



Monitoring Report

CARBON OFFSET UNIT (CoU) PROJECT



**Title: Surat, Tapi, Narmada, Anand, Navsari, Amreli, Mahesana
Small Scale Biogas Projects, Gujarat**

Version 1.0

Date 30/09/2021

First CoU Issuance Period: 7 years, 0 months

Date: 01/01/2014 to 31/12/2020



Monitoring Report (MR) CARBON OFFSET UNIT (CoU) PROJECT

Monitoring Report	
Title of the project activity	Surat, Tapi, Narmada, Anand, Navsari, Amreli, Mahesana Small Scale Biogas Projects, Gujarat
UCR Project Registration Number	xxxx
Version	1
Completion date of the MR	30/09/20
Monitoring period number and duration of this monitoring period	Monitoring Period Number: 1 Duration of this monitoring Period: (first and last days included (01/01/2014 to 31/12/2020)
Project participants	Dharmesh Chaudhari, A-25/26, Ambika Nagar, Kakrapar Road, Tadkuva, Vyara, District – Tapi – 394650
Host Party	India
Applied methodologies and standardized baselines	AMS.I.E. Switch from non-renewable biomass for thermal applications by the user. UCR Protocol Standard Baseline
Sectoral scopes	SECTORAL SCOPE - 01 Energy industries (Renewable/NonRenewable Sources)
Estimated amount of annual GHG emission reductions for this monitoring period	2014: 499 CoUs (499 tCO _{2eq})
	2015: 548 CoUs (548 tCO _{2eq})
	2016: 580 CoUs (580 tCO _{2eq})
	2017: 591 CoUs (591 tCO _{2eq})
	2018: 621 CoUs (621 tCO _{2eq})
	2019: 627 CoUs (627 tCO _{2eq})
	2020: 627 CoUs (627 tCO _{2eq})
Total: 4093 CoUs (4093 tCO_{2eq})	

SECTION A. Description of project activity

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

a) Purpose of the project activity and the measures taken for GHG emission reductions >>

The project **Surat, Tapi, Narmada, Anand, Navsari, Amreli, Mahesana Small Scale Biogas Projects, Gujarat** is located in Taluka: Uchchhal, Mahuva, Vyara, Umarpada, Navsari, Savarkundla, Nizar, Adajan, Songadh and Kadi, State: Gujarat, India. The project activities are located across 14 villages within State: Gujarat.

The purpose of the project activity is the set up of 27 independent biogas plants (digesters) of 3m³, 4m³, 6m³, 15m³, 60m³ and 85m³ capacity each for serving individual households comprising of an average of 4 members each using cattle dung collected from buffaloes, cows and calves currently being housed at such households in the District of Surat, Tapi, Narmada, Anand, Navsari, Amreli and Mahesana.

By using biogas generated from cattle dung, the project activity replaces Non-Renewable Biomass with biogas for cooking and heating water. The baseline scenario is thermal energy from fuel wood within the domestic households in the village of which a large part of it was non-renewable for domestic cooking and water heating.

b) Brief description of the installed technology and equipment>>

A total of 27 biogas digesters have been installed between 2006 and 2020, having capacities ranging between 3m³, 4m³, 6m³, 15m³, 60m³ and 85m³. All households within the project activity possess cattle or other bovine animals, the number of cattle at each household ranges from 2-6. Biogas is used on a single ring gas stove having one 4” burner with a flame temperature of 870 ° C, supplied as part of the project activity. The biogas slurry is used as bio-manure. The digesters are installed in the following locations:

Sr. No	Village Name	Taluka	District
1	Bhitbhudrak	Uchchhal	Tapi
2	Umra	Mahuva	Surat
	Vanskui (Sumul)	Mahuva	Surat
3	Vanskui	Mahuva	Surat
	Indu	Vyara	Tapi
	Umarpada	Umarpada	Narmada
4	National Dairy Development Board (NDDB)	Anand	Anand
	Tejas Eye Hospital - (Mandvi)	Mandvi	Surat
	Parodh Hostel (Kharel)	Navsari	Navsari
	Khadashli	Savarkundla	Amreli
5	Velda	Nizar	Tapi
	Kosad	Adajan	Surat
6	Pipalkuva	Songadh	Tapi
7	Naranli Gausala (Detroj)	Kadi	Mahesana

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

Date of UCR Project Authorization: 27/09/2021

Start Date of Crediting Period: 01/01/2014

Project Commissioned: 01/01/2006

Total Biogas Units in the monitoring period: 27

This is the first monitoring report for the first crediting period for the period 01/01/2014 to 12/01/2020.

