



Chicago Climate Exchange®

Small Scale Renewable Biogas Offset Project Protocol

Small Scale Renewable Biogas Projects

The Chicago Climate Exchange (CCX®) Small Scale Renewable Biogas Offset Project Protocol outlines the process and requirements for Project Proponents to register greenhouse gas emission reductions resulting from the voluntary collection, capture and combustion of biogas. CCX General Offsets Program Provisions, CCX Offset Project Verification Guidance Document and CCX Offset Project Protocols can be downloaded by visiting www.theccx.com. Requests for further information or comments may be directed to offsets@theccx.com.

[PAGE INTENTIONALLY LEFT BLANK]

CHICAGO CLIMATE EXCHANGE OFFSET PROJECT PROTOCOL

Small Scale Renewable Biogas

Updated as of 8/20/2009

Table of Contents

Acronyms	3
1. Introduction	4
2. General Provisions	4
3. Associated Documents	4
4. Project Definition	5
5. Eligibility Criteria	5
5.1 CCX Membership	5
5.2 Eligibility Governing Entities with Minor Emissions	5
5.3 Ownership Status	6
5.4 Project Start Date	6
5.5 Project Location.....	6
5.6 Performance Benchmark	6
5.6.1 Regulatory Criteria	7
5.6.2 Common Practice Criteria	7
6. Project Boundary.....	7
6.1 Identification of GHG sources, sinks and reservoirs	8
6.1.1 Relevant GHG Sources and Sinks.....	8
Table 1: Relevant GHG Sources / Boundary Inclusion.....	8
6.1.2 Controlled GHG Sources and Sinks	9
6.1.3 Affected GHG Sources and Sinks	9
6.2 Determining the Baseline Scenario	9
6.3 Project-Related Emissions.....	9
7. Monitoring Requirements.....	10

8. Quantifying GHG Emission Reductions	10
Equation 1: Emission Reductions in Year, “y”	11
Table 2: Standardized Rates for Small Scale Biogas Units for Rural India	11
9. Reporting and Record-Keeping Requirements	11
10. Validation and Verification Requirements	11
10.1 Validation	12
10.2 Verification	12
Appendix A: Verification Checklist	13
Appendix B: CCX Small Scale Renewable Biogas Offset Project Verification Protocol	16
Background and General Procedures	16
Guidelines and Procedures for Small Scale Renewable Biogas Offset Project Verification	17
Scope of Work	17
Procedures for Desk Verification	17
Sampling Procedures for Field Verification	18
Guidelines for Field Verification	18
Verification Reporting Results	19
Appendix C: Chicago Climate Exchange Small Scale Renewable Biogas Digesters Project Reporting forms	21
Form 1: CCX Small Scale Renewable Biogas Digester Project Reporting Form	22
Form 2: Small Scale Renewable Biogas Digester Project Attestation by CCX Project Owner/Aggregator	23
Appendix D: Constructing a Rural India Specific Emissions Displacement Factor	24
Estimation of Fuel Mix per Household in Rural India	24
Table 3: Household Emission Displacement factor for Rural India	26

ACRONYMS¹

ANSI	American National Standards Institute
CCX	Chicago Climate Exchange
GHG	Greenhouse Gas
IPCC	Intergovernmental Panel on Climate Change
WBCSD	World Business Council on Sustainable Development
WRI	World Resources Institute

¹ Please refer to CCX General Offsets Program Provisions for additional “Acronyms, Terms and Definitions”

1. INTRODUCTION

Chicago Climate Exchange (CCX) is the world's first and North America's only active voluntary, legally binding integrated trading system to reduce emissions of all six major greenhouse gases (GHGs), with Offset Projects worldwide. CCX Members with significant GHG emissions voluntarily enter into a legally binding agreement to reach CCX GHG Emission Reduction Commitment². Upon enrollment with CCX, Exchange Allowances are issued to Members in amounts equal to their emission reduction targets. CCX Offset are issued to Owners or Aggregators of registered Projects on the basis of verified sequestration, destruction or reduction of GHG emissions not included under the CCX Emission Reduction Commitment. Members are required to turn in the amount of Exchange Allowances and/or Offset equal their actual GHG emissions annually.

CCX strives to promote transparency and integrity in the carbon market. In accordance with this goal, in developing this document, CCX was guided by the fundamental principles of Project GHG accounting outlined in ISO 14064-2: *Specification with guidance at the Project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements*, Version 1. These principles include:

- Relevance
- Completeness
- Consistency
- Accuracy
- Transparency
- Conservativeness

The following sections of this Protocol discuss the Project criteria, boundaries, monitoring requirements, emissions reduction calculations and other guidelines that each Project Proponent must adhere to in order to generate Offset from biogas digester Projects.

