Component project activity design document form for small-scale CDM component project activities

(Version 05.0)

Complete this form in accordance with the Attachment "Instructions for filling out the component project activity design document form for CDM small-scale component project activities" at the end of this form.

COMPONENT PROJECT DESIGN DOCUMENT (CPA-DD)	
Title of the CPA	Sichuan Rural Poor-Household Biogas Development Programme, CPA Nb. SCHHBG-XXX-XXX
Version number of the CPA-DD	Version 1.5
Completion date of the CPA-DD	30/07/2016
Title of the PoA to which the CPA is included	Sichuan Rural Poor-Household Biogas Development Programme – PoA 2898
Host Party	People's Republic of China
Estimated amount of annual average GHG emission reductions	XXX tCO_2e.
Applied methodology(ies) and, where applicable, applied standardized baseline(s)	AMS-I.C - *Thermal energy production with or without electricity* (version 19) (EB61, Annex 16); AMS-III.R– *Methane recovery in agricultural activities at household/small farm level* (version 02) (EB59, Annex 4)
Sectoral scope(s) linked to the applied methodology(ies)	Scope 1 – Energy Industries (Renewable /non-Renewable Sources) Scope 15 - Agriculture

SECTION A. General description of CPA

A.1. Title of the proposed or registered PoA

>>
Sichuan Rural Poor-Household Biogas Development Programme – PoA 2898

A.2. Title of the CPA

>>
Sichuan Rural Poor-Household Biogas Development Programme, CPA Nb. SCHHBG-XXX-XXX
Version 1.5
Date: 30/07/2016

A.3. Description of the CPA

>>

The CPA SCHHBG-XXXX-XXX involves the installation and operation of XXX household biogas systems at low-income households located in XXX Sichuan Province, China.

The CPA builds on and integrates into the existing subsidy and implementation program for household bio digesters of the Sichuan Rural Energy Office (SREO) and its subsidiaries. The CPA consists of the extension of the existing program towards low-income households within XXX that are not able to participate under the SREO program without further support.

Following the scope of the PoA, the CPA involves two main components:

a) **Financial support:** Although the existing subsidies promote the installation of household biogas digesters, the investment is not financially feasible. By offering an additional regular income generated by carbon credits, the PoA will support the households in closing the financial gap.

b) **Technical support:** The proposed PoA will provide free technical service during start up and operation of the digesters. By this means low-income households, who much more than richer households cannot afford to allocate scarce financial resources in a sensitive technology, are guaranteed that they will actually receive long-term benefits of their investment in the biogas systems. Thereby, not only the barrier for the initial installation of the digesters is overcome, but also the stability of the digester operation is improved after the equipment has been installed.

Expected outcome of the proposed programme is an increased distribution of digesters on the one side and a more reliable operation of the installed systems on the other side. Both effects will contribute to the success of the existing subsidy programme and increase the achieved emission reductions.

As stated and explained above, the target group of the proposed PoA and its CPAs are low-income families. By focusing on these groups, the PoA clearly facilitates additional and sustainable development and will improve the living conditions of underprivileged farmers. Implementation, operation, maintenance and monitoring will be primarily executed by the SREO and its subsidiaries and supervised by the C/ME.

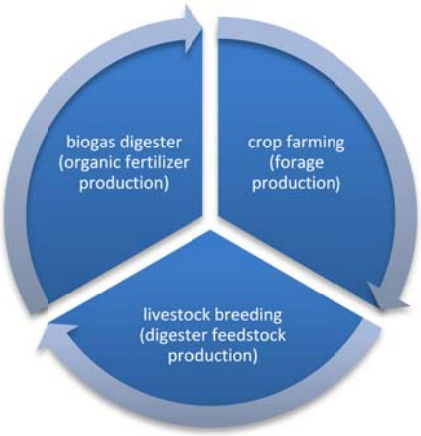
By installing biogas digesters in which all organic waste produced by the households can be used to generate biogas, the existing pit storages that are used to store the manure and other waste will be abandoned and GHG emissions will be avoided. All digesters within the CPA will be installed following the technology and technical standards as presented in section A.4.2.1 of the PoA-DD. As stated there, all digesters have to be installed by technicians, certified following the procedures described in the PoA-DD. After the successful installation and commission, technical service will be offered to the participating households on a regular basis to ensure a stable operation and prevent a relapse to old habits.

The biogas generated by the digesters will be fed into a newly built/bought biogas stove that can be used for cooking purposes. This will lead to a reduction consumption of coal that is used by most households for cooking. As the biogas is a renewable resource, this will lead to a further reduction of GHG emissions

The expected average annual emission reduction that is calculated according to the procedures described in the PoA-DD, using CPA specific input values from this CPA are XXXX tCO_2e.

In addition to the emission reduction aspect, the proposed PoA will contribute to local sustainable development in various ways, as by:

- Alleviating the national energy pressure: through the proposed CPA, biogas will be utilized by thousands of households as a renewable energy, thus the shortage of energy will be alleviated.
- Economic sustainability: Biogas is a renewable energy source and the bio digesters distributed through the CPA provide users with energetic autonomy. Households become independent from coal for cooking, leading to continuous and substantial expenditure savings.
- Improving local environment: the proposed PoA will replace traditional coal stoves and reduce coal consumption by installing biogas stoves for household cooking. Therefore, a significant source of indoor air pollution will be reduced. The concentrations of CO, SO_2, PM_{10} and NH_3 in the air will decrease.
- Improving living condition and public health: by reducing the indoor coal consumption and installing a proper animal manure management system, common diseases caused by coal burning and improper handling of manure, such as respiratory diseases, eye ailment etc. will be reduced to a great extent.
- Promoting sustainable development of local agriculture: a recycle economy model can be formed through the proposed CPA, i.e. crop farming (forage production) - livestock breeding (digester feedstock production) - biogas digester (organic fertilizer production) - crop farming (higher quality of agricultural products). Thus, a sustainable development of the rural agricultural production can be achieved.
- Reducing the risks of accidents: In the past, several deadly accidents have happened during the operation of household biogas digesters in Sichuan. The proposed CPA will provide technical service to the farmers and thereby reduce the risk of such accidents.



Through the effects described above, the proposed CPA will improve the rural living conditions and the financial situation of rural families and reduce GHG emissions by changing the existing manure management systems and by reducing coal consumption in remote areas.

A.4. Entity/individual responsible for CPA
>>

- Chengdu Oasis Science & Technology Co., Ltd. (also acting as the C/ME)
- The Sichuan Rural Energy Office

A.5. Technical description of the CPA
>>

A typical biogas digester system consists of different components such as inlet, inlet pipe, fermentation chamber, gas chamber storage, hydraulic chamber, movable cover and gas tube. The typical structure of a biogas digester applied under the proposed PoA is displayed in Figure 1.