The operational domestic biogas units are in continuous operation after installation, with minor and major repairs as and when are reported by the project owner. Entries are logged and will be provided to the UCR verifier during verification. Since the UCR protocol for biogas systems is based on a conservative 330 days (default) a year operation, the project activity was never non-operational for a period of 35 days or more during any year of the monitoring period.

Year	2006-07	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
Capacity Additions m3	170	107	25	33	10	12	6

d) 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:

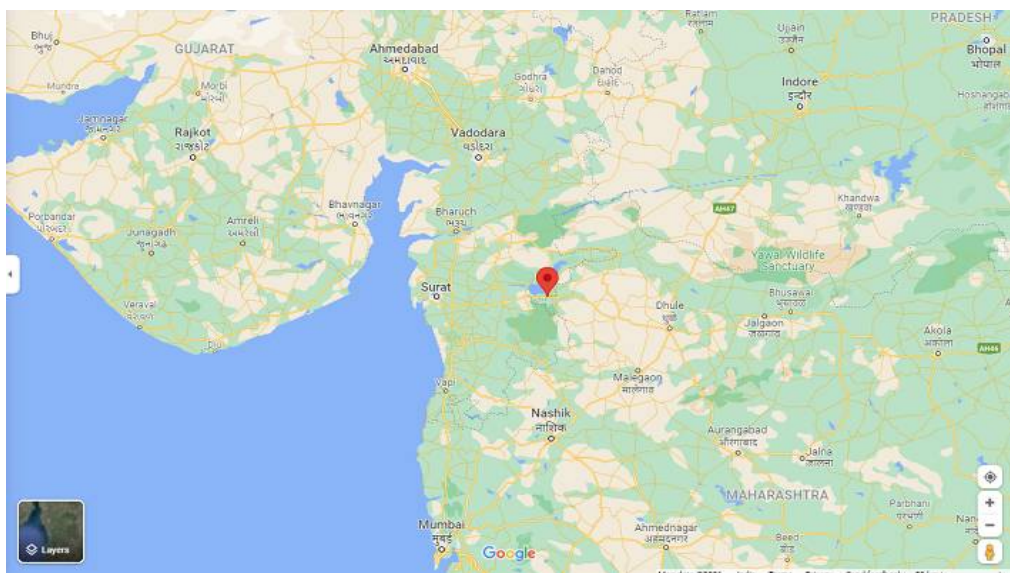
Summary of the Project Activity and ERs Generated for the Monitoring Period	
Start date of this Monitoring Period	01/01/2014
Carbon credits claimed up to	31/12/2020
Total ERs generated (tCO _{2eq})	4093 tCO _{2eq}

The baseline scenario is thermal energy from more GHG intensive means based on the use of non-renewable biomass 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 baseline emission boundary is site of the anaerobic digester in the case of project activity that recovers and utilizes biogas for producing thermal energy and applies this methodology on a standalone basis, i.e. without using a Type III component of a SSC methodology.