2. GENERAL PROVISIONS

Projects are subject to the conditions of this Protocol, the CCX General Offset Program Provisions and determinations of the CCX Committee on Offsets. All Project Proponents should review CCX General Offset Program Provisions and CCX Offset Project Protocol for Small Scale Renewable Biogas Offset Projects.

3. ASSOCIATED DOCUMENTS

This Protocol references the use of the following associated documents. These documents include:

² <http://theccx.com/content.jsf?id=72>

- CCX General Offset Program Provisions
- CCX General Verification Guidance Document
- CCX Project Implementation Document
- CCX Project Specific Conflict of Interest Form
- CCX Greenhouse Gas Emission Factors Document
- CCX Project Owner Attestation

These documents are available on the Offsets section of the CCX website: www.theccx.com

4. PROJECT DEFINITION

A Small Scale Renewable Biogas Offset Project consists of the installation and operation of a biogas digester plants that meet the eligibility criteria and other requirements outlined in these guidelines. Biogas digesters are small scale renewable energy technologies that supply individual households and other users with energy from methane that is mainly used to generate hot water or for cooking gas, or electricity. Projects are issued Offset for emission displacement by end-users who employ clean renewable biogas as substitute for fossil fuel based sources of cooking fuel such as kerosene or non renewable biomass.

5. ELIGIBILITY CRITERIA

Several factors determine a Project's eligibility for generating Offset including the Project Proponent's membership status, ownership status, Project start date, location and whether the Project meets the CCX performance benchmark.

5.1 CCX Membership

The Project Proponent(s) must be a Member or Participant Member (Offset Provider or Aggregator) of CCX. For-profit entities, cooperatives, governmental bodies and non-profit organizations may act as CCX Offset Aggregators. An Aggregator serves as an administrative representative, on behalf of Project Owners, of one or more Projects. Project Proponents should contact CCX directly for membership rules and information.

5.2 Eligibility Governing Entities with Minor Emissions

Entities with an entity-wide emissions profile greater than 10,000 metric tons CO₂ equivalent for the most recent calendar year may register and trade CCX Offset only if the entity is a Member of CCX and undertakes the CCX Emission Reduction Commitment. For

specific guidance on this provision, Project Proponents should review CCX General Offset Program Provisions.

Entities who are unsure of their emissions profile should estimate their direct CO₂ emission using well accepted methodologies such as those available at the World Resources Institute (WRI)/World Business Council on Sustainable Development (WBCSD). CCX requires that all entities that are not Members, including producers enrolled with Aggregators, provide an attestation relating to their direct emissions in a form provided by CCX.

5.3 Ownership Status

The Project Proponent must demonstrate clear ownership of the GHG mitigation rights associated with the Project in order to register Small Scale Renewable Biogas Offset Projects with CCX. Contract documentation may be provided by the Project Proponents to express ownership of the GHG mitigation rights. Where appropriate, an attestation of Project Ownership shall satisfy this requirement.

CCX Offset Aggregators must have acquired appropriate control of the GHG mitigation rights from the Project Owner in order to execute its responsibilities on CCX pursuant to CCX General Offset Program Provisions. Aggregators must demonstrate to the Project Verifier and CCX that they have acquired appropriate control.

5.4 Project Start Date

Projects must start on or after January 1, 2003, which corresponds with the beginning of the CCX cap and trade program.

5.5 Project Location

Small Scale Renewable Biogas Offset Projects shall be located either in the United States or in a country designated as a non-Annex I country under the Kyoto Protocol. Project Proponents should submit the CCX Project Information Document (PID) to CCX for review.

5.6 Performance Benchmark

Small Scale Renewable Biogas Offset Projects are not eligible to generate Offset in instances where the collection and destruction of biogas can be considered a standard business practice (i.e. business as usual) or is required by law or other legally binding framework. CCX has identified two performance criteria that Projects must meet to be considered for Exchange Offset issuance.

5.6.1 Regulatory Criteria

In order to be eligible to receive Offset under these guidelines, the Project shall not be required to collect and utilize the biogas under any federal, state or local regulation or other legally binding framework. The regulatory criteria must be applied to both U.S. and non-U.S.-based Projects (approved Projects originating in non-Annex I Kyoto Protocol countries).

During the course of verification, the Project Proponent shall provide to the Verifier reasonable assurances necessary to prove that the Project, including the use of small scale biogas units, is not required under any federal, state or local regulation or other legally binding framework and shall sign an attestation stating that the Project is not required under any federal, state, or local regulation or other legally binding framework.