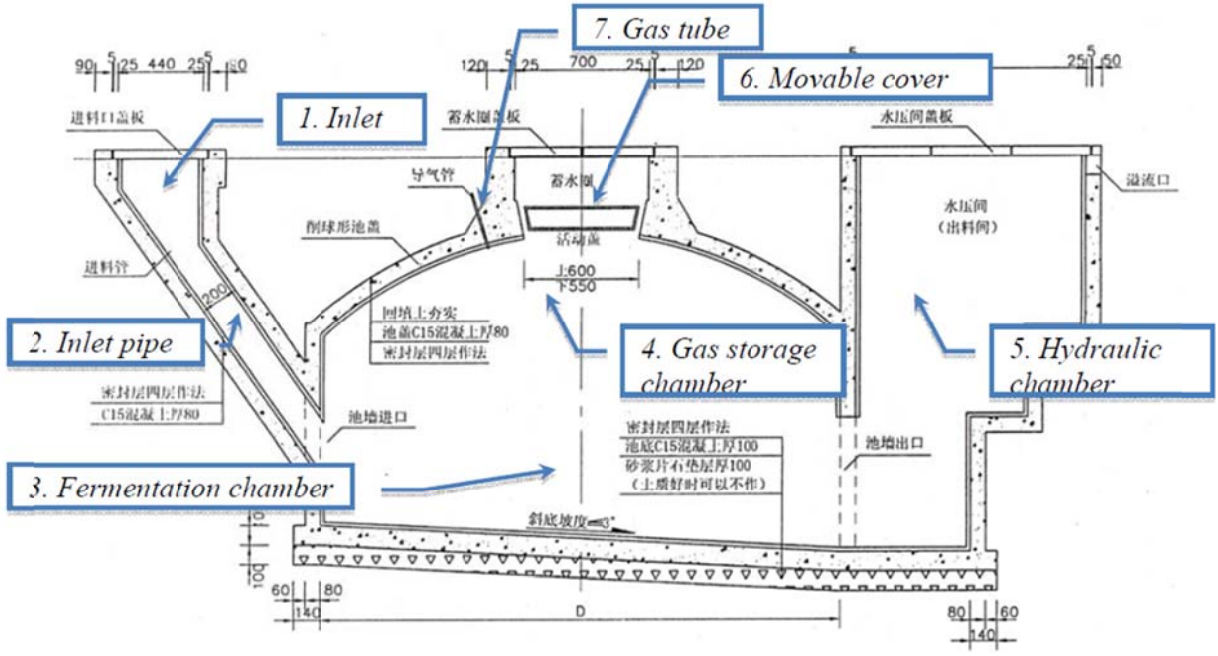


Figure 1: Typical design of a household biogas digester installed under the proposed PoA.

The technical flow is described in detail as follows:

1. Biogas generation and collection system

The design of biogas digesters will be based on national standards established by the Chinese government.

According to the national standard NY/T 465-2001, the standard designs comprise digesters of 6 m^3, 8 m^3 and 10 m^3. All digesters constructed in Sichuan and included into the PoA will follow either this standard or an applicable national or provincial revision or updated that replaced the current standard. The digesters will be constructed and finally approved by engineers accredited by the local Rural Energy System.

A list of the standards relevant for household biogas digesters in Sichuan province is shown inTable 1.

No.	Standard Code	Title
1.	GB/T 3606-2001	Domestic Biogas Stove
2.	GB/T 4750-2002	Collections of Standard Design Drawings of Household Anaerobic Digesters
3.	GB/T 4751-2002	Specification for Check and Acceptance of the Quality of Household Anaerobic Digesters
4.	GB/T 4752-2002	Operation Rules for Construction of Household Anaerobic
5.	NY/T 465-2001	Household-ScaledBiogas &Integrated Farming System-Specification on Design, Construction and Use for Southern
6.	NY/T1496.1-2007	Biogas Transmission System for rural household_Part 1-Thermoplastic Pipes
		Biogas Transmission System for rural household_Part 2-Thermoplastic Pipe Fittings

		Biogas Transmission System for rural household_Part 3i=-Thermoplastic Waves
7.	NY/T 1639-2008	Technical Criterion on Rural Biogas Digesters and Three Renovations
8.	NY/T 858-2004	Biogas Pressure Meter
9.	NY/T 859-2004	Desulfuricer household biogas
10.	NY/T 860-2004	Digester sealing Coatings
11.	DB51/T 770-2008(Sichuan)	The Criterion of Supportive Installation on Rural Household Biogas Digester

Table 1: Standards relevant for the construction of household biogas digesters in Sichuan Province.

The design and construction of the digesters is certified by technicians accredited by the Ministry of Agriculture. The digesters are usually installed below the pigpen and the inlet will be directly connected to livestock room so that the dung can be drained into the digester directly without being stored under anaerobic conditions before. Additionally, a toilet will be installed in each household next to the livestock room so that human excreta can be treated in the digester as well.

After being fed into the inlet of the whole system, the manure will reach the fermentation chamber where it is digested with a planned retention time of several months. Within the fermentation chamber, the main biogas generation takes place. The gas is stored in the upper part of fermentation chamber just above the slurry surface (the gas storage chamber). If more gas is generated than consumed, the pressure within the gas storage chamber will increase and press the liquids into the hydraulic chamber. When the gas is extracted for utilization via the gas tube, the pressure decreases again and allows the liquids to flow back into the fermentation chamber. This system guarantees a strict separation of the gas storage and the hydraulic chamber where the sludge can be extracted and used as organic fertilizer.

By placing the digester tank below the barns, a relatively stable temperature can be achieved within the digester. As the generation of biogas requires a warm environment, this is important to ensure the availability of gas without additional heating of the digestate.

2. Biogas utilization system

After the biogas is extracted from the gas storage chamber, it is led into desulphurization and dehydration units to purify the gas and extract harmful substances. Eventually, the gas will be fed into a biogas stove that can be used for cooking purposes, and thereby replace coal as fuel. The biogas stove meets the national standard and has the rated heating efficiency above 55%. To allow a proper gas flow control and completely shut the gas pipe when the stove is switched of, a pressure gauge will be installed.

Special maintenance procedures including cleaning the sulfide capture device and periodic controls and maintenance of the burners (cooking stoves, rice cookers, heaters, etc.) have been developed to ensure effective operation of the biogas system and proper utilization of digested slurry throughout the lifetime of the digester. To ensure the proper implementation of these methods, the technical service team that is set up during the Programme Activity will support the participating households.

All main equipment in the proposed PoA is domestically produced; the proposed PoA involves no technology and installations from abroad.

