



Verification Report for

Project : Surat, Tapi, Narmada, Anand, Navsari, Amreli,
Mahesana Small Scale Biogas Projects, Gujarat
UCR Project ID : 006

Name of Verifier	SQAC Certification Pvt. Ltd.
Date of Issue	27/10/2021
Client	Gram Vikas Trust
Project Proponent	Ms. Nutan Pancholi
Work carried by	Mr. Suuhas Tendulkar & Ms. Sheetal Wader
Work reviewed by	Mr. Santosh Nair

Summary:

SQAC Certification Pvt. Ltd. has performed verification on the replacement of Non-Renewable Biomass with biogas for cooking and heating water in the 14 villages within the district of Surat, Tapi, Narmada, Anand, Navsari, Amreli and Mahesana.

Verification for the period 1st January 2014 till 31st December 2020.

In our opinion, the total GHG emission reductions over the crediting / verification period stated in the Project Concept Note (PCN) / Monitoring Report (MR), submitted to SQAC are fairly stated.

The GHG emission reductions were calculated on the basis of UCR Standard 2021 which draws reference from AMS. I.E. Switch from Non-Renewable Biomass for Thermal Applications by the User. Owing to the Covid pandemic, the verification was done remotely by way of video calls / verification, phone calls and submission of documents for verification through emails.

SQAC is able to certify that the emission reductions from the Surat, Tapi, Narmada, Anand, Navsari, Amreli, Mahesana Small Scale Biogas Projects, Gujarat for the period 1st January 2014 till 31st December 2020 amount to 4106 CoUs (4106 tCO₂eq/yr)

Detailed Verification Report:

Purpose:

The client has set up 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 Districts of Surat, Tapi, Narmada, Anand, Navsari, Amreli and Mahesana, Gujarat, India.

The objectives of this verification are, by way of suitable evidences, to establish that:

1. The project has been commissioned as per the documented / video evidence
2. The details provided in the PCN are correct
3. The emission reductions from the project claimed are correct and in accordance with the requirements of the UCR Standard.

Scope:

The scope covers verification of emission reductions from the project - Surat, Tapi, Narmada, Anand, Navsari, Amreli, Mahesana Small Scale Biogas Projects, Gujarat.

Criteria:

Verification criteria is as per the requirements of UCR Standard.

Description of project:

The **Surat, Tapi, Narmada, Anand, Navsari, Amreli, Mahesana Small Scale Biogas Projects, Gujarat** is located across 14 villages within the district of Surat, Tapi, Narmada, Anand, Navsari, Amreli and Mahesana.

The purpose of the project activities 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 Districts of Surat, Tapi, Narmada, Anand, Navsari, Amreli and Mahesana, Gujarat, India. Each household is directly connected to the biogas digesters and feeds cattle dung into the anaerobic digesters. The technology is tried and tested in India, 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 is used on either a single ring gas stove typically having one 4" burner or a double ring gas stove 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 villages:

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 (NDDDB)	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

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. This project contributes strongly to sustainable development of the rural households involved in the project. The small 3m³, 4m³ and 6m³ biogas plants are sufficient to provide cooking fuel to a household family with four to five members each. The larger 15m³, 60m³ and 85m³ capacity digesters are sufficient to provide provide cooking fuel to a larger number of households (upto 121 households) with each household having four to five members. Approximately 0.24 m³ biogas per capita is estimated per person per day. The larger 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. The percentage of population using fuel wood is higher in rural areas (67.3%) and 14% in urban and semi-urban areas (NSSO, 2012). uel wood is largely used by women for cooking purpose and they approximately spends more than 374 hours in a year for collecting fuel wood. The fuel wood is collected from forests, trees grown on farm lands, homesteads and common land outside forest. The annual fuel wood consumption by 854 million people in India is 216.4 million tonnes per year (FSI, 2011). Around 27% of fuel wood is collected from Government owned forests (Public Land).

The smoke from burning such fuels causes alarming household pollution and adversely affects the health of women & children causing several respiratory diseases/ disorders. Biogas technology is a particularly useful system in the Indian rural economy, and can fulfill several end uses. The gas is useful as a fuel substitute for firewood, dung, agricultural residues, petrol, diesel, and electricity, depending on the nature of the task, and

local supply conditions and constraints, thus supplying energy for cooking and lighting. Biogas systems also provide a residue organic waste after anaerobic digestion that has superior nutrient qualities over the usual organic fertilizer, cattle dung, as it is in the form of ammonia. Anaerobic digesters also function as a waste disposal system, particularly in curbing methane emissions from cattle dung which is stockpiled and untreated in most villages.