5.6.2 Common Practice Criteria

According to the GHG Protocol for Project Accounting, “*Common practice refers to the predominant technologies or practices in a given market, as determined by the degree to which those technologies or practices have penetrated the market (defined by a specified geographic area).*”³ For example, CCX reviewed information regarding the prevalence of biogas digesters in rural India and found that in the absence of biogas use as a cooking fuel, conventional fossil fuel in the form of LPG or kerosene, and non renewable biomass fuel combustion using inefficient wood stoves, is the norm. Project Proponents wishing to apply this Protocol to Projects outside of India must present the CCX Offset Committee with sufficient information that can be used to establish strict regulatory and beyond business as usual criteria.

Given the common practice definition above, building and operating biogas digester plants for the purpose of generating cooking gas for households in India is clearly not common practice. Therefore, a Project that meets the regulatory criteria above and installs a biogas plant can be considered beyond business as usual. For Projects in non-Annex 1 countries under the Kyoto Protocol, the Project Proponent must similarly demonstrate that the Project activity is beyond business as usual. CCX will periodically review this data to assess whether the performance benchmark has changed and may implement modifications in the future based on the review. Once a Project is registered with CCX, it is not affected by changes to the common practice criteria for the market period in which it registers. The current market period is from January 1, 2003 through December 31, 2010.

6. PROJECT BOUNDARY

A clearly defined boundary is vital to accurately assessing emission reductions due to the installation of a biogas digester plant. The Project boundary for small scale biogas plant Projects will include the biogas collection system, manure collection site and a device to collect and combust renewable biogas fuel such as cooking stoves. Specifically, the Project

³ World Resources Institute and World Business Council for Sustainable Development. 2005. *The Greenhouse Gas Protocol for Project Accounting*. WRI/WBCSD, Washington, D.C.

Boundary encompasses the sum of all the physical geographical sites of all individual biogas plants (digester system, pipe leading to the stove and the stove itself realized by the Project activity).

6.1 Identification of GHG sources, sinks and reservoirs

6.1.1 Relevant GHG Sources and Sinks

Table 1 identifies relevant GHG Sources and whether each is to be included within the Project's Boundary.

Table 1: Relevant GHG Sources / Boundary Inclusion

GHG Source Category	GHG Source	GHG	Included in Project Boundary	Comment ⁴
Biogas Collection and Upgrading Systems	Emissions resulting from fossil fuel derived energy used during manure collection and processing	CO ₂	Yes	All CO ₂ emissions (direct and indirect) due to fossil fuel combustion are included. ⁵
		CH ₄	No	Excluded, as this emission source is assumed to be very small.
		N ₂ O	No	Excluded, as this emission source is assumed to be very small.
Biogas Gas Destruction Device	Emissions resulting from the destruction of biogas gas	CO ₂	No	Biogenic emissions are excluded.
		CH ₄	No	Dependent on efficiency of the destruction device.
		N ₂ O	No	Excluded, as this emission source is assumed to be very small.
	Emissions resulting from the combustion of fossil fuel in the destruction device	CO ₂	Yes	All CO ₂ emissions (direct and indirect) due to fossil fuel combustion are included.
		CH ₄	No	Excluded, as this emission source is assumed to be very small.
		N ₂ O	No	Excluded, as this emission source is assumed to be very small.

⁴ Based on emissions factors found in Volume 2, Table 2.2 of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, all CH₄ and N₂O emissions are excluded (with the exception of CH₄ emissions from agricultural methane gas destruction), as emissions will be small in comparison to CO₂ emissions.

⁵ See Project Emissions discussion in this section for exceptions of the inclusion of indirect emission sources.

The GHG Sink(s) will be the combustion process and associated destruction device(s) used by the Project. No reservoirs are anticipated in small scale biogas Projects and therefore are not discussed at greater length below.

ISO 14064-2 requires that the Project's GHG Sources and Sinks be categorized as controlled by the Project Proponent, related to the Project, or affected by the Project. These are discussed below.

6.1.2 Controlled GHG Sources and Sinks

Controlled GHG Sources and Sinks for Small Scale Renewable Biogas Offset Projects Project are those that occur on-site. Therefore, controlled GHG sources and sinks for small scale renewable biogas Projects refer to those that are part of the biogas collection and combustion systems.

6.1.3 Affected GHG Sources and Sinks

Affected GHG Sources and Sinks are those that are influenced by the Small Scale Renewable Biogas Offset Projects and result in new or changed activities outside the boundary of the Project that actually increase GHG emissions. This concept is commonly referred to as leakage. CCX does not expect Small Scale Renewable Biogas Offset Projects to result in new or changed activities that increase GHG emissions outside of the Project boundary and, therefore, no Project-specific leakage assessment is required.

6.2 Determining the Baseline Scenario

Based on the information presented in [Section 5.6.2](#) of this document, the baseline scenario is the emissions associated with the use of fossil fuels for the Project activity. The GHG emissions displacements are calculated by estimating the fossil fuel emissions displaced through the use of the renewable biogas for the region.