3. Qualification of the biogas technicians and technical acceptance of the digesters

According a rural biogas construction regulation (Rural Biogas Construction Project Management Regulation), issued by the Ministry of Agriculture in 2003, rural household biogas digesters have to be constructed by certified technicians. In order to get certified, the engineers have to complete a training following a regulation by the Ministry of Labor and Social Security (Profession Standard Number: 5-99-02-01).

After the construction, all biogas digesters have to pass a technical acceptance procedure to ensure that they have been constructed properly. This procedure of this acceptance is defined by the provincial standard DB51/T 271.3—2009. The acceptance is performed and recorded by the local Rural Energy Offices.

4. Digester IDs

The biogas digesters in Sichuan are identified by a system of ID numbers. To attach the ID numbers to the digesters, two different systems are used in Sichuan. The IDs are either engraved into the wet concrete of the digesters during construction or are painted on the digesters itself or the wall of the rural household next to the digester. These ID numbers are universal to each digester and will be used to clearly identify the single units for the PoA and this CPA .

The ID numbers are to be given to the digesters by the Rural Energy Offices after the final check and will be listed on the technical acceptance records.

A.6. Party(ies)

Name of Party involved (host) indicates a host Party	Private and/or public entity(ies) CPA implementer(s) (as applicable)	Indicate if the Party involved wishes to be considered as CPA implementer (Yes/No)
People's Republic of China(host)	Chengdu Oasis Science & Technology Co., Ltd.	No
United Kingdom of Great Britain and Northern Ireland	UPM Umwelt-Projekt-Management GmbH	No

A.7. Geographic reference or other means of identification

>> The households bundled in this CPA are located in XXXX, which covers the geographical coordinates of XXXX ° XXXX ' - XXXX ° XXXX ' E and XXXX ° XXXX ' - XXXX ° XXXX ' N.

The following figure shows the location of the CPA.

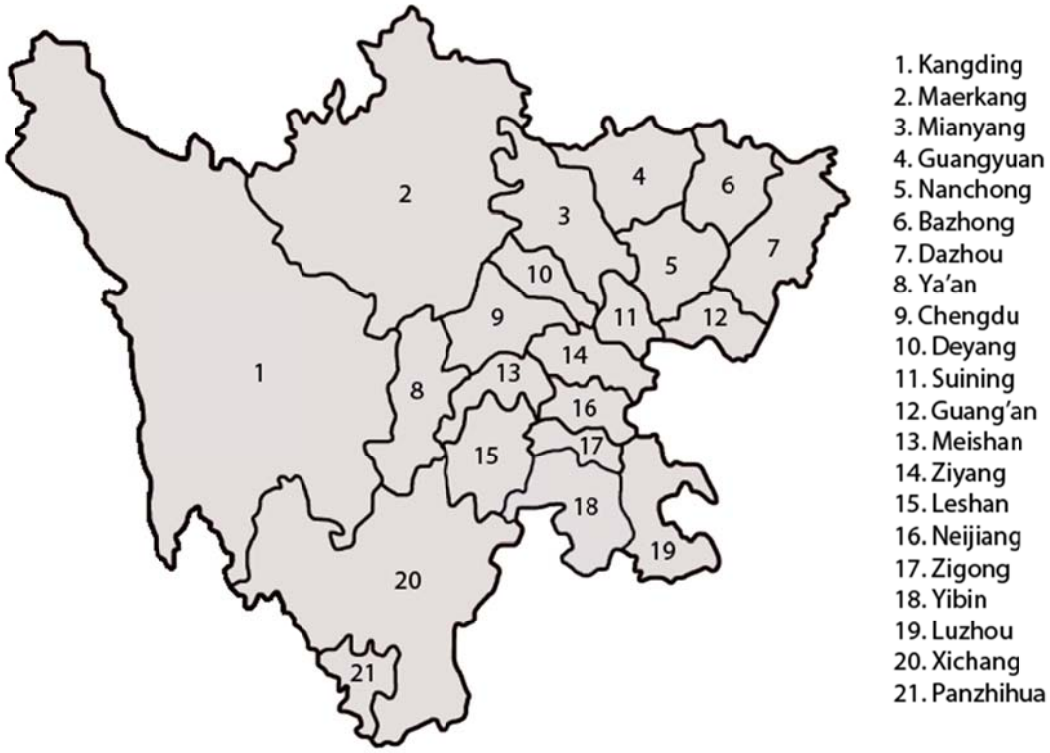


Figure 2: Location of the CPA within Sichuan

A.8. Duration of the CPA

A.8.1. Start date of the CPA

>> XXXX

The starting date marks the date at which implementation of biogas units under the CPA will start or has started.

A.8.2. Expected operational lifetime of the CPA

>>20 years

A.9. Choice of the crediting period and related information

>> Fixed crediting period

A.9.1. Start date of the crediting period

>> XX/XX/ XXXX or the date of inclusion of the CPA to the PoA, whichever is later.

A.9.2. Length of the crediting period

>>10 years, 0 months

A.10. Estimated amount of GHG emission reductions

Emission reductions during the crediting period	
Years	**Annual GHG emission reductions (in tonnes of CO_2e) for each year**
Year 1	XXX
Year 2	XXX
Year 3	XXX
Year 4	XXX
Year 5	XXX
Year 6	XXX
Year 7	XXX
Year 8	XXX
Year 9	XXX
Year 10	XXX
Total number of crediting years	10
Annual average GHG emission reductions over the crediting period	XXX
Total estimated reductions (tonnes of CO_2e)	XXX

A.11. Public funding of the CPA

>> No public funding from Annex-I countries is involved in the implementation of the CPA.

A.12. Debundling of small-scale component project activities

>>

The *Guidelines On Assessment Of Debundling For SSC Project Activities* states:

> *10. If each of the independent subsystems/measures (e.g., biogas digester, solar home system) included in the CPA of a PoA is no larger than 1% of the small-scale thresholds defined by the methodology applied, then that CPA of PoA is exempted from performing de-bundling check i.e., considering as not being a de-bundled component of a large scale activity.*

The thermal capacity of each biogas stove is below 150 kW and the emission reduction resulting from methane avoidance is well below 600 tCO_2e. The quantifiable values are presented and compared against the eligibility criteria of the PoA in section D.5. Therefore, the CPA is considered as not being a de-bundled component of a large scale activity.

A.13. Confirmation for CPA

>>This CPA is neither registered as an individual CDM project activity, nor is it part of another registered PoA.

A.14. Contact information of responsible persons/ entities for completing the CDM-SSC-CPA-DD-FORM

>>

UPM Umwelt-Projekt-Management GmbH
guog@upm-cdm.eu, fuyy@oasispower.cn

SECTION B. Environmental analysis

B.1. Analysis of the environmental impacts

>>The analysis of environmental impacts has been carried out on the PoA level. Therefore, this section is not applicable.