Livestock production can result in methane (CH₄) emissions from enteric fermentation and both CH₄ and nitrous oxide (N₂O) emissions from livestock manure management systems. Cattle are an important source of CH₄ in many countries because of their large population and high CH₄ emission rate due to their ruminant digestive system.

Methane emissions from manure management tend to be smaller than enteric emissions, with the most substantial emissions associated with confined animal management operations where manure is handled in liquid-based systems. The conventional method of handling manure has been to use sufficient bedding to keep the manure relatively dry and then to move it out of the confinement area and deposit it into a manure pile for months prior to the project activity.

The baseline scenario identified at the PCN stage of the project activity is:

- thermal energy from more GHG intensive means based on the use of non-renewable biomass for domestic cooking and water heating.

Thus, all these biogas digesters within the project activity is a voluntary investment which replaced equivalent amount of thermal energy from renewable source, the biogas. 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 and fight the impacts of climate change.

Level of Assurance:

The verification report is based on the information collected through interviews conducted over video calls / phone calls, supporting documents provided during the verification, Project Concept Note (PCN) / Monitoring Report (MR), submitted to SQAC. The verification opinion is assured provided the credibility of all above.

Verification Methodology:

Review of the following documentation was done by SQAC Team, Mr. Suuhas Tendulkar & Ms. Sheetal Wader both of whom are experienced in such projects.

- Project Concept Note (PCN)
- Monitoring Report (MR)
- Commissioning Report of all Bio Digestors
- Data provided upon request of all the documents of the related projects

Sampling Method:

There are 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 Districts of Surat, Tapi, Narmada, Anand, Navsari, Amreli and Mahesana, Gujarat, India.

A sampling size of 10% was arrived at, which resulted in detailed audit of 3 Bio Digestors i.e., 15m³, 60m³ and 6m³ capacity.

Applied methodologies and standardized baselines :

AMS.I.E. Switch from non-renewable biomass for thermal applications by the user and
UCR Protocol Standard Baseline

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}





Applicability of double counting emission reductions

Each of the biogas unit is constructed by the project participant close to the household. The project participants have not applied for carbon credits under any other GHG program.

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

	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.

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.

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

Estimated Annual Emission Reductions: $BE_y = HG_{y,thermal} \times EF_{FF, CO2}$

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

$EF_{FF, CO2}$ = CO₂ emission factor of the fossil fuel displaced in the baseline as determined by the UCR Standard based on the various capacities of digesters.

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

NCV_{CH4} = 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)

Estimated total baseline emission reductions (BE_y) = 4106 CoUs (4106 tCO_{2eq})

Monitoring period number and duration>>

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

Year	2006-07	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Capacity Additions m3	170	107	25	33	10	12	6	0

Year	2014	2015	2016	2017	2018	2019	2020
Total Capacity Digesters >5m3	230	251	284	290	302	308	308
Baseline Emissions TCO2eq	253	276.1	312.4	319	332.2	338.8	338.8
Total Capacity Digesters =4m3	44	48	48	52	52	52	52
Baseline Emissions TCO2eq	233.2	254.4	254.4	275.6	275.6	275.6	275.6
Total Capacity Digesters =3m3	3	3	3	3	3	3	3
Baseline Emissions TCO2eq	13.5	13.5	13.5	13.5	13.5	13.5	13.5
Total Baseline Reductions (tCO2eq/yr)	499.7	544	580.3	608.1	621.3	627.9	627.9
Rounded Off to min.	499	544	580	608	621	627	627
Total Baseline Reductions for the period (tCO2eq)	4106						

Conclusions:

Based on the audit conducted on the basis of UCR Standard 2021 which draws reference from AMS. I.E. Switch from Non-Renewable Biomass for Thermal Applications by the User, the documents submitted during the verification including the data, Project Concept Note (PCN) / Monitoring Report (MR), SQAC is able to certify that the emission reductions from the project - Surat, Tapi, Narmada, Anand, Navsari, Amreli, Mahesana Small Scale Biogas Projects, Gujarat for the period 1st January 2014 till 31st December 2020 amounts to **4106 CoUs (4106 tCO2eq/yr)** .