CCX has determined a standardized baseline fuel emissions rate for rural India based on an estimation of the emissions associated with the baseline fuel mix used for cooking purposes in rural India and is presented in Appendix D. Project Proponents wishing to apply this Protocol to Projects outside of India must present the CCX Offset Committee with baseline fuel emissions rates for the region in question.

6.3 Project-Related Emissions

Biogas Projects as defined in these guidelines are not expected to result in Project emissions. GHG emissions from combustions of biogas is biogenic in nature is does not constitute a deduction to Project crediting.

7. MONITORING REQUIREMENTS

The Project Proponent shall develop and maintain a monitoring plan with procedures for obtaining, recording, compiling and analyzing data and information required for quantifying and reporting GHG emission reductions.

The Monitoring and Verification procedures define Project specific standards against which the biogas digester Project's performance and conformance with all relevant criteria will be monitored and verified. They include developing suitable data collection methods including a computerized data capture system, and techniques for data interpretation for monitoring and verifying GHG emission reductions with specific focus on technical/efficiency/performance parameters. The aim is to enable this Project to have clear, credible and accurate monitoring, evaluation and verification procedures. See [Appendix B](#) for the CCX Small Scale Biogas Verification Protocol. Project specific standards that all Projects must follow are:

- Metering the energy produced by a sample of the biogas installations where the simplified baseline is based on the energy produced multiplied by an emission coefficient.
- Recording annually the number of systems operating.
- Estimating the annual hours of operation of an average system, if necessary using survey methods.
- Annual hours of operation will also be estimated from total output – amount of biogas generated based on amount of manure fed into the digester; and output per hour will also be estimated by doing a regular random survey of operating systems which will record energy to the stove.

8. QUANTIFYING GHG EMISSION REDUCTIONS

Offset produced by eligible biogas units that displace fossil fuel used for combustion and cooking purposes shall be determined based on fossil emissions displaced from the prior Project energy mix. Displaced emissions are those that would have otherwise been emitted if the equivalent energy content of non-renewable fuel was used instead of renewable biogas. In addition, the emission displacement is a function of the capacity of the biogas unit.

Therefore, emission reductions are calculated by multiplying the capacity of the biogas unit with the emissions displacement factor for the region.

Equation 1: Emission Reductions in Year, “y”

$$ER_y =$$

$$CAP \times EF_{FF}$$

Where:

ER_y	Emission reductions in the year “y” (tCO ₂ e)
CAP	Biogas plant size (in cubic meters)
EF_{FF}	Carbon emissions factor of fossil fuel being displaced (tCO ₂ per year)

Based on estimation of emissions associated with the baseline fuel mix, CCX has developed standardized rates for small scale biogas units for rural India. These established rates are as given in **Table 2** below:

Table 2: Standardized Rates for Small Scale Biogas Units for Rural India

Biogas Plant Size (cubic meters)	Mt CO ₂ /unit/year
1	3.54
2	3.54
3	4.55
4	5.31
5	5.55

Biogas units that have a capacity above 5 cubic meters that follow this Protocol will be credited at the 5 cubic meters rates.

9. REPORTING AND RECORD-KEEPING REQUIREMENTS

The Project Proponent shall implement monitoring, recordkeeping and procedures for quality management and uncertainty assessments. All relevant Project documentation shall be kept by the Aggregator for a minimum of 2 years beyond the completion of the Project.

10. VALIDATION AND VERIFICATION REQUIREMENTS

10.1 Validation

CCX Projects utilizing these guidelines are validated one of two ways. All projects must submit a PID to CCX Staff for review. Projects that adhere strictly to the requirements of this protocol are validated by CCX staff and do not require a separate Validation by CCX Offsets Committee. For all Projects seeking to deviate from specific components of this protocol, the Project Proponent is required to complete the deviation request section of the PID for review and approval by the CCX Offsets Committee. Upon receipt and review of the deviation request, the CCX Offsets Committee will review the feasibility and appropriateness of the requested deviation(s) and, as needed, seek guidance from appropriate technical experts. Under either approach, the Project Proponents will be notified of the Project or Deviation approval by notification letter.

10.2 Verification

Prior to undertaking verification, the prospective Verifier must conduct a Project specific conflict of interest process. The prospective Verifier must complete and submit the CCX Project Specific Conflict of Interest Form⁶ to CCX for approval prior to the commencement of verification activities.

Projects seeking to register Offset shall be verified by a CCX-Approved Verifier⁷ in accordance with CCX General Offsets Program Provisions, CCX Verification Guidance Document and the Project Protocols. A checklist list of verification requirements is contained in [Appendix A](#). Independent verification is critical to ensure that the requirements of this Protocol are correctly applied. Projects shall be verified on an annual basis at minimum.