SECTION C. Local stakeholder comments

C.1. Solicitation of comments from local stakeholders

>> Comments of local stakeholders have been invited on the PoA level. Therefore, this section is not applicable.

C.2. Summary of comments received

>> Comments of local stakeholders have been invited on the PoA level. Therefore, this section is not applicable.

C.3. Report on consideration of comments received

>> Comments of local stakeholders have been invited on the PoA level. Therefore, this section is not applicable.

SECTION D. Eligibility of CPA and Estimation of emissions reductions

D.1. Reference of methodology(ies) and standardized baseline(s):

>> The CPAs included in the proposed Programme will apply the following combination of methodologies:

AMS-I.C - *Thermal energy production with or without electricity* (version 19) (EB61, Annex 16);

AMS-III.R– *Methane recovery in agricultural activities at household/small farm level* (version 02) (EB59, Annex 4).

Both methodologies are approved for use in a PoA (AMS-III.R since its first approval in EB35, October 2007 and AMS-I.C. since EB33, July 2007).

The combination of the methodologies AMS-III.R and AMS-I.C has been approved for the use within PoAs by the CDM Executive Board (EB) in its 53th meeting.

Furthermore, AMS-III.R refers to AMS-III.D - *Methane recovery in animal manure management systems* (version 17) to calculate baseline and project emissions.

To calculate emissions from fossil fuel combustion, the *Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion* is used.

D.2. Applicability of methodology(ies) and standardized baseline(s)

>> Both methodologies, AMS I.C and AMS III.R have specific applicability criteria that will be discussed separately to ensure the correct application of the methodologies.

AMS I.C

Criteria	Applicability of the proposed PoA
1. This methodology comprises renewable energy technologies that supply users with thermal energy that displaces fossil fuel use. These units include technologies such as solar thermal water heaters and dryers, solar cookers, energy derived from renewable biomass and other technologies that provide thermal energy that displaces fossil fuel.	XXX
2. Biomass-based cogeneration systems are included in this category. For the purpose of this methodology "cogeneration" shall mean the simultaneous generation of thermal energy and electrical energy in one process. 1 Project activities that produce heat and power in separate element processes (for example heat from a boiler and electricity from a biogas engine) do not fit under the definition of cogeneration project.	XXX
3. Emission reductions from a biomass cogeneration system can accrue from one of the following activities: (a)Electricity supply to a grid; (b)Electricity and/or thermal energy (steam or heat) production for on-site consumption or for consumption by other facilities; (c)Combination of (a) and (b).	XXX
4. The total installed/rated thermal energy generation capacity of the project equipment is equal to or less than 45 MW thermal (see paragraph 6 for the applicable limits for cogeneration project activities).	XXX
5. For co-fired systems, the total installed thermal energy generation capacity of the project equipment, when using both fossil and renewable fuel shall not exceed 45 MW thermal (see paragraph 6 for the applicable limits for cogeneration project activities).	XXX
6. The following capacity limits apply for biomass cogeneration units: (…)[2]	XXX
7. The capacity limits specified in the above paragraphs apply to both new facilities and retrofit projects. In the case of project activities that involve the addition of renewable energy units at an existing renewable energy facility, the total capacity of the units added by the project should comply with capacity limits in paragraphs 4 to 6 and should be physically distinct from the existing units.	XXX

[1] This methodology however does not preclude production of heat and power from the same heat generating equipment, for example a portion of steam produced in a boiler is used for process heat and another portion of steam from the same boiler is used for electricity production.

[2] Shortened for simplification.

AMS I.C	
Criteria	**Applicability of the proposed PoA**
8. Project activities that seek to retrofit or modify an existing facility for renewable energy generation are included in this category.	XXX
9. New Facilities (Greenfield projects) and project activities involving capacity additions compared to the baseline scenario are only eligible if they comply with the related and relevant requirements in the "General Guidelines to SSC CDM methodologies".	XXX
10. If solid biomass fuel (e.g. briquette) is used, it shall be demonstrated that it has been produced using solely renewable biomass and all project or leakage emissions associated with its production shall be taken into account in emissions reduction calculation.	XXX
11. Where the project participant is not the producer of the processed solid biomass fuel, the project participant and the producer are bound by a contract that shall enable the project participant to monitor the source of the renewable biomass to account for any emissions associated with solid biomass fuel production. Such a contract shall also ensure that there is no double-counting of emission reductions.	XXX
12. If electricity and/or steam/heat produced by the project activity is delivered to a third party i.e. another facility or facilities within the project boundary, a contract between the supplier and consumer(s) of the energy will have to be entered into that ensures there is no double-counting of emission reductions.	XXX
13. If the project activity recovers and utilizes biogas for power/heat production and applies this methodology on a stand alone basis i.e. without using a Type III component of a SSC methodology, any incremental emissions occurring due to the implementation of the project activity (e.g. physical leakage of the anaerobic digester, emissions due to inefficiency of the flaring), shall be taken into account either as project or leakage emissions.	XXX
14. Charcoal based biomass energy generation project activities are eligible to apply the methodology only if the charcoal is produced from renewable biomass sources provided: (…)[3]	XXX

Table 2: Relevant applicability criteria for AMS I.C.

AMS III.R

[3]Shortened for simplification.

Criteria	Applicability of the proposed PoA
1. This project category comprises recovery and destruction of methane from manure and wastes from agricultural activities that would be decaying anaerobically emitting methane to the atmosphere in the absence of the project activity. Methane emissions are prevented by: (a) Installing methane recovery and combustion system to an existing source of methane emissions, or (b) Changing the management practice of a biogenic waste or raw material in order to achieve the controlled anaerobic digestion equipped with methane recovery and combustion system.	XXX
2. The category is limited to measures at individual households or small farms (e.g. Installation of a domestic biogas digester). Methane recovery systems that achieve an annual emission reduction of less than or equal to 5 tonnes of CO_2e per system are included in this category. Systems with annual emission reduction higher than 5 tonnes of CO_2e are eligible under AMS III.D.	XXX
3. This project category is only applicable in combination with AMS-I.C, AMS-I.I and/or AMS-I.E.	XXX
4. The project activity shall satisfy the following conditions: (a) The sludge must be handled aerobically. In case of soil application of the final sludge the proper conditions and procedures that ensure that there are no methane emissions must be ensured. (b) Measures shall be used (e.g. combusted or burnt in a biogas burner for cooking needs) to ensure that all the methane collected by the recovery system is destroyed.	XXX
5. Aggregated annual emission reductions of all systems included shall be less than or equal to 60 kt CO_2 equivalent.	XXX

Table 3: Relevant applicability criteria for AMS III.R.

After this comprehensive analysis of all applicability criteria of the involved methodologies, it can be concluded that the methodologies are applicable to the proposed PoA and can be used to calculate the expected emission reductions.