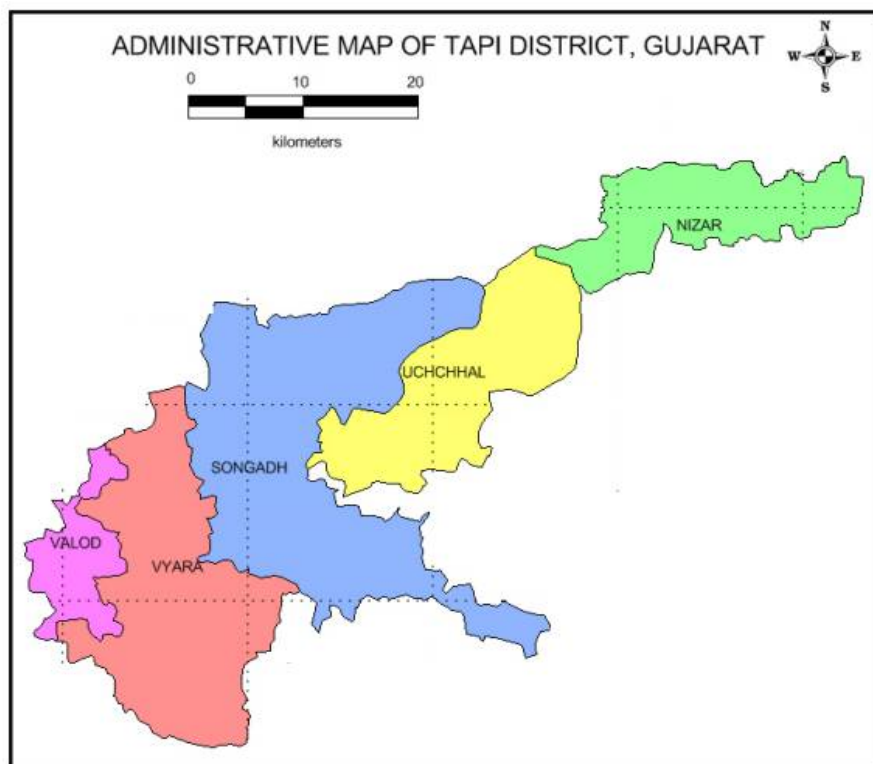
The project proponents are not bound to incur this investment as it was not mandatory by national and sectoral policies.

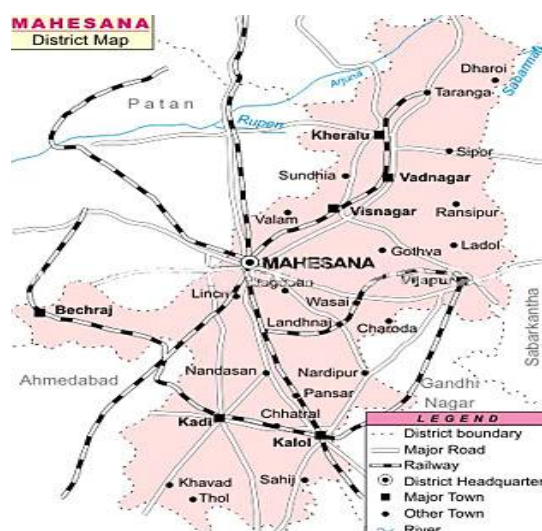
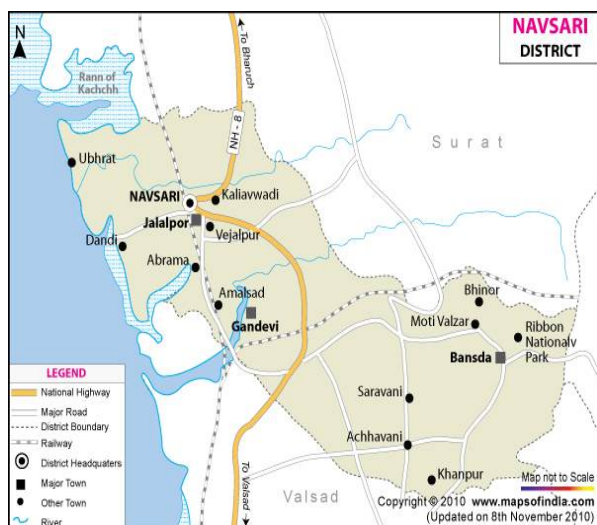
The CoUs or emission reductions for small-scale biogas units are based on approved fossil fuel emission displacement rates established by the UCR Standard. These rates have taken into account the size of the biogas unit, fossil fuel displaced and size of a household.

A.2. Location of project activity>>









Country: India.

District: Surat, Tapi, Narmada, Anand, Navsari, Amreli and Mahesana.

Taluka: Uchchhal, Mahuva, Vyara, Umapada, Navsari, Savarkundla, Nizar, Adajan, Songadh and Kadi

State: Gujarat

A.3. Parties and project participants >>

Party (Host)	Participants
India	Dharmesh Chaudhari, A-25/26, Ambika Nagar, Kakrapar Road, Tadkuva, Vyara, District – Tapi – 394650