To ensure impartiality, completeness and consistency in the verification report review process an additional independent review of the submitted verification reports is conducted by the CCX Provider of Regulatory Services. Further information about the roles and responsibilities of Verifiers and the roles and responsibility of Members during verification are discussed in detail in *Chicago Climate Exchange Offset Program Verification Guidance Document* available on the CCX webpage: www.theccx.com.

See Appendix B for the CCX Small Scale Biogas Verification Protocol.

⁶ CCX Project Specific Conflict of Interest Form can be found in the Associated Documents section of the CCX website: www.theccx.com.

⁷ A list of CCX-Approved Verifiers is found on the CCX website: www.theccx.com

APPENDIX A: VERIFICATION CHECKLIST

CCX Requirement	Assessment Criteria		Verification Findings
Validation	CCX Project Approval Letter.		
Verification: Conflicts of Interest	Complete a conflicts of interest assessment.		
CCX Membership	Confirm that the Project Proponent is a CCX Member or Participant Member (Offset Aggregator or Provider).Offset		
Ownership Status	Entity has clear ownership of GHG emission rights.		
Project Start Date	Date of installation of biogas unit is on or after January 1, 2003.		
Project Location	Project is in an eligible geographic location.		
Regulatory Criteria	Confirm the Project is not required by federal, state, local law or other legally binding framework.		
Common Practice Criteria	Fuel source that is the norm.		
Identification of GHG Sources, Sinks and Reservoirs	Confirmation of the identification of all sources, sinks and reservoirs.		
Project Boundary	Biogas Collection and Upgrading Systems.	All CO ₂ emissions (direct/indirect) resulting from fossil fuel combustion derived energy used during manure collection and processing.	
	Manure Collection Site.	Coordinates.	

	Biogas Gas Destruction Device.	Efficiency of destruction device to determine whether CH ₄ emissions resulting from the destruction of biogas gas should be considered.	
		All CO ₂ emissions (direct/indirect) resulting from fossil fuel combustion in the destruction device.	
Baseline Establishment	Technology / source of energy that would have been used in the absence of the Project activity.		
	Fuel emissions rate applied.		
GHG Calculations	The quantification methodology applied.		
Monitoring Requirements			
Monitoring Plan	Do procedures for obtaining, recording, compiling and analyzing data and information for quantifying and reporting GHG emission reductions exist? (yes/no).		
Metering	Sample of the systems.		
Annual Number of Operational Systems	Records.		
Estimation of Annual Hours of Operation of an Average System	Survey Methods.		
	Total output (amount of biogas generated based on amount of cow dung fed into the digester) and output per hour (estimated by doing a regular random survey of operating systems, recording energy to stove).		
Desk Verification			
Recordkeeping	Name of Offset Provider/Aggregator.		
	Total number of operating systems registered by capacity annually.		

	Total number of registered systems not operational, classified by capacity of biogas unit.	
Database Management Procedures	Brief description.	
Monitoring Procedures	Brief description.	
Field Verification		
Ownership	Evidence of ownership of biogas unit, property, etc.	
Contract	Contractual agreement between owner and CCX Aggregator.	
Biogas Unit Inspections	Operational and working properly (pipes, biogas drum, etc).	
Fossil Fuel Usage	Site records	

APPENDIX B: CCX SMALL SCALE RENEWABLE BIOGAS OFFSET PROJECT VERIFICATION PROTOCOL

Background and General Procedures

Registration of each CCX Small Scale Renewable Biogas Offset Project must be accompanied by a Project verification statement prepared by a CCX-Approved Verifier. A verification report must be submitted at least once per year to CCX. This overview provides general guidance pertaining to submission of annual verification reports for CCX Small Scale Renewable Biogas Offset Projects. For detailed information on rules and the approved Protocol for Small Scale Renewable Biogas Offset Projects, please consult the CCX General Offset Program Provisions and CCX Offset Project Protocol for Small Scale Renewable Biogas Offset Projects.

The verification report should describe the verification process employed by the Verifier along with the results and recommendations from the verification. The verification filings must contain an attestation by a CCX-Approved Verifier as to the quantity of mitigation achieved and Exchange Offset issuance that is prepared in conformance with the rules provided herein, and with the verification Protocols prescribed by the Exchange.

Once completed, the verification report shall be submitted to CCX for staff review. If all items on the Verifier Checklist are included and well documented, and the report is otherwise complete, it will be sent to the CCX Provider of Regulatory Services for a third-party review. The CCX Provider of Regulatory Services will review the verification report to assure completeness, accuracy and conformance to the CCX-specified verification Protocols. If the report is deemed to be complete and requires no additional review or corrective actions, the quantity of Offsets listed in the report will be registered in the CCX Registry account of the CCX Offset Aggregator. If CCX staff, the CCX Provider of Regulatory Services or the CCX Committee on Offsets requires any additional information from the Verifier, CCX staff will contact the Verifier with such a request.