D.3. Sources and GHGs

>> The geographic sites of all individual biogas systems included in the CPA define the SSC-CPA boundary. A biogas system consists of a bio digester and a cooking/combustion unit. The figure below visualizes the SSC-CPA boundary:

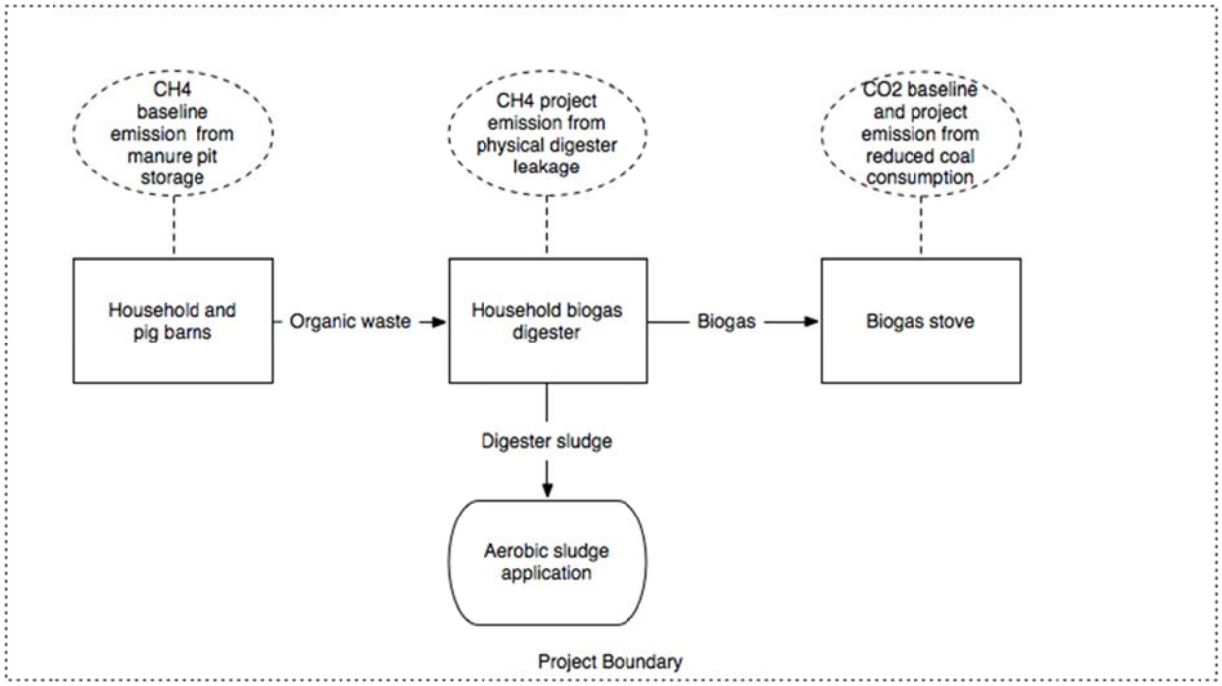


Table 4: Project boundary for one sample household.

Two different sources of GHG emissions are relevant for the proposed PoA and therefore included in its boundary:

a) **Methane emissions from existing manure management systems:** Most farmers and rural households with pigs use a deep pit as manure management system in the rural Sichuan Province. The storage in the pit for a retention time of 3 – 6 months improves the fertilizer capacity of the manure and is the easiest way of handling the manure problem. However, this leads to the emission of methane that is generated due to the anaerobic conditions within the pit.
By installing biogas digesters, the generated methane will be captured and stored within the digester until it is utilized as energy source for cooking. Thereby, the methane will be destroyed efficiently and its emission will be avoided.

b) **Carbon dioxide emissions from fossil fuel consumption:** The predominant source of energy for cooking in rural Sichuan is coal. Except for occasional events where straw or crop residues are available in little amounts, coal is used as main fuel for household purposes. As the biogas generated by the digesters can be stored within the device until it is used, the biogas can replace the coal as main fuel. Thereby, significant amounts of CO_2 emission will be reduced.

Additional to these explanations,

	GHG emission source	Gas	Included?	Justification/Explanation
Baseline emission	Thermal energy used for cooking by burning coal	CO_2	Yes	Major source of baseline emission.
		CH_4	No	Excluded for simplification. This is conservative.
		N_2O	No	Excluded for simplification. This is conservative.

	Thermal energy used for cooking by burning other fuels (straw, firewood, crop residues, etc.)	CO_2	No	Excluded for simplification. This is conservative.
		CH_4	No	Excluded for simplification. This is conservative.
		N_2O	No	Excluded for simplification. This is conservative.
	Existing manure management system	CO_2	No	Excluded as the CO_2 generated during the decomposition of organic waste has been extracted from the atmosphere during the generation of the organic material. Therefore, this circle is CO_2 neutral.
		CH_4	Yes	Major source of baseline emission.
		N_2O	No	Excluded for simplification. This is conservative.
Project emission	Thermal energy used for cooking by burning biogas	CO_2	No	Excluded as biogas is a renewable form of energy and its generation and destruction is CO_2 neutral.
		CH_4	No	Not applicable; in line with the applied methodologies.
		N_2O	No	Not applicable; in line with the applied methodologies.
	Thermal energy used for cooking by burning coal	CO_2	Yes	Major source of emission.
		CH_4	No	Not applicable; in line with the applied methodologies.
		N_2O	No	Not applicable; in line with the applied methodologies.
	Thermal energy used for cooking by burning straw and firewood	CO_2	No	Not applicable; in line with the applied methodologies.
		CH_4	No	Not applicable; in line with the applied methodologies.
		N_2O	No	Not applicable; in line with the applied methodologies.
	Leakage from biogas digester	CO_2	No	Excluded as the CO_2 generated during the decomposition of organic waste has been extracted from the atmosphere during the generation of the organic material. Therefore, this circle is CO_2 neutral.
		CH_4	Yes	10% leakage assumed in accordance with methodology

				AMS III.R
		N_2O	No	Not applicable; in line with the applied methodologies.
	Electricity consumption from operation of project equipment.	CO_2	No	The equipment installed by the proposed project does not consume any electricity.
		CH_4	No	The equipment installed by the proposed project does not consume any electricity.
		N_2O	No	The equipment installed by the proposed project does not consume any electricity.

Table 5 gives an overview on the emission sources included and excluded.