A.4. References to methodologies and standardized baselines >>

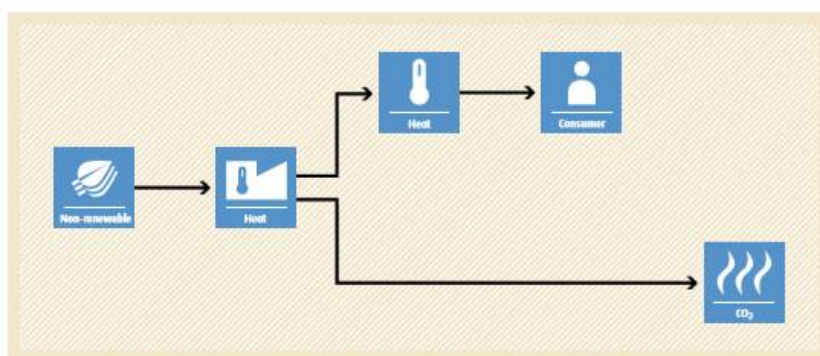
SECTORAL SCOPE - 01 Energy industries (Renewable/Non-renewable sources)

TYPE I - Renewable Energy Projects

CATEGORY- AMS. I.E. Switch from Non-Renewable Biomass for Thermal Applications by the User

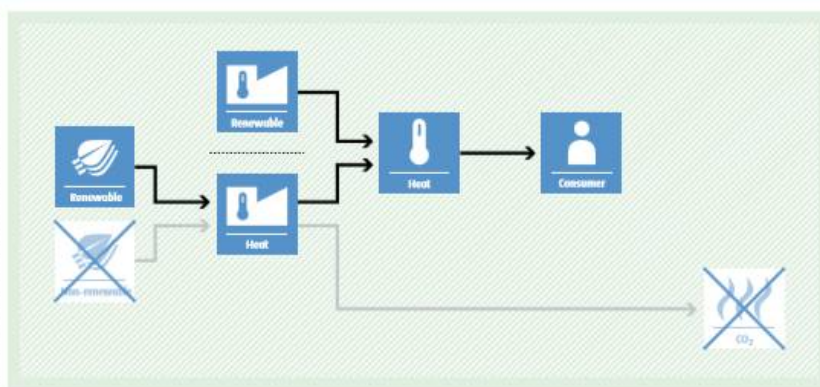
BASELINE SCENARIO

Thermal energy would be produced by more-GHG-intensive means based on the use of non-renewable biomass.



PROJECT SCENARIO

Use of renewable energy technologies for thermal energy generation, displacing non-renewable biomass use.



A.5. Crediting period of project activity >>

Type: Renewable

State date: 01/01/2014

Length of the crediting period corresponding to this monitoring period: 7 years – 01/01/2014 – 31/12/2020

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

**Nutan Pancholi, Mo # 989 806 2970 , Gram Vikas Trust, Vadodara – 390 020. Gujarat. India.
Email: gvtbiogas@gmail.com**

SECTION B. Implementation of project activity

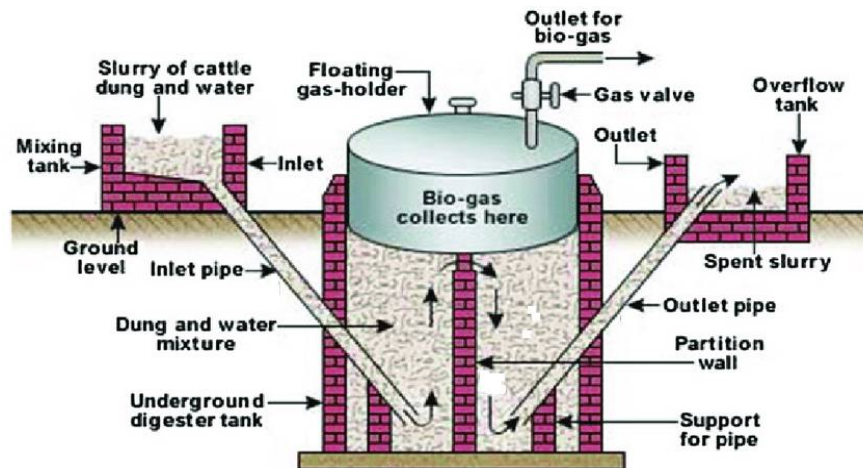
B.1. Description of implemented registered project activity >>

a) Provide information on the implementation status of the project activity during this monitoring period in accordance with UCR PCN>>

Total Biogas Units in the monitoring period: 27 individual units.