The following items must be included while submitting a CCX Small Scale Renewable Biogas Offset Projects verification report to CCX:

1. Cover letter on Verifier's letter head providing full contact details of Verifier including phone number and email.
2. Verification report addressing all the items included in the verification checklist in Appendix A of the Protocol. Verifier has to clearly indicate their conclusion for items on the checklist along with a brief description of the process/rationale for arriving at the conclusion. The Verifier's report must include, as a header, the CCX-Approved Verifier's letterhead on all pages. All accompanying documents mentioned in the

- Verifier's report must be clearly referenced providing both the source of the data and title of the attached document. The Verifier's report must be signed by an official.
3. Completed CCX Annual Reporting form signed by an official from the entity for which the verification is being conducted. CCX Annual Reporting form is included in Appendix A of this document.
 4. Accompanying documents must be clearly titled and should indicate the source of the information and be included as appendices to the report. For example, any information or supporting data from the participating entity should either be on the company letter head or indicate that it is an entity submitted document.

Guidelines and Procedures for Small Scale Renewable Biogas Offset Project Verification

Scope of Work

This section provides general guidelines for verification; checklists and reporting formats for CCX registered Small Scale Renewable Biogas Offset Projects. However, considering the unique nature of practices and procedures by the enrolled participants, the Verifier shall use their judgment in demanding additional data/documentation as relevant to each case.

The verification process will consist of two components namely, a desk verification and a field verification. Field verification must be conducted on a sample of registered participants in the CCX Small Scale Renewable Biogas Projects by a CCX-Approved Verifier. The field verification is intended to verify and report conformance with the program criteria, and to identify and report any biogas units within the sample not in compliance with eligibility criteria. Project Owners that are unable to provide sufficient documentation as required by the Verifier will be ineligible.

The verification will be conducted on a sample from each pool of enrolled biogas units. Each pool may contain any number of biogas units across the various unit sizes. Aggregators must notify and receive CCX approval prior to enrolling new pools of biogas units.

Procedures for Desk Verification

The purpose of the desk verification is to verify and report on the recordkeeping procedures of the Aggregators with the purpose of ensuring effective management of the biogas Project.

The desk audit report will provide the following items:

1. A record of the name of the Offset Provider/Aggregator
2. A record of the total number of operating systems registered by capacity on an annual basis.

3. A brief description of the database management procedures in place along with any monitoring procedures.
4. Recording annually the total number of registered systems that are not operational classified by capacity of the biogas unit.

Sampling Procedures for Field Verification

1. The CCX-Approved Verifier will be responsible to collect the samples from each pool of registered biogas units.
2. The minimum required sample size for in-field verification component of small scale biogas units in a pool should consist of a stratified sample drawn at 95% confidence interval and 5% margin of error.
3. Biogas units that are in proximity to the selected sample may also be visited by the CCX-Approved Verifier, at his discretion.

Guidelines for Field Verification

The field verification will consist of a general inspection of the sampled units. Guidelines for field verification are provided below.

General Inspection

The following items will be inspected and reported during the general inspection on the selected sample for each pool of registered biogas units:

- Record the following information from sampled households:
 - Name, Address, Pool Identification number
 - Number of members in Household
 - Number of owned cattle
 - Common input to biogas unit (manure/organic waste etc.)
- Evidence of ownership of biogas unit. (This could include evidence of ownership of the property in which the biogas unit is located).
- Evidence of contract with the registered CCX Aggregator.
- Evidence that the biogas units are installed on or after January 1, 2003.

- General inspection to verify that the biogas unit is operational and the installed infrastructure is working, including pipes, biogas drum etc.) Any evidence of non-operational biogas unit or leakage of gas should be documented in Verifiers report.
- Document and report any additional fossil fuel usage by the sampled household.

The format for reporting summary results from the general inspection are provided in of Appendix III this document. The next section provides guidance on verification reporting format.

Verification Reporting Results

The verification report is intended to be a stand-alone document providing results from a complete overview and quantification of the Project. The report must include:

1. Executive Summary

- Contact details of the staff involved in verification
- Description of sampling procedure and results
- Description of Verifier's execution of methodology for both desk and in-field verification
- Verification results, including recommendation of Offset crediting in metric tons carbon dioxide equivalent for each crediting period

2. General Information

- Provide a general introduction to the Project undergoing verification
- Provide a description of the scope of work of the verification report
- Provide the contact information for the following parties
- Project Aggregator
- CCX-Approved Verifier

3. Results of Desk Verification

- Provide a description of the Aggregator's record keeping, monitoring and database management infrastructure along with any recommendations for enhancements.