	GHG emission source	Gas	Included?	Justification/Explanation
Baseline emission	Thermal energy used for cooking by burning coal	CO_2	Yes	Major source of baseline emission.
		CH_4	No	Excluded for simplification. This is conservative.
		N_2O	No	Excluded for simplification. This is conservative.
	Thermal energy used for cooking by burning other fuels (straw, firewood, crop residues, etc.)	CO_2	No	Excluded for simplification. This is conservative.
		CH_4	No	Excluded for simplification. This is conservative.
		N_2O	No	Excluded for simplification. This is conservative.
	Existing manure management system	CO_2	No	Excluded as the CO_2 generated during the decomposition of organic waste has been extracted from the atmosphere during the generation of the organic material. Therefore, this circle is CO_2 neutral.
		CH_4	Yes	Major source of baseline emission.
		N_2O	No	Excluded for simplification. This is conservative.
Project emissio	Thermal energy used for cooking by burning biogas	CO_2	No	Excluded as biogas is a renewable form of energy and its generation and destruction is CO_2 neutral[4].

[4]UN-Habitat – Renewable energy

		CH_4	No	Not applicable; in line with the applied methodologies.
		N_2O	No	Not applicable; in line with the applied methodologies.
	Thermal energy used for cooking by burning coal	CO_2	Yes	Major source of emission.
		CH_4	No	Not applicable; in line with the applied methodologies.
		N_2O	No	Not applicable; in line with the applied methodologies.
	Thermal energy used for cooking by burning straw and firewood	CO_2	No	Not applicable; in line with the applied methodologies.
		CH_4	No	Not applicable; in line with the applied methodologies.
		N_2O	No	Not applicable; in line with the applied methodologies.
	Leakage from biogas digester	CO_2	No	Excluded as the CO_2 generated during the decomposition of organic waste has been extracted from the atmosphere during the generation of the organic material. Therefore, this circle is CO_2 neutral.
		CH_4	Yes	10% leakage assumed in accordance with methodology AMS III.R
		N_2O	No	Not applicable; in line with the applied methodologies.
	Electricity consumption from operation of project equipment.	CO_2	No	The equipment installed by the proposed project does not consume any electricity.
		CH_4	No	The equipment installed by the proposed project does not consume any electricity.
		N_2O	No	The equipment installed by the proposed project does not consume any electricity.

Table 5: Sources of GHG emissions included and excluded in the project boundary.

All households included in the proposed CPA are located within XXX. XXX is located in Sichuan Province, China, that is defined as the geographical boundary of the PoA, as defined in section A.4.1.2 of the PoA-DD. Therefore, the small-scale CPA is located within the geographical boundary of the PoA.

Biogas is a mixture of methane and carbon dioxide that is generated from organic material broken down through the anaerobic digestive process. This can be a dry process without water in which the bacteria degrades waste to produce biogas: a renewable energy source. (…)
http://www.unlao.org/UNCT/UNHABITAT/docs/Brochures/Renewable%20energy.pdf

Ecosense–Forum for sustainable development of German business:
Biogas: Biogas is methane, which is produced by the fermentation of organic material such as animal dung, human sewage, organic waste or crop residues in an airtight environment. Biogas is considered to be carbon neutral, since the carbon in biogas feedstocks has already been extracted from the atmosphere by the photosynthesis of plants. Hence, in contrast to fossil fuels, biogas is assumed not to add any additional carbon to the global carbon cycle.
http://www.climate-policy-map.econsense.de/en_glossar.aspx

D.4. Description of the baseline scenario

>> The baseline emissions will be determined separately for both type of GHG emissions, each described in the related methodologies AMS I.C and AMS III.R.

Baseline of AMS III.R:

9. *The baseline scenario is the situation where, in the absence of the project activity, biomass and other organic matter are left to decay anaerobically within the project boundary and methane is emitted to the atmosphere. Baseline emissions (BE_y) are calculated ex ante using the amount of the waste or raw material that would decay anaerobically in the absence of the project activity, with the most recent IPCC tier 2 approach (please refer to the chapter "Emissions from Livestock and Manure Management" under the volume "Agriculture, Forestry and other Land use" of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories). Country/regional-specific values shall be used if available. The option in paragraph 9 (a) and relevant formulae shown in paragraph 10 of AMS-III.D "Methane recovery in animal manure management systems" shall be used to calculate baseline emissions.*

Among small pig-raising farms in Sichuan province, it is common practice to store the pig manure within pit storage, typically below a slatted floor in a small-enclosed animal housing[5,6]. Two to three times a year, the stored manure is then scooped out and applied on the fields as fertilizer. By only including households with such pit manure storage, that's existence has been confirmed by the local Rural Energy Office staff, it is ensured, that this baseline is applicable for all included households. Households to which the baseline situation described above does not apply are not included in the proposed CPA and do not contribute to the overall achieved emission reduction.

The equations and input parameters used to calculate the quantitative baseline emissions are introduced in section D.6.2.

Baseline of AMS I.C:

13. *For renewable energy technologies that displace technologies using fossil fuels, the simplified baseline is the fuel consumption of the technologies that would have been used in the absence of the project activity times an emission factor for the fossil fuel displaced. For calculating the emission factor, reliable local or national data shall be used. IPCC default values shall be used only when country or project specific data are not available or demonstrably difficult to obtain.*

As coal offers a high availability throughout the entire year and provides an easy obtainable fuel to meet the household energy demand, coal is the main fuel used in rural areas in Sichuan[7,8]. To ensure that this baseline scenario is applicable to all programme households, the proposed PoA does not include households that do not have any coal consumption. Following the

[5] J. P. Henderson, Anaerobic Digestion in Rural China, 2007

[6] See Section 1.4.2, Dong Hongmin, Li Yu'e: Feasibility study – Rural Household Biogas and Conservation Tillage CDM Project Development, 2010, UNESCAP

[7] See Section 1.4.3, Dong Hongmin, Li Yu'e: Feasibility study – Rural Household Biogas and Conservation Tillage CDM Project Development, 2010, UNESCAP

[8] Jin Jiamen - Situation and trends in China's rural energy consumption, 2010, Global Environmental Institute

household inclusion criteria, households without any coal consumption cannot join the programme and are not taken into account for the calculation of emission reduction.

The equations and input parameters used to calculate the quantitative baseline emissions are introduced in section D.6.2.