Sr. No	Village Name	Taluka	District	Capacity m ³	Number of Digesters	Installed Years
1	Bhitbhudrak	Uchchhal	Tapi	85	2	2006-07
2	Umra	Mahuva	Surat	3	1	2014
				4	11	
	Vanskui (Sumul)	Mahuva	Surat	60	1	
3	Vanskui	Mahuva	Surat	6	1	2015
	Indu	Vyara	Tapi	4	1	
	Umarpada	Umarpada	Narmada	15	1	
4	National Dairy Develoment Board (NDDB)	Anand	Anand	6	1	2016
	Tejas Eye Hospital - (Mandvi)	Mandvi	Surat	6	1	
	Parodh Hostel (Kharel)	Navsari	Navsari	6	1	
	Khadashli	Savarkundla	Amreli	15	1	
5	Velda	Nizar	Tapi	6	1	2017
	Kosad	Adajan	Surat	4	1	
6	Pipalkuva	Songadh	Tapi	6	2	2018
7	Naranlila Gausala (Detroj)	Kadi	Mahesana	6	1	2019
				Total	27	

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



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. 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 KVIC model bio-digesters are as follows:

Specification	Value
Total Installed Capacity	363 m ³
Mixing Proportion	(Water: Dung) 1:1
Number of units (digesters)	27
Feed Material	Cattle Dung
Biogas Flow rate	0.9 m ³ /hr
Number of Stoves	1-2 per household
Unit Conversion rate MJ -> kWh	0.28

Efficiency of Burners	60.00%
Calorific Value Biogas	20 MJ/m ³
Rated Capacity (thermal) MW	1.09 MW _{th}



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 1-ring stove inside the house.

A.2 Do no harm or Impact test 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 are 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
- Leads 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
- Provides employment to local communities through construction and maintenance of biogas units.

- The project reduces cooking time, thus providing the three households to take up income generating activities like farming and other compost related sale activities.

A.6. Baseline Emissions>>

The baseline scenario is thermal energy from more GHG intensive means based on the use of non-renewable biomass 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 baseline emission boundary is site of the anaerobic digester in the case of project activity that recovers and utilizes biogas for producing thermal energy and applies this methodology on a standalone basis, i.e. without using a Type III component of a SSC methodology.

The project proponents are 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.

The CoUs or emission reductions for small-scale biogas units are based on approved fossil fuel emission displacement rates established by the UCR Standard. These rates have taken into account the size of the biogas unit, fossil fuel displaced and size of a household.

1-2 cubic meter	3 cubic meter	4 cubic meter	5 cubic meter	>5 cubic meter
3.5 CoUs/year	4.5 CoUs/year	5.3 CoUs/year	5.5 CoUs/year	Biogas units that have a capacity above 5 cubic meters that follow this UCR Protocol will be credited at the 5 cubic meters rate

A.7. Debundling>>

This micro scale project is not a debundled component of a larger carbon or GHG project activity.

SECTION B. Application of methodologies and standardized baselines

B.1. References to methodologies and standardized baselines >>

SECTORAL SCOPE - 01 Energy industries (Renewable/Non-renewable sources)

TYPE I - Renewable Energy Projects

CATEGORY- AMS. I.E. Switch from Non-Renewable Biomass for Thermal Applications by the User

B.2. Applicability of methodologies and standardized baselines >>

Applicability of methodologies and standardized baselines >>
The project activity is biogas cook stove for households 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 at the household level. The biogas produced is also used for captive power generation. All biogas units distinct from each other.
Biogas produced by the digesters are used or flared.
The annual average temperature of the biogas site is located is higher than 5°C
The storage time of the manure after removal from the animal barns, including transportation, does not exceed 45 days before being fed into the digesters.
The livestock population in the farm is managed under confined conditions. Manure or the streams obtained after treatment are not discharged into natural water resources (e.g. river or estuaries).
The residual waste from the animal manure management system is handled aerobically.
The communities across India are using non-renewable biomass since 31st December 1989. This is based on using published literature, official reports and statistics.
The project activity does not use renewable biomass. The renewable source is cattle dung.
The project activity is biogas cook stove and is not electric cook stoves.
There is a technology switch from traditional stove to biogas stove.
This is a small scale project with total thermal capacity of 1.09 Mw _{th} which is not greater than the small scale thresholds defined by the applied methodology I.E. the limit of 45 MW _{th} is the installed/rated capacity of the thermal application equipment or device/s (e.g. biogas stoves)".