- Document how the aggregation maintains accurate and up to date information on Project participants
- Provide a summary of total biogas units registered and operational by year and biogas plant capacity
- Provide a summary of biogas units that are in non-conformance or not operational to the rules laid out in the CCX Protocol for Small Scale Renewable Biogas Offset Projects. (Voluntary report)
- Provide recommendation that the CCX Offset issuance calculations and conversions to carbon dioxide are being properly done by the registered Aggregator.

4. Results of Field Verification

- Provide results from the general inspection as described in this document.

5. Conclusion

- Provide conclusions and recommendations regarding Project and specifically address any areas of concern.

6. CCX Project Forms

- Provide a completed Offset Project verification statement.
- Provide a completed Small Scale Renewable Biogas Digester Project Attestation by CCX Project Owner/Aggregator.

APPENDIX C: CHICAGO CLIMATE EXCHANGE SMALL SCALE RENEWABLE BIOGAS DIGESTERS PROJECT REPORTING FORMS

The forms provided below are used to report on the continued eligibility and effectiveness of CCX-registered methane collection Projects with the Chicago Climate Exchange.

This report must be:

1. Submitted by each CCX Project Owner before January 31 (to report on Project performance for the prior year).
2. Accompanied by a Project eligibility and performance attestation form signed by a CCX-Approved Verifier.

Required steps:

1. CCX-Approved Verifier is to complete and sign Form 1 contained in this packet.
2. CCX Project Owner or Aggregator is to complete and sign Form 2 contained in this packet.
3. Submit the signed Form 1 and Form 2 to CCX before July 31 and January 31 to CCX.
4. Maintain for inspection the records of all regulatory documents, types and capacities of biogas digesters, calculations and other information used as the basis for this report.

Form 1: CCX Small Scale Renewable Biogas Digester Project Reporting Form

To be completed and signed by a CCX-Approved Verifier

CCX Project Owner: _____

Please report only for Projects that have completed the CCX Offset Project registration process. If additional qualifying sites are placed into operation they must be registered via a Project registration amendment form. *Please duplicate this form as necessary.*

Reporting period:	(Enter for example: January 1, 2003 through June 30, 2003)		
CCX Small Scale Renewable Biogas Digester Offset Project Details	Count	Enter Document Reference	CCX Offset Issuance ⁸
1 cubic meter size			(hundred metric tons CO ₂)
2 cubic meter size			(hundred metric tons CO ₂)
3 cubic meter size			(hundred metric tons CO ₂)
4 cubic meter size			(hundred metric tons CO ₂)

CCX-Approved Verifier Name: _____

CCX-Approved Verifier Representative: _____

Signature: _____

Contact Number: _____

⁸ CCX Offsets for Small Scale Biogas Digester in India are issued at an annual rate of 3.54 per standard 2 cubic meter biogas plant

**Form 2: Small Scale Renewable Biogas Digester Project Attestation
by CCX Project Owner/Aggregator**

Reporting period: ___ / ___ / ___ through: ___ / ___ / ___.

I hereby warrant:

1. That the small scale biogas digesters identified in this filing caused the displacement of fossil fuel emissions reported by _____ (Verifier) as reported in Form 1 (CCX Small Scale Renewable Biogas Digester Reporting form);
2. That the small scale biogas digester identified in this filing continue to meet CCX eligibility rules for such Projects;
3. That _____ (Project Owner) or _____ (Project Aggregator) continues to hold full legal title to the Greenhouse Gas mitigation rights associated with the emission displacement at the facilities identified in Form 1.

Signed and attested by a duly authorized representative of:

(Project Owner or Project Aggregator)

Signature

Print Name

Title

Date

APPENDIX D: CONSTRUCTING A RURAL INDIA SPECIFIC EMISSIONS DISPLACEMENT FACTOR

The objective is to formulate an emission displacement factor that is representative of the cooking fuel mix in rural areas of India. This emission displacement factor provides the basis for crediting biogas digester plants under the rationale explained earlier in the Protocol. The general approach to estimating the Rural India Emission Displacement Factor involves computing the business as usual energy usage from fossil fuel and non renewable biomass sources in India. The fuel mix in rural India relies heavily on traditional biomass based fuels (fuel wood, crop residue and animal dung)⁹ along with Kerosene and LPG which account for about 2% of total rural energy consumption. The quantity and type of fuel mix in a representative rural Indian household can then be converted, using standard fuel emission factors, to provide the emission displacement factors. The underlying assumption is that rural Indian households with biogas units will rely solely upon biogas to meet their cooking fuel needs. While this is predominantly the case, a combination of conservative crediting rules and appropriate monitoring and verification procedures are used herein to confirm that this assumption. The next section provides the basis for estimating the fuel mix for a representative household in rural India.