D.5. Demonstration of eligibility for a CPA

>>

Nb.	Criterion	Fulfilled?	Evidence
1.	The CPA has been approved by the C/ME.	XXX	• XXX
2.	The geographic boundary of the CPA lies within Sichuan province.	XXX	• XXX
3.	Measures to avoid double counting are implemented.	XXX	XXX
3.1.	The CPA implementers confirm in written statements that: a) All biogas systems to be newly installed under the CPA are not and will not be part of another CDM project or program activity and that no CERs will be claimed for the biogas system other than those to be claimed by the C/ME on behalf of the CPA implementer and the participating households respectively; and That he is aware and agrees with the inclusion of the CPA to the proposed PoA.	XXX	• XXX
3.2.	The biogas systems for all involved households is to be newly installed under the CPA is not and will not be part of another CDM project or program activity and that no CERs will be claimed for the biogas system other than those to be claimed by the C/ME on behalf of the CPA implementer and the participating households respectively;	a) XXX	• XXX

Nb.	Criterion	Fulfilled?	Evidence
3.3.	A check for double counting of single households came to a negative result.	XXX	• XXX
4.	All relevant applicability criteria of methodology AMS-III.R shall be met.	XXX	XXX
4.1.	The project installs methane recovery and combustion systems to existing sources of methane emissions.	XXX	• XXX
4.2.	• The installed methane recovery systems achieve annual emission reductions of less than 5 tCO_2e. (This can be shown by demonstrating that the annual average temperature does not exceed 21ºC and the annual average number of pigs is no larger than 33.7 for the project households.	XXX	• XXX
4.3.	• Methodology AMS-III.R is used in combination in with methodology AMS-I.C.	XXX	• XXX
4.4.	• The sludge must be handled aerobically. In case of soil application of the final sludge the proper conditions and procedures that ensure that there are no methane emissions must be ensured.	XXX	• XXX
4.5.	• Measures shall be used (e.g. combusted or burnt in a biogas burner for cooking needs) to ensure that all the methane collected by the recovery system is destroyed.	XXX	• XXX
4.6.	• Aggregated annual emission reductions of all systems included shall be less than or equal to 60 kt CO_2 equivalent.	XXX	• XXX

Nb.	Criterion	Fulfilled?	Evidence
5.	All relevant applicability criteria of methodology AMS-I.C shall be met.	XXX	XXX
5.1.	This category comprises renewable energy technologies that supply users with thermal energy that displaces fossil fuel use. These units include technologies such as solar thermal water heaters and dryers, solar cookers, energy derived from renewable biomass and other technologies that provide thermal energy that displaces fossil fuel.	XXX	• XXX
5.2.	The total installed/rated thermal energy generation capacity of the project equipment is equal to or less than 45 MW thermal.	XXX	XXX
6.	All households meet the inclusion criteria for households to be included in a certain CPA. They	XXX	XXX
6.1.	• are located within the geographic boundary of the CPA.	XXX	• XXX
6.2.	• generate animal manure and wastes from agricultural activities that are currently stored under anaerobic conditions in deep pits.	XXX	• XXX
6.3.	• currently use coal as source of energy for cooking.	XXX	• XXX
6.4.	• install a new household biogas system, considering the relevant technical standards.	XXX	• XXX
6.5.	• are considered low-income households.	XXX	• XXX

Nb.	Criterion	Fulfilled?	Evidence
6.6.	• No recovery or combustion equipment is transferred from or to other activities	XXX	• XXX
7.	Each of the independent subsystems (the digesters and biogas stoves) is no larger than 1% of the small-scale thresholds defined by the methodologies applied (600 tCO_2e emission reduction from methane avoidance, 150 kW thermal installed capacity of the stoves).	XXX	• XXX
8.	The proposed project and the new CPA do not lead to a diversion of official development assistance (ODA).	XXX	• XXX
9.	The CPA implements a monitoring plant that is in line with the monitoring plan described in the PoA-DD (section D.7.2)	XXX	• XXX
10.	The starting date of the CPA is determined and not prior to the Global Stakeholder Consultation of the PoA.	XXX	XXX
10.1	The start date of the CPA can be determined with suitable evidence.	XXX	• XXX
10.2	The start date of the CPA is not before the date of public web hosting of the PoA documentation (28/10/2010).	XXX	• XXX
11.	The end date of the CPA does not exceed the PoA end date.	XXX	• XXX
12.	The CPA meets the additionality criteria relevant for Type I.	XXX	XXX
12.1	The total thermal capacity installed at all households of the CPA does not exceed 15 MW_{th}.	XXX	• XXX
12.2	The thermal capacity of a single stove does not exceed 4,500 kW_{th}.	XXX	• XXX
12.3	The users of the subsystems will be households.	XXX	• XXX

Nb.	Criterion	Fulfilled?	Evidence
13.	The CPA meets the additionality criteria relevant for Type III.	XXX	XXX
13.1	The total annual emission reduction from methane avoidance (type III activity) aimed by the CPA does not exceed 20 $ktCO_2e$ in any year of the crediting period.	XXX	• XXX
13.2	The annual emission reduction from methane avoidance (type III activity) of one single household does not exceed 600 tCO_2e.	XXX	• XXX
13.3	The users of the subsystems will be households.	XXX	• XXX
14.	All CPA specific input parameters that are determined by sampling have been determined by a survey that is based on the validated sampling plan and fulfils the minimum confidence/error of 95/10 for surveys combining several CPAs or 90/10 for surveys that cover only single CPAs.	XXX	• XXX

D.6. Estimation of emission reductions
D.6.1. Explanation of methodological choices
>>

1. **Baseline emissions**

AMS-III.R - ***Methane recovery in agricultural activities at household/small farm level***

To calculate the baseline emissions covered by AMS-III.R, paragraphs 9 and 10 are applied:

> *9. The baseline scenario is the situation where, in the absence of the project activity, biomass and other organic matter are left to decay anaerobically within the project boundary and methane is emitted to the atmosphere. Baseline emissions (BEy) are calculated ex ante using the amount of the waste or raw material that would decay anaerobically in the absence of the project activity, with the most recent IPCC tier 2 approach (please refer to the chapter 'Emissions from Livestock and Manure Management' under the volume 'Agriculture, Forestry and other Land use' of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories). Country/regional-specific values shall be used if available. The option in paragraph 9 (a) and relevant formulae shown in paragraph 10 of AMS-III.D "Methane recovery in animal manure management systems" shall be used to calculate baseline emissions.*

> *10. The amount of waste or raw materials that would decay anaerobically in the absence of the project activity is determined by survey of a sample group of households/small farms with a 90% confidence interval and 10% margin of error. The survey should determine the baseline animal manure management practices applied. This small-scale methodology is only applicable to the portion of the manure, which would decay anaerobically in the absence of the project activity established by the survey.*

In the cited paragraph 9 of methodology AMS-III-D, the first option (9 (a)) is chosen to calculate the emissions. Therefore, the formulas provided in paragraph 10 are applied for the calculation. To distinguish the baseline methane emissions from the baseline carbon dioxide emissions (which are covered under AMS-I.C), an additional index CH_4 is applied to BE_y:

$$BE_{CH_4,y} = GWP_{CH_4} \cdot D_{CH_4} \cdot UF_b \cdot \sum_{j,LT} MCF_j \cdot B_{0,LT} \cdot N_{LT,y} \cdot VS_{LT,y} \cdot MS\%_{Bl,j} \quad (1)$$

Where:

$BE_{CH_4,y}$	Baseline methane emissions in year y (tCO_2e)
GWP_{CH_4}	Global Warming Potential for CH_4 (25)
D_{CH_4}	CH_4 density (0.00067 t/m^3 at room temperature (20 ^oC) and 1 atm pressure)
UF_b	Model correction factor to account for model uncertainties (0.94)
j	Index for animal manure management system. As – according to the applicability criteria - all households use pits to store the animal manure, this index is used for the different climate conditions on a city basis.
LT	Index for all types of livestock
MCF_j	Annual methane conversion factor (MCF) for the baseline animal manure management system j. To pay respect to different annual mean temperatures in the covered region, the pits in different cities are considered different manure management systems with different MCF values.
$B_{0,LT}$	Maximum methane producing capacity for the volatile solid generated for animal type LT (m^3 $CH_4(kgdm)^{-1}$)
$N_{LT,y}$	Annual average number of animals of type LT in year y (numbers). The number of animals will be determined based on city averages of the number of pigs per households and the number of households in each city (=climatic region).
$VS_{LT,y}$	Volatile solids for livestock LT entering the animal manure management system in year y (on a dry matter weight basis, kg dm/animal/year)
$MS\%_{Bl,j}$	Fraction of manure handled in baseline animal manure management system j. As the index j is covered the different climate conditions of the cities, this fraction reflects the share of animals in a climatic region to the total number of animals.

AMS I.C - *Thermal energy production with or without electricity*

Following paragraph 13 of AMS I.C, version 19, the simplified baseline is defined as:

> *16. For renewable energy technologies that displace technologies using fossil fuels, the simplified baseline is the fuel consumption of the technologies that would have been used in the absence of the project activity times an emission factor for the fossil fuel displaced. For calculating the emission factor, reliable local or national data shall be used. IPCC default values shall be used only when country or project specific data are not available or demonstrably difficult to obtain.*

Therefore, the formulas provided by the *Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion* are applied to calculate the baseline emissions quantitatively:

$$BE_{CO_2,y} = \sum_{j,LT} FC_{i,j,y} \cdot COEF_{i,y} \quad (2)$$

Where:

$BE_{CO_2,y}$	Baseline carbon dioxide emissions from fossil fuel combustion in year y (tCO_2e)
$FC_{i,j,y}$	Quantity of fuel type i combusted in process j during the year y (mass volume or volume unit/yr). For this project, only baseline emissions from domestic use coal are considered in the calculation of emission reductions. This is a conservative approach that results in i and j being reduced to 1 (i: coal is the only type of fuel; j: only domestic coal consumption is considered).
$COEF_{i,y}$	Is the CO_2 emission coefficient of fuel type *i* in year *y* (tCO_2/mass or volume unit). This will be calculated using national data.

As the available data is not sufficient for option A, offered by the tool to calculate $COEF_{i,y}$, option B is chosen:

$$COEF_{i,y} = NCV_{i,y} \cdot EF_{CO_2,i,y} \quad (3)$$

Where:

$COEF_{i,y}$	Emission coefficient of fuel type i(tCO_2/mass or volume unit)
$NCV_{i,y}$	Is the weighted average net calorific value of the fuel type I in year y(GJ/mass or volume unit). According to national data published by NDRC, at the time of PDD writing, the NCV of raw coal is 20.908 GJ/t.
$EF_{CO_2,i,y}$	Is the weighted average CO_2emission factor of fuel type *I* in year *y* (tCO_2/GJ). According to the national data, the emissions factor for raw coal is 87.300 tCO_2/TJ. This value reflects the lower value of the 95% confidence level of the values provided in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories and is therefore conservative.

With these input values, the emission coefficient used is $COEF_{i,y} = 1.825\ \frac{tCO_2}{tCoal}$.

As the proposed project only accounts for the emission reductions due to the reduction of coal consumption, the baseline emissions covered by methodology AMS I.C can be reduced to:

$$BE_{CO_2,y} = FC_{BE,y} \cdot NCV_{coal,y} \cdot EF_{CO_2,coal,y} \quad (4)$$

Where:

$BE_{CO_2,y}$	Baseline carbon dioxide emissions from fossil fuel combustion in year y (tCO_2e)
$FC_{BL,y}$	Quantity of coal combusted for domestic use in year y (mass volume or volume unit/yr).
$NCV_{coal,y}$	Is the CO_2 emission coefficient of coal in year *y* (tCO_2/mass or volume unit).
$EF_{CO_2,coal,y}$	Is the weighted average CO_2emission factor of raw coal in year *y* (tCO_2/GJ). According to the national data, the emissions factor for raw coal is 87,300 tCO_2/TJ. This value reflects the lower value of the 95% confidence level of the values provided in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories and is therefore conservative.

2. Project emissions

AMS-III.R - ***Methane recovery in agricultural activities at household/small farm level***

To calculate the project emissions, methodology, paragraphs 7 and 8 of AMS-III.R (version 02) are used.

Paragraph 7 states:

> *7. Project emissions consist of CO_2emissions from use of fossil fuels or electricity for the operation of the system and the physical leakages of methane from the recovery system.*

In this specific case, no fossil fuel or electricity is consumed during the operation of the project. Therefore, the project emissions (covered by AMS-III.R) only comprise the physical leakage from the methane recovery system. These calculation method to determine the project emissions are referred to in paragraph 8:

> *8. Project emissions due to physical leakage of biogas digester is estimated using one of the two options using the method indicated in paragraph 13 of AMS-III.D "Methane recovery in animal manure management systems".*

In the cited paragraph 13 of AMS-III.D, the first option (13 (a)) is chosen to calculate the project emissions. Following this paragraph, a physical leakage of 10% of the maximum methane producing potential of manure fed into the management systems implemented by the project activity is assumed.

$$PE_{CH_4,y} = 0.10 \cdot GWP_{CH_4} \cdot D_{CH_4} \cdot \sum_{i,LT} B_{0,LT} \cdot N_{LT,y} \cdot VS_{LT,y} \cdot MS\%_{i,y} \quad (5)$$

Where:

$PE_{CH_4,y}$	Project methane emissions in year y (tCO_2e)
GWP_{CH_4}	Global Warming Potential for CH_4 (25)
D_{CH_4}	CH_4 density (0.00067 t/m^3 at room temperature (20 ^oC) and 1 atm pressure)
i	Index for animal manure management system. As – according to the applicability criteria - all households use pits to store the animal manure, this index is used for the different climate conditions on a city basis.
LT	Index for all types of livestock
$B_{0,LT}$	Maximum methane producing capacity for the volatile solid generated for animal type *LT* (m^3 CH_4 $(kg\ dm)^{-1}$)
$N_{LT,y}$	Annual average number of animals of type LT in year y (numbers). The number of