which the project is implemented****A.3. Parties and project participant(s)**

Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate whether the Party involved wishes to be considered as project participant (yes/no)
INDIA (host)	Private entity: M/s Community Reconstruction of Social Service (CROSS)	No

**A.4. Reference of applied methodology and standardized baseline**

&gt;&gt;

Sectoral Scope 01, TYPE I - RENEWABLE ENERGY PROJECTS, I.E. Switch from Non-Renewable Biomass for Thermal Applications by the User, Version 04, EB 60.

**A.5. Crediting period of project activity**

&gt;&gt;

Type: Renewable

State date: 01-01-2014

Length of the crediting Period corresponding to this monitoring period: 7 years - 01 Jan 2014 - 31 Dec 20

**A.6. Contact information of responsible persons/entities**

&gt;&gt;

Dr. Sudha Padmanabha, CDM Consultant, FCN

Mr. Bhupati Puvvani, Director, Community Reconstruction of Social Service (CROSS)

**SECTION B. Implementation of project activity****B.1. Description of implemented registered project activity**

&gt;&gt;

- a) Provide information on the implementation status of the project activity during this monitoring period in accordance with the applicable provision for description of implemented registered CDM project activity in the Project standard.

Community Reconstruction of Social Service (CROSS) is a Non-Governmental Organization (NGO) working in Chittoor district of Andhra Pradesh, India. CROSS works 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. With the carbon credits from CDM, CROSS took up this project to provide biogas to the rural communities of Chittoor district of Andhra Pradesh, India.

The project activity is construction of 5,000 biogas plants in the project area. Of these, 1863 were built during this monitoring period. The biogas project involves implementation of the technology, maintenance and monitoring the emission reductions. The construction of biogas plants was done in a phased manner. The details of the units commissioned are as follows:

Mandal	2013	2014	2015	2016	2017	Grand Total
G.D.Nellore	31	157	329	73	24	614
Karvetinagaram	30	61	136	11	4	242
Nagalapuram				118	7	125
Nagari				38	44	82
Narayanavanam				29	20	49
Nindra				27	2	29
Pichatur				96		96
Puttur				62	6	68
Ramachandrapuram				22	2	24
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<b>Total</b>	<b>62</b>	<b>295</b>	<b>777</b>	<b>581</b>	<b>148</b>	<b>1863</b>

The list of beneficiaries, their unique user ID, village, and other details are provided in the ER calculations excel file. The dates of commission of all the biogas plants is listed in the excel sheet. The project activity of 1863 biogas units was implemented in 194 villages of 12 Mandals, Chittoor district, the details of which are as follows.

Mandals	Number of Villages	Number of households
G.D.Nellore	66	614
Karvetinagaram	24	242
Nagalapuram	10	125
Nagari	9	82
Narayanavanam	8	49
Nindra	5	29
Pichatur	8	96
Puttur	4	68
Ramachandrapuram	5	24
S.R.Puram	24	284

Vadamalapeta	3	10
Vedurukuppam	28	240
<b>Total</b>	<b>194</b>	<b>1863</b>

Alongside, construction of biogas units, repair and maintenance of constructed units were also done during this monitoring period. Of the constructed units, 99.5% (1854) units were operational at the end of this monitoring period. The remaining 0.5% units became non-operational at various times of the monitoring period.

The operational domestic biogas units are in continuous use after installation. In between, due to repair and maintenance, some of the biogas units were not be in operation for different durations of time. For each of the unit, the days not operational, is recorded. This information is included in the excel ER calculations sheet. The date on which the problem occurred and the problem was fixed is recorded in the village level monitoring sheets and then entered into the online monitoring solution, which is the basis for emission reduction calculations for only the operational units and operational days of installed units. The various reasons and days lost due to repairs and maintenance are as follows:

<b>Reason For Breakdown/ Non-Usage</b>	<b>Non-operational biogas days<sup>1</sup> for the monitoring period (1<sup>st</sup> Jan 2014 – 31<sup>st</sup> March 2017)</b>
Empty and Re-plaster Dome	20,861
Dung substrate too Watery	6,129
Nozzle Jet	5,344
Kitchen not Used	4,674
Repair Stove	3,206
Not Feeding dung substrate	2,817
Unit Demolished	2,625
Repair Outlet Tank	1,953
Drain Water in Gas Pipe	1,557
Repair Gas Pipe	991
Replace Gate Valve	757
Replace Stove	698
Change Nozzle	548
Replace Gas Pipe	189
Drain Water in Gas Pipe & Empty and Re-plaster Dome	12
<b>Total</b>	<b>52,361</b>

The beneficiaries inform the village volunteers or the biogas case workers of any repairs required. Minor repairs are done by them, while the major repairs such as repair of cracked domes and re-plastering of domes are done by the trained masons.