Estimation of Fuel Mix per Household in Rural India

Fuel Wood

Fuel wood is the primary domestic energy source contributing 78% of rural energy needs¹⁰. Household consumption of fuel wood used depends on a variety of factors including availability and ease of collection, proximity to urban areas, socio-economic status, availability of clean and efficient forms of commercial fossil energy (LPG and Kerosene), fuel efficient cooking equipment, relative price of fuels and inter-fuel substitutability.

For the purpose of arriving at a realistic national figure for avoided emissions, we use estimates from several peer reviewed literature sources to arrive at a standard fuel wood consumption estimate of 3,306 kilograms¹¹ per year per rural household. Following the approach set by CDM, the above estimate is arrived as a simple average of five recent studies that estimate rural Indian fuel wood consumption.

⁹ NSSO. "Energy used by Indian Households. New Delhi. National Sample Survey Organization. Department of Statistics [Report no. 410/2]

¹⁰ Preeti Malhotra, I.H. Rehman, P. Bhandari, R. Khanna, R. Upreti. "Rural Energy Data Sources and estimations in India." TERI

¹¹ The above estimate is arrived as the arithmetic average of the following peer reviewed studies in India: P. Malhotra *et al.* (2000); Ramachandra T.V. *et al.* (2004); Ramachandra T.V. *et al.*; Ramachandra T.V and G.R. Rao; R. Heltberg *et al.* (2000)

It is important to distinguish between the renewable and non renewable portions of the above fuel woods. There is a range of estimates that suggests that 65% to 80% of the above fuel wood occurs through forest extraction¹². This fuel wood is necessarily extracted illegally as there is a ban on fuel wood extraction from forests in India. This portion of biomass is considered non-renewable in the sense that the Forest Department is not able to plan, and therefore keep up with the required replanting to supply sufficient biomass fuel for combustion for cooking and water heating. For purposes of this estimation and in the interest of being conservative, we use the lower bound of estimates (i.e. 65%) to account for the non-renewable portion of total fuel wood usage will be utilized.

Kerosene and LPG consumption

The per capita consumption of kerosene in rural India has been estimated to be 0.68 litres per month¹³. Using these figures average kerosene consumption for a medium sized rural household¹⁴ in India is computed to be 40.8 liters per year. Similarly, per capita LPG consumption in rural areas is 0.04 kilograms per month. Using these figures average LPG consumption for a medium sized rural household in India is computed to be 2.4 kilograms per year.

The next section of the document uses standard IPCC emission factors to determine the Rural India Emission Displacement Factor. Although burning fire wood in efficient basic mud stoves that dominate rural India households produce variety of other potentially global warming gases such as Non methane hydrocarbons (NMHC) and carbon monoxide¹⁵. The current analysis accounts for the release of conventional GHG's of CO₂, methane and nitrous oxide from wood burning. Table 1 provides greater detail on estimating the household displacement factor for rural India based on the above data.

¹² Kanchan Chopra, B.B. Bhattacharya, P. Kumar. "Contribution of Forestry Sector to Gross Domestic Product (GDP) in India Report". Institute of Economic Growth, Delhi University Enclave, Ministry of Environment and Forests, Government of India. (2001)

¹³ NSSO. Consumption of Some Important Commodities in India. Report No. 404. New Delhi. National Sample Survey Organization, Department of Statistics, Government of India. (1997)

¹⁴ The National Census Bureau of India defines Medium sized rural household in India as one consisting of 5 members

¹⁵ Smith et al. Greenhouse Implications of Household Stoves: An Analysis for India. Annual Review Energy and Environment. 2000

Table 3: Household Emission Displacement factor for Rural India

Fuel Type	Annual Household Consumption	Emission Coefficient	CO ₂ Emission (metric tons)
Total firewood (kilograms)	3,306		
Non renewable firewood (kilograms) [65% of total wood]	2,149	1784.6 grams per kg wood	3.834
Kerosene (liters)	40.8	0.0026 metric tons per liter	0.1061
LPG (kilograms)	2.4	0.003 per kilogram	0.0072
Total	-	-	3.94
<i>CCX Proposed Factor (10% discount of estimated rural household emission displacement factor)</i>			3.54

In the context of biogas digesters, it is important to note that the above emission displacement factor does not capture all the sources of GHG avoided through the use of the technology. Other sources not accounted for include potential methane emissions from manure sludge, nitrous oxide from volatilization of nitrogenous fertilizers, CO₂ emissions from dead wood after deforestation due to fuel wood harvesting etc. The estimated emission displacement factor is therefore implicitly suggests a conservative estimate of the total displaced emissions. However, to be further conservative CCX proposes apply a 10% discount to the above estimate.

Applying this discount, the proposed emission displacement factor for rural India is 3.54 Mt CO_{2e} per household per year.