B.3. Applicability of double counting emission reductions >>

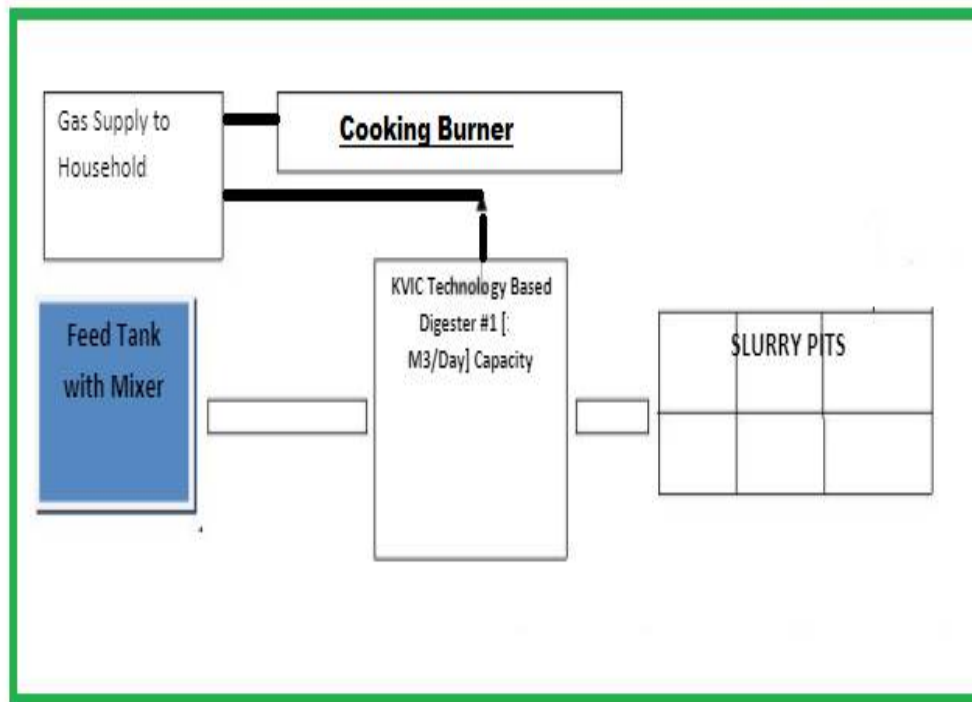
Each of the biogas unit is constructed by the project participant close to the household. The details of the end user's name and the location i.e. District, Mandal, village in which it is constructed will be provided to the UR Verifier during verification. The project participants have not applied for carbon credits under any other GHG program.

B.4. Project boundary, sources and greenhouse gases (GHGs)>>

The project boundary includes the physical, geographical site(s) of:

- Biogas digesters;
- Households using biogas for heating and cooking

Project Boundary



	Source	GHG	Included?	Justification/Explanation
Baseline	Emissions from burning non-renewable wood	CO ₂	Included	Major source of emission
		CH ₄	Excluded	Excluded for simplification. This is conservative
	Emissions from animal manure stored on site	N ₂ O	Excluded	Excluded for simplification. This is conservative
Project Activity	Emissions from residue from anaerobic digester	CO ₂	Excluded	Heat is generated from collected biogas, hence these emissions are not accounted for. CO ₂ emissions from the decomposition of organic waste are not accounted
		CH ₄	Excluded	Excluded for simplification. This is conservative
		N ₂ O	Excluded	Excluded for simplification. This is conservative

Leakage Emissions is not applicable as the project cook stove is not switching to charcoal or

processed renewable biomass.

B.5. Establishment and description of baseline scenario (UCR Protocol) >>

The baseline scenario is thermal energy from more GHG intensive means based on the use of non-renewable biomass 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 baseline emission boundary is site of the anaerobic digester in the case of project activity that recovers and utilizes biogas for producing thermal energy and applies this methodology on a standalone basis, i.e. without using a Type III component of a SSC methodology.

According to the UCR project standard for such project activities, CoUs or carbon credits for small-scale biogas units are based on approved fossil fuel emission displacement rates established worldwide. These rates have taken into account the size of the biogas unit, fossil fuel displaced and size of a household.

1-2 cubic meter	3 cubic meter	4 cubic meter	5 cubic meter	>5 cubic meter
3.5 CoUs/year	4.5 CoUs/year	5.3 CoUs/year	5.5 CoUs/year	Biogas units that have a capacity above 5 cubic meters that follow this UCR Protocol will be credited at the 5 cubic meters rate

Calculated Annual Emission Reductions: $BE_y = HG_{y,thermal} \times EF_{FF, CO_2}$

BE_y = Emission reductions from the use of non-renewable biomass as per the UCR protocol in a year y.

where:

$HG_{y, thermal}$ = Total thermal capacity of the number of digesters in year y

EF_{FF, CO_2} = 5.5 CoUs/year -CO₂ emission factor of the fossil fuel displaced in the baseline as determined by the UCR Standard for 5m³. CO₂ emission factors for 3m³ and 4m³ are used at 4.5 CoUs/year and 5.3 CoUs/year respectively as indicated in the UCR Standard.

GWP_{CH_4} = 21 is the default IPCC value of CH₄ applicable to the crediting period (tCO_{2e}/t CH₄)

NCV_{CH_4} = NCV of methane (MJ/Nm³) (default value: 35.9 MJ/Nm³)

$NCV_{biomass}$ = Net calorific value of the non-renewable biomass as per UCR Standard (0.015 TJ/tonne)

Year	2014	2015	2016	2017	2018	2019	2020
Total Capacity Digesters >5m3	230	255	284	294	302	308	308
Baseline Emissions TCO2eq	499.7	548.4	580.3	591.3	621.3	627.9	627.9
Total Baseline Reductions (tCO2eq/yr)	499	548	580	591	621	627	627
B.E Monitoring Period (tCO2eq)	4093						

B.6. Prior History>>

The project activity has not applied to any other GHG program for generation or issuance of carbon offsets or credits.

B.7. Monitoring period number and duration>>

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

B.7. Changes to start date of crediting period >>

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

B.8. Permanent changes from PCN monitoring plan, applied methodology or applied standardized baseline >>

There are no permanent changes from registered PCN monitoring plan and applied methodology. Minor changes to the installed capacity has been updated in the latest PCN version and submitted to UCR.

B.8. Monitoring plan>>

Data/Parameter	Date of commissioning of biogas units
Data unit	Dates are provided as per Section B1 of this MR
Description	Actual date of commissioning of the project device
Source of data Value(s) applied	Monitoring Report As and when commissioned
Measurement methods and procedures	The construction processes are maintained from its initiation to completion dates for the biogas unit. Thus the start date of each of the unit installed is recorded in the monitoring report. Commissioning certificates will be provided for any sample units selected by the UCR Verifier
Monitoring frequency	As and when commissioned and fixed and recorded in the monitoring report
Purpose of data	To calculate baseline emissions

Data/Parameter	Number of Households Served
Data unit	27
Description	Number of households in the project activity in year y
Source of data Value(s) applied Measurement methods and procedures	Commissioning certificates and log sheets. As and when commissioned The number of household connected to each biogas digester is recorded in log sheets. The log sheets for the sample households selected by the UCR verifier will be provided during verification.
Monitoring frequency	Fixed during commissioning.
Purpose of data	To calculate baseline emissions

Data/Parameter	Number of Working Days for Project Activity per year
Data unit	330 days
Description	Number of working days are conservative as per UCR Standard
Source of data Value(s) applied	Conservative estimate to offset repair and maintenance activities at the farm of biogas systems.
Measurement methods and procedures	
Monitoring frequency	Recorded in log books
Purpose of data	To calculate baseline emissions

Data/Parameter	$f_{NRB,y}$
Data unit	0.65
Description	fraction of non-renewable biomass
Value(s) applied	UCR Standard As per IPCC Standard
Measurement methods and procedures	Conservative Estimate
Monitoring frequency	NA
Purpose of data	To calculate baseline emissions

Data/Parameter	$NCV_{biomass}$
Data unit	0.0156 TJ/tonne
Description	Average annual consumption of woody biomass per household in the preproject devices during the project activity.
Value(s) applied	UCR Standard As per IPCC Standard
Measurement methods and procedures	Fixed
Monitoring frequency	NA
Purpose of data	To calculate baseline emissions

Data/Parameter	Firewood Consumption in Baseline
Data unit	3306 kgs/household/year
Description	Average annual consumption of woody biomass per household in the preproject devices during the project activity.
Source of data Value(s) applied	UCR Standard Protocol As per Standard
Measurement methods and procedures	Fixed
Monitoring frequency	NA
Purpose of data	To calculate baseline emissions