**b) For the description of the installed technology(ies), technical process and equipment, include diagrams, where appropriate.**

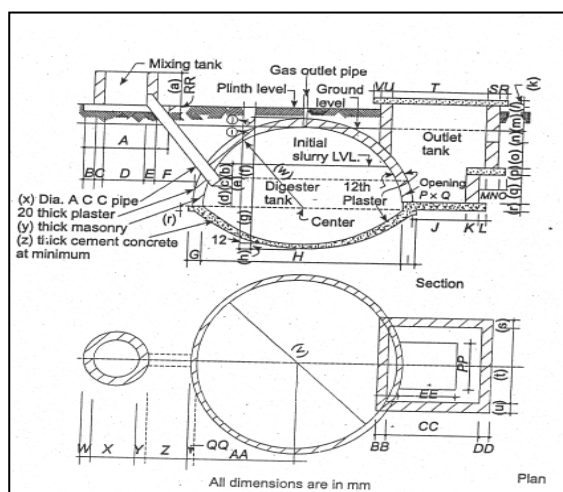
The biogas plant of Deenbandhu model (Fig 2) consists of a digester with a fixed, non-movable gas space. Users prepare batches of dung slurry in the mixing tank, before allowing the final

<sup>1</sup> This is the total number of days in the monitoring period for all the biogas units which were under repair and not operational. Thus for a month of 30 days, the total biogas days for 2028 units are 2028 x 30 days = 60,840

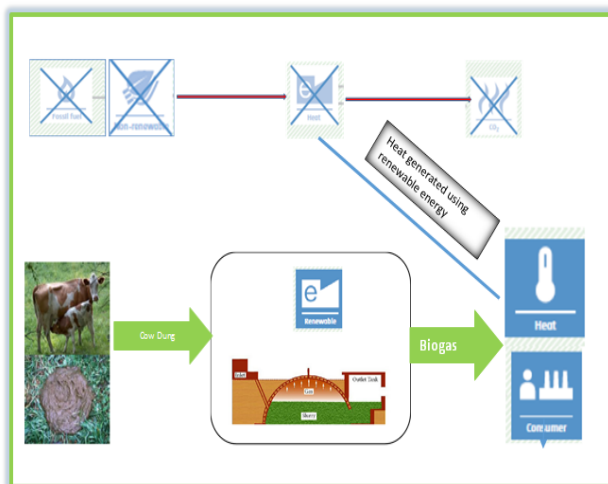


mixture to flow into the digester for methane formation phase. By utilizing dung substrate in an anaerobic digestion and combustion system, biogas is made available. Biogas is generated by fermentation of cellulose rich organic matter under anaerobic conditions. In anaerobic conditions, the methane-producing bacteria become more active. The anaerobic digestion consists of three stages: I Hydrolysis; II Acid formation and III Methane fermentation. 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 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 India.

The individual plant consists of a mixing chamber where waste water and cow dung are mixed, 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 is provided to supply biogas to a 2-ring stove inside the house. The cross-section of a biogas unit is as shown in Fig 2.



Cross-section of biogas model



Technical process and equipment of biogas unit



Deenabandhu Model Biodigester



Biogas Stove used for Cooking in the project region

**Fig 2: Deenabandhu 2 cum Biogas Unit installed in the project activity**

**B.2. Post-registration changes****B.2.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline**

&gt;&gt;

There are no temporary deviations from registered monitoring plan and applied methodology

**B.2.2. Corrections**

&gt;&gt;

There are no corrections to project information or parameters fixed at validation.

**B.2.3. Changes to start date of crediting period**

&gt;&gt;

There is no change in the start date of crediting period.

**B.2.4. Inclusion of a monitoring plan to the registered PDD that was not included at registration**

&gt;&gt;

There is no inclusion of a monitoring plan to the registered PDD as it was included during the registration of the project activity.

**B.2.5. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline**

&gt;&gt;

There are no permanent changes from registered monitoring plan and applied methodology.

**B.2.6. Changes to project design of registered project activity**

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The change to the project design of registered project activity is with regard to addition of multiple sites. During the course of implementation there were many interested rural households, who are interested in implementing biogas units beyond the identified Mandals and Villages, in which CROSS is working. Thus, interested end users have been and will be identified within all the Mandals of Chittoor District and provided with biogas unit.

This change to the project design of the project activity has been submitted with this monitoring report vide. Version 03 of the PDD dated 31/May/2017.

**B.2.7. Types of changes specific to afforestation or reforestation project activity**

&gt;&gt;

Not applicable

**SECTION C. Description of monitoring system**

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**1. Implementation Plan**

The project activity was implemented only after gets registered as a CDM project activity. Emission Reductions yet to be generated was sold, in advance, to a Carbon Investor under an ERPA drawn up for the purpose. Carbon Revenue is being used 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 ER revenues as the project is funded only from carbon revenue.



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 being implemented and monitored by CROSS, where in over 5 years CROSS is constructing 5,000 domestic biogas units of 2m<sup>3</sup> capacity, for as many farmer families in the Mandals of Chittoor district, Andhra Pradesh, India.

CROSS is facilitating the End User families to set up Self Help Groups (SHGs) to take care of minor repair, maintenance and the social controls/peer support needed to cope with various exigencies that will crop up. These SHGs are entry point for the organization to facilitate training and organization of the women in the village to be part of the project activity. These are 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 has been set up within CROSS for management and monitoring of the Biogas CDM Project. This Project Management & Monitoring Unit consists of the following staff:

- **Biogas CDM Project Manager:** A biogas CDM project manager has been appointed for overall in-charge of the project activity. The CDM project manager is responsible for overall project implementation and meeting the requirements of monitoring protocol thereafter. He was directly appointed by CROSS Board of Trustees and reports to the Director, CROSS. His main functions 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 has been appointed who 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 has been appointed who is responsible for ensuring a strict and diligent spending of carbon revenues and the recording thereof in a computerised accounting package. He reports to the Director, CROSS. He administers the following tasks:
  - Arrange for the bulk purchase of cement and hardware and transfer them to the Mandal
  - 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 have been appointed for overseeing the construction of biogas units. The field worker is in-charge of construction of the biogas units and report to the Project Manager and their tasks are:
  - 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 to the Village

- 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

Post construction of the biogas units, the biogas field workers 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.
- **Local Masons:** Trained masons by NEDCAP are involved in construction of the biogas units in the region. Each of their personal and contact details is stored in the digitized monitoring solution to fix responsibility.

Similarly, the personal and contact details of each Material Supplier are also recorded, along with their bank account numbers. Payments are made only by crossed cheque to enable audit of the accounts for the project activity.

## 2.2. Management system at village level:

- **End User Groups:** About 20-25 End User families are organized into SHGs for local management of construction and post construction, ensuring proper functioning of all biogas units in their respective villages. These SHGs are a support system for End User.
- **Volunteers:** Every participating village has Volunteer, preferably women staff with either minimum SSLC or PUC qualification, to monitor usage of 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 be the first to identify dysfunctional units. The Volunteer either prompt the End User Group to set right a problem or bring it to the notice of the Biogas Field Worker.

## 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 can be generated at all levels – Project, Mandal, Gram Panchayat, Village and Participating Family. The database is updated on an everyday basis, as and when Project Staff return from their respective villages.

**Progress Reports:** Real-time Progress Reports is 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

The image displays two side-by-side screenshots of the TRISTLE Monitoring Database Solution web application. Both screenshots show a browser window with a menu bar at the top containing 'Biogas', 'Common', 'Administer', and 'Other'. Below the menu is a navigation pane with links like 'End User', 'Village', 'Gram Panchayat', 'Case Worker', 'Biogas Online Reports', 'Construction', 'Monitoring', 'Repairs & Maintenance', 'Stakeholders', and 'Photo Album'. The main content area of the left window is titled 'Monitor Biogas Construction' and shows a table with columns 'Farmer', 'Which Process?', 'Completion Date', and 'Mason'. It lists two entries: '004 C.Shabnam Fathima' and '008 N.Shobha'. Below the table are 'Record Progress' and 'Cancel' buttons. The right window is titled 'Log Breakdowns' and features several dropdown menus for 'Which Taluk/Mandal?', 'Which Gram Panchayat?', 'Which Village?', and 'Which Farmer?'. It also has a 'Problem' dropdown, 'Reported By' and 'Reported On' text fields, and 'Record' and 'Cancel' buttons. A message at the bottom states 'Existing Breakdowns logged for 011 C.Renukamma'. The status bar at the bottom of both windows shows 'User: administrator', 'Session time: 2 minutes' (left) and '15 minutes' (right), and 'Licensed to: CROSS'.

Snapshot of the TRISTLE Monitoring Database Solution

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

Construction of 5,000 Biogas Units is being carried out in a phased manner. 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 ensures 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 installed 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. GPS coordinates of the units are also taken and entered into the monitoring solution.

### Monitoring after Commissioning of biogas units

A Daily monitoring book is maintained in each of the villages where the volunteers record the problem with the biogas units and the 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 and the day it was repaired.

**Monitor Biogas Construction**

003 Chavatur

Farmer	Which Process?	Completion Date	Mason
004 C.Shabnam Fathima	select		R.Sivalingam
008 N.Shobha	select		A.Sathiyaraj

Record Progress Cancel

**Record Biogas GPS Readings**

Neervoy GP of Pichatur Taluk/Mandal

Village	Unit ID	Head of Household	Process	Latitude	Longitude
Neervoy	4758	656 001 G.Prabavathi		13.401750	79.708400
	4759	656 002 P.Rusendramma		13.375310	79.737530
	4760	656 003 K.Lavanya		13.375960	79.736540
	4761	656 004 M.Lakshmi		13.375080	79.737210
	4762	656 005 A.Radha		13.374950	79.737110
	4763	656 006 K.Susilamma		13.375800	79.736840
	4764	656 007 R.Subachana		13.375380	79.737750
	4974	656 008 A.Sakunthala		13.376450	79.735950
	6002	656 009 M.Himala		13.387590	79.739450
	6238	656 010 V.Radhika			
	6239	656 011 M.Lakshmi			
	6240	656 012 S.Deepa			

Update GPS Readings Another Gram Panchayat?

### Snapshot of the TRISTLE Monitoring Database Solution

If any Biogas Unit is faulty or not functional, the problem report is automatically passed on to the Area Team for action. There is 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 will know exactly where they stand in terms of progress and results. They are comfortable in the knowledge that objective standards like number of commissioned Units, recording of breakdowns, conducting timely repairs, etc. is 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 are archived and stored throughout the crediting period and an additional 2 years.

### 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. They are further educated on their responsibilities during the construction and post-construction phases.

Before commencement of the Biogas CDM Project, village-wise Participation Agreements are signed between CROSS and potential End Users. This clearly states the roles and responsibilities of each party, fully disclose the finances and commit CROSS to the carbon revenue sharing arrangement.

### 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 formally spell out the roles, entitlements and responsibilities of both parties.

### 5. Maintenance and Servicing

Volunteers record daily Monitoring data. They are the point persons who immediately identify problems. Minor repairs are conducted 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, the matter 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.

Trainings have been conducted before project implementation at various stages to orient the end-users on the effects of climate change, CDM processes and about biogas. Women are trained on use and maintenance of bio-gas units and also on repair and maintenance of biogas units. The village volunteers are also trained for monitoring and repair of the units.

## SECTION D. Data and parameters

### D.1. Data and parameters fixed ex ante or at renewal of crediting period

Data/parameter:	Rating Biogas
Unit	kW <sub>th</sub> /digester
Description	Thermal capacity of a digester
Source of data	Calculated as shown in Section B.2 of the PDD
Value(s) applied)	1.69

Choice of data or measurement methods and procedures	Calculated as shown in Section B.2 of the PDD
Purpose of data	Qualifies as a micro-scale project activity. This parameter is fixed for the entire crediting period
Additional comments	All the constructed units are of 2 cum and hence the value remains the same.

<b>Data/parameter:</b>	<b>B<sub>y</sub></b>
Unit	Tonnes /year
Description	Quantity of woody biomass that is substituted or displaced in tonnes
Source of data	Survey
Value(s) applied)	3.97 tonnes/year/family and 19,850 t/year for 5,000 families
Choice of data or measurement methods and procedures	Based on survey conducted to estimate the average annual consumption of woody biomass. The details of the study are described in Annex 3 of the PDD. The average annual consumption of biomass is 3.58±0.73 kg/capita/day. The lower bound of 95/5 confidence/precision level of per capita consumption is 3.48 kg/capita/yr. The adult equivalent per family in the project area is 3.13. $B_y = 3.48 \text{ kg/capita/day} \times 365 \text{ days} \times 3.13 \text{ adult equivalent/family} = \mathbf{3.97 \text{ t/family/yr.}}$ $B_y$ for 5,000 biogas units is $3.97 \times 5000 = 19,850 \text{ t/year.}$
Purpose of data	To estimate the emission reductions for the project activity
Additional comments	This parameter is fixed for the entire crediting period

<b>Data/parameter:</b>	<b>f<sub>NRB, y</sub></b>
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	Assessment of Non Renewable Biomass based on data provided by Forest Survey of India, 2011, Ministry of Environment and Forests, Govt of India.
Value(s) applied)	0.95
Choice of data or measurement methods and procedures	Based on data from State of Forest Report, 2011. Forest Survey of India, Ministry of Environment and Forests, Government of India. The data gives the consumption of fuel wood and production of fuel wood from forests and from trees outside forests. This data is assessed at the state level. Thus the f <sub>NRB</sub> for Andhra Pradesh is applied for the project activity.
Purpose of data	To estimate the emission reductions for the project activity
Additional comments	This parameter is fixed for the entire crediting period

<b>Data/parameter:</b>	<b>NCV<sub>biomass</sub></b>
Unit	TJ/tonne
Description	Net Calorific Value of Biomass
Source of data	AMS_I.E., Version 4 methodology
Value(s) applied)	0.015



Choice of data or measurement methods and procedures	-
Purpose of data	To estimate the emission reductions for the project activity
Additional comments	This parameter is fixed for the entire crediting period

<b>Data/parameter:</b>	<b>EF<sub>projected_fossilfuel</sub></b>
Unit	tCO <sub>2</sub> /TJ
Description	Emission Factor for fossil fuel. Emission factor for substitution of non-renewable woody biomass by similar consumers.
Source of data	AMS-I.E., Version 4 methodology
Value(s) applied)	81.6
Choice of data or measurement methods and procedures	Based on the methodology, this value represents the emission factor of the substitution fuels likely to be used by similar users on a weighted average basis. It is assumed that the mix of present and future fuels would consist of a solid, liquid and gaseous fossil fuel.
Purpose of data	To estimate the emission reductions for the project activity
Additional comments	This parameter is fixed for the entire crediting period

<b>Data/parameter:</b>	<b>Diversion of non-renewable biomass saved under the project activity by non-project households</b>
Unit	tonnes / year
Description	Diversion of non-renewable biomass saved under the project activity by non-project households
Source of data	Based on the methodology B <sub>y</sub> will be multiplied by a net to gross adjustment factor of 0.95 to account for leakages.
Value(s) applied)	Biomass (t) - $3.97 \times 0.95 = 3.77$ t/yr. The biomass diversion is $3.97 - 3.77 = 0.20$ t/family/yr or 1000 t/yr for 5,000 families.  Emissions (tCO <sub>2</sub> ) - $4.61 - 4.38 = 0.23$ tCO <sub>2</sub> /family/yr; $0.23 \times 5000 = 1150$ tCO <sub>2</sub> /year
Choice of data or measurement methods and procedures	According to I.E, Version 4, B <sub>y</sub> can be multiplied by a net to gross adjustment factor of 0.95 to account for leakages, in which case surveys are not required. $3.97 \times 0.95 = 3.77$ t/Household/yr. Thus the diversion is $3.97 - 3.77 = 0.20$ t/family/yr or 1000 t/yr for 5000 families. In terms of leakage of emissions, $4.61 - 4.38 = 0.23$ tCO <sub>2</sub> /family/yr and $0.23 \times 5000 = 1150$ tCO <sub>2</sub> /year.
Purpose of data	To estimate the leakage for the project activity
Additional comments	This parameter is fixed for the entire crediting period. Surveys will not be conducted to determine leakage

## D.2. Data and parameters monitored

<b>Data/parameter:</b>	<b>Biogas Units constructed</b>
Unit	Number

Description	Number of biogas units constructed
Measured/calculated/default	Measured. Monitoring of construction of biogas units and its start date of operation will be from the on-line monitoring solution of CROSS
Source of data	Data recorded at site based on the progress of construction and installation and entered into the online monitoring Solution
Value(s) of monitored parameter	1863 till 31/03/2017
Monitoring equipment	Continuous
Measuring/reading/recording frequency:	100% of the units are monitored from the procurement of material till construction and commissioning of the biogas units
Calculation method (if applicable):	The emission reductions are calculated for the constructed and operational units for operational days.
QA/QC procedures:	<ul style="list-style-type: none"> <li>- The biogas units built for the households was monitored on field and entered into the on-line monitoring database.</li> <li>- The beneficiaries have signed an End User agreement with CROSS with all details of the family to identify the user irrefutably.</li> <li>- The timeline of construction of the units is monitored and database maintained</li> </ul>
Purpose of data:	To estimate the emission reductions for the project activity
Additional comments:	

<b>Data/parameter:</b>	<b>Number of biogas plants operating</b>
Unit	Number
Description	Number of plants operating in year (t)
Measured/calculated/default	Measured
Source of data	Log books maintained and entered in the digitized monitoring database for Daily monitoring of the biogas units operating. In every village, the Village Level Volunteers monitor the biogas units that are operating for every single day.
Value(s) of monitored parameter	Of the 1863 units constructed, 1854 units are operational by 31/03/2017, which accounts to 99.5% operational units of the constructed units.
Monitoring equipment	No monitoring equipment, The biogas case workers and village level volunteers monitor on daily basis.
Measuring/reading/recording frequency:	The non-usage of biogas units are measured on daily basis and entered into the online monitoring database, which determines the operating biogas unit.
Calculation method (if applicable):	The operating biogas units are those that have not been dysfunctional and are functioning. The non-operational days are also recorded and ER not accounted for those days.
QA/QC procedures:	Log books and digitized database are checked regularly by project staff and CDM coordinator.
Purpose of data:	Estimate emission reductions for the project activity for the operational units and on operational days.
Additional comments:	The uncertainty of emission reduction is very low as there is continuous monitoring of all units for operational units and operational days.

<b>Data/parameter:</b>	<b>Non-usage of biogas plants</b>																																		
Unit	Days																																		
Description	Usage of non-renewable biomass in case of non-performance of biogas units																																		
Measured/calculated/default	Measured.																																		
Source of data	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. Dependent on the number of days the biogas units are under repair																																		
Value(s) of monitored parameter	<table border="1"> <thead> <tr> <th>Reason For Breakdown/ Non-Usage</th><th>Non-operational biogas days<sup>2</sup> for the monitoring period (1<sup>st</sup> Jan 2014 – 31<sup>st</sup> March 2017)</th></tr> </thead> <tbody> <tr><td>Empty and Re-plaster Dome</td><td>20,861</td></tr> <tr><td>Dung substrate too Watery</td><td>6,129</td></tr> <tr><td>Nozzle Jet</td><td>5,344</td></tr> <tr><td>Kitchen not Used</td><td>4,674</td></tr> <tr><td>Repair Stove</td><td>3,206</td></tr> <tr><td>Not Feeding dung substrate</td><td>2,817</td></tr> <tr><td>Unit Demolished</td><td>2,625</td></tr> <tr><td>Repair Outlet Tank</td><td>1,953</td></tr> <tr><td>Drain Water in Gas Pipe</td><td>1,557</td></tr> <tr><td>Repair Gas Pipe</td><td>991</td></tr> <tr><td>Replace Gate Valve</td><td>757</td></tr> <tr><td>Replace Stove</td><td>698</td></tr> <tr><td>Change Nozzle</td><td>548</td></tr> <tr><td>Replace Gas Pipe</td><td>189</td></tr> <tr><td>Drain Water in Gas Pipe &amp; Empty and Re-plaster Dome</td><td>12</td></tr> <tr><td><b>Total</b></td><td><b>52,361</b></td></tr> </tbody> </table>	Reason For Breakdown/ Non-Usage	Non-operational biogas days <sup>2</sup> for the monitoring period (1 <sup>st</sup> Jan 2014 – 31 <sup>st</sup> March 2017)	Empty and Re-plaster Dome	20,861	Dung substrate too Watery	6,129	Nozzle Jet	5,344	Kitchen not Used	4,674	Repair Stove	3,206	Not Feeding dung substrate	2,817	Unit Demolished	2,625	Repair Outlet Tank	1,953	Drain Water in Gas Pipe	1,557	Repair Gas Pipe	991	Replace Gate Valve	757	Replace Stove	698	Change Nozzle	548	Replace Gas Pipe	189	Drain Water in Gas Pipe & Empty and Re-plaster Dome	12	<b>Total</b>	<b>52,361</b>
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<b>Total</b>	<b>52,361</b>																																		
Monitoring equipment	There is no monitoring equipment. As and when the biogas units are not functional, the beneficiaries report to the village level volunteer, who in turn report to the Biogas Field 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.																																		
Measuring/reading/recording frequency:	On a day to day basis																																		
Calculation method (if applicable):	ERs are not estimated for non-functional days.																																		
QA/QC procedures:	Though the methodology does not require monitoring this parameter, it has been done for a credible estimation of ERs.																																		
Purpose of data:	To calculate emission reductions for only the operational days for																																		

<sup>2</sup> This is the total number of days in the monitoring period for all the biogas units which were under repair and not operational. Thus for a month of 30 days, the total biogas days for 2028 units are 2028 x 30 days = 60,840

	operational biogas unit.
Additional comments:	The main objective of the project is to provide sustainable energy sources to the rural households with good repair and maintenance. Hence a robust monitoring system is in place.

Data/parameter:	Confirmation that non-renewable biomass has been substituted
Unit	-
Description	Confirmation that non-renewable biomass has been substituted
Measured/calculated/default	Measured
Source of data	Sample survey
Value(s) of monitored parameter	The survey shows that biogas has been used by the participating families, thus replacing non-renewable biomass. Some families use crop residues and fallen twigs and branches occasionally for heating water.
Monitoring equipment	Annual
Measuring/reading/recording frequency:	Annual stratified sampling conducted for 2014-15; 2015-2016 and 2016-2017.
Calculation method (if applicable):	There is no calculation method.
QA/QC procedures:	The daily monitoring of biogas units for non-operational days results in estimation of credible emission reductions with low uncertainty.
Purpose of data:	Not used for Emission Reduction calculations Confirmation of replacement of non-renewable biomass
Additional comments:	

Data/parameter:	Average annual hours of operation of a system
Unit	Hrs
Description	Average annual hours of operation of a biogas unit
Measured/calculated/default	Measured. Based on annual sample survey that will be conducted on statistically determined number of households.
Source of data	Based on the survey conducted annually
Value(s) of monitored parameter	3.06 hours
Monitoring equipment	A household level sample survey was conducted to estimate the average hours of operation of a biogas system for a day. Survey sheets were given to sample households to record the start and finish time of use of biogas units in a day for a period of 7 days.
Measuring/reading/recording frequency:	Annually
Calculation method (if applicable):	This survey was done annually for a statistically determined number of households at 90/10 precision confidence level.
QA/QC procedures:	The procedure was monitored by the biogas case workers and the FCN Tech team for QA/QC.
Purpose of data:	This is not included for ER Calculations
Additional comments:	No additional comments

### D.3. Implementation of sampling plan

>>

The various parameters that need to be monitored as described in section B.7 are:

- (i) Biogas units constructed
- (ii) Number of biogas plants operating
- (iii) Non-usage days of biogas plants
- (iv) Average annual hours of operation of a system
- (v) Confirmation that non-renewable biomass has been substituted

The parameters (i), (ii) and (iii) are monitored for all the biogas plants constructed and in operation and the parameter (iv) and (v) were monitored based on sample survey.

#### (a) Sampling Design

**(i) Objectives and Reliability Requirements:** The objective of the sampling effort is to determine the mean yearly value of the following parameters with 90/10 confidence/precision during the crediting period:

- (i) Average annual hours of operation of a system
- (ii) Confirmation that non-renewable biomass has been substituted

The survey was conducted yearly once for a period of 7 days and extrapolated for the year. The estimated value of parameter was determined through a random sample survey.

**(ii) Target Population:** The target population is the rural households for which biogas is constructed and operational in Chittoor district of Andhra Pradesh State, India. These rural households are from all the Mandals in which the project has been implemented.

**(iii) Sampling Method:** The sampling method chosen for the project area is simple random sampling as the target population is homogeneous in nature. A simple random sample is a subset of a population chosen randomly, such that each biogas of the population has the same probability of being selected. The sample-based estimate of mean is an unbiased estimate of the population parameter. It is easy to implement as the sampling frame (household details for which biogas has been implemented) is collected and stored in the monitoring database.

**(iv) Sample Size:** The sample size was determined use the equation

$$n \geq \frac{1.645^2 NV}{(N-1) \times 0.1^2 + 1.645^2 V}$$

Where:

$$V = \frac{p(1-p)}{p^2}$$

$n$	Sample size
$N$	Total number of households (5,000)
$p$	the proportion (0.99)
1.645	Represents the 90% confidence required
0.1	Represents the 10% relative precision

Substituting the values for the project activity,

$$V = \frac{0.99 \times (1-0.99)}{0.99^2} = 0.01$$

Using the equation

$$n \geq \frac{1.645^2 NV}{(N-1) \times 0.1^2 + 1.645^2 V}$$

The sample size annually is as follows:

Year	2014	2015	2016	2017
Sample size (n)	2.72	2.73	2.73	2.73
Total number of households (N)	357	1134	1714	1863
Our proportion (p)	99%	99%	99%	99%
90% Confidence required (1.645)	1.645	1.645	1.645	1.645
10% relative precision (0.1)	0.1	0.1	0.1	0.1
V	0.01	0.01	0.01	0.01
Sample size @80% response	4	4	4	4

Therefore the required sample size is at least 3 households @ 99% operational. Assuming a response rate of only 80%, the number of households will be scaled up to  $3/0.8 = 4$  households.

A minimum of 30 samples have been sampled each year as the value of sample size is less than that. The sample was drawn at random from the sampling frame using the random number generator in Microsoft Excel Sheet.

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

**(b) Data:**

- (i) Field Measurements:** The variables recorded on field are
- Average annual hours of operation of a system
  - Confirmation that non-renewable biomass has been substituted

A household level questionnaire was designed to collect information for the parameters of interest. The frequency of measurement was once a year during the monitoring period and was done for 7 days for the sample households. Each household was given the questionnaire to fill in the data for the parameters. They were guided by the biogas case workers to fill in the data under the supervision of the FCN technical expertise.

The average annual hours of operation of a system was monitored by recording the time of start and switch off biogas units each time it is used by the household for a period of 7 days.

**(ii) Quality Assurance/Quality Control:** The QA/QC procedure was followed to achieve good quality data through field measurements. The household level questionnaire was designed and field tested by the FCN Technical team before administering the actual questionnaire survey. The biogas case workers were trained to administer the questionnaire at the household level. The households were trained to collect and fill in the questionnaire. The case workers were trained to conduct and supervise data collection at the household level. This reduced non-response from the households.

The data collected was entered by the case workers, which was checked and verified further for any typographic mistakes. A valuator further cross-checked each entry with the physical form for any typographic mistakes or to clarify any sort of confusion in the data. The field staff, the data entry staff and the valutors are literate to collect good quality data.



(iii) **Analysis:** The data was entered into Microsoft excel sheet and cross checked with the filled in questionnaire by Valuators as QA/QC procedure. The data was analyzed for the mean annual value of the parameters.

### (c) Implementation:

(i) **Implementation Plan:** The implementation of sampling effort was 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 10 years. The FCN team trained the case workers to conduct the survey along with the randomly selected households. The collected data was analysed by the FCN for inclusion in the monitoring report.

## SECTION E. Calculation of emission reductions or GHG removals by sinks

### E.1. Calculation of baseline emissions or baseline net GHG removals by sinks

>>

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 and emission reductions is calculated as:

$$ER_y = B_y * f_{NRB,y} * NCV_{biomass} * EF_{projected\_fossilfuel}$$

Where:

$ER_y$	Emission reductions during the year y in tCO <sub>2</sub> e
$B_y$	Quantity of woody biomass that is substituted or displaced in 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 using survey methods
$NCV_{biomass}$	Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.015 TJ/tonne)
$EF_{projected\_fossilfuel}$	Emission factor for the substitution of non-renewable woody biomass by similar consumers. Use a value of 81.6 tCO <sub>2</sub> /TJ

Emissions Reductions for the Monitoring Period (31/05/2014 to 31/03/2017)		
Activity Data	Value	ID Ref
Quantity of Biomass that is substituted (t/yr)	10,206.87	$B_y$
Fraction of NRB	0.95	$f_{NRB,y}$
NCV Biomass (TJ/t)	0.015	$NCV_{biomass}$
Emission factor (tCO <sub>2</sub> /TJ)	81.6	$EF_{projected\_fossilfuel}$
<b>Emission Reductions (tCO<sub>2</sub>/Monitoring Period)</b>	<b>11,868.55</b>	<b><math>ER_y</math></b>

The total emission reductions for the monitoring period **01/01/2014 to 31/03/2017** for the installed and operational 1863 biogas units are **11,868.55 tCO<sub>2</sub>**. The unit-wise calculations of emission reduction are as enclosed in the ER Calculations excel sheet.

### E.2. Calculation of project emissions or actual net GHG removals by sinks

>> There are no project emissions in the project activity

**E.3. Calculation of leakage**

&gt;&gt;

Leakage related to the non-renewable woody biomass saved by the project activity shall be assessed based on ex post surveys of users and the areas from which this woody biomass is sourced (using 90/30 precision for a selection of samples). The following potential source of leakage shall be considered:

- (a) The use/diversion of non-renewable woody biomass saved under the project activity by non-project households/users that previously used renewable energy sources. If this leakage assessment quantifies an increase in the use of non-renewable woody biomass used by the non-project households/users, that is attributable to the project activity, then  $B_y$  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.

If the equipment currently being utilised is transferred from outside the boundary to the project boundary, leakage is to be considered.

There will not be any transfer of equipment being currently utilized transferred from outside the project boundary to the project boundary. All the biogas units will be constructed at site. Thus leakage from equipment transfer need not be monitored.

$B_y$  is multiplied by a net to gross adjustment factor of 0.95 to account for leakages, in which case surveys will not be required.

According to the methodology, Version 4, after considering leakage, the emission reduction calculations are as follows:

Activity Data	Value
$B_y$	10,206.87
<b><math>B_y</math> adjusted for leakage (<math>B_y \times 0.95</math>)</b>	9,696.53
$f_{NRBy}$	0.95
NCV <sub>biomass</sub> (TJ/tonne)	0.015
EF <sub>projected_fossilfuel</sub> (tCO <sub>2</sub> /TJ)	81.6
<b>CER generated for the monitoring period</b>	<b>11,275</b>

**Summary of calculation of emission reductions or net GHG removals by sinks**

Item	Baseline emissions or baseline net GHG removals by sinks (t CO <sub>2</sub> e)	Project emissions or actual net GHG removals by sinks (t CO <sub>2</sub> e)	Leakage (t CO <sub>2</sub> e)	GHG emission reductions or net GHG removals by sinks (t CO <sub>2</sub> e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
<b>Total</b>	11,869	0	594	0	11,275	11,275

**E.4. Comparison of actual emission reductions or net GHG removals by sinks with estimates in registered PDD**

Item	Values estimated in ex ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO <sub>2</sub> e)	116,776	11,275

**E.5. Remarks on difference from estimated value in registered PDD**

&gt;&gt;

The emission reductions are lesser than that projected in the PDD as only 1863 units have been constructed and commissioned against a PDD estimate of 5,000 biogas units. These units have been constructed in a phased manner over the years unlike that estimated in the PDD from the start of the year. Also, as detailed in section B.1, units were under repair and maintenance leading to non-operational biogas days during the monitoring period. This has also led to further decrease of emission reductions during the monitoring period. These factors has accounted for far lesser emission reductions to that estimated in the registered PDD.

## Appendix 1. Contact information of project participants and responsible persons/entities

<b>Project participant and/or responsible person/ entity</b>	<input checked="" type="checkbox"/> Project participant <input type="checkbox"/> Person/entity responsible for completing the CDM-MR-FORM
<b>Organization name</b>	<b>Community Reconstruction of Social Service - CROSS</b>
<b>Street/P.O. Box</b>	Velkur Village & Post, Gangadhara Nellore Mandal
<b>Building</b>	-
<b>City</b>	Chittoor
<b>State/region</b>	Andhra Pradesh / South India
<b>Postcode</b>	517 125
<b>Country</b>	India
<b>Telephone</b>	08572 – 273292
<b>Fax</b>	-
<b>E-mail</b>	<a href="mailto:cross_org2005@yahoo.com">cross_org2005@yahoo.com</a>
<b>Website</b>	-
<b>Contact person</b>	-
<b>Title</b>	Director
<b>Salutation</b>	Mr.
<b>Last name</b>	Bhupathi
<b>Middle name</b>	-
<b>First name</b>	Puvvani
<b>Department</b>	-
<b>Mobile</b>	098854 12972
<b>Direct fax</b>	-
<b>Direct tel.</b>	-
<b>Personal e-mail</b>	-

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### Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: <ul style="list-style-type: none"> <li>• Include provisions related to delayed submission of a monitoring plan;</li> <li>• Provisions related to the Host Party;</li> <li>• Remove reference to programme of activities;</li> <li>• Overall editorial improvement.</li> </ul>

<i>Version</i>	<i>Date</i>	<i>Description</i>
04.0	25 June 2014	Revisions to: <ul style="list-style-type: none"> <li>• Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0));</li> <li>• Include provisions related to standardized baselines;</li> <li>• Add contact information on a responsible person(s)/entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1;</li> <li>• Change the reference number from <i>F-CDM-MR</i> to <i>CDM-MR-FORM</i>;</li> <li>• Editorial improvement.</li> </ul>
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	28 May 2010	EB 54, Annex 34. Initial adoption.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: monitoring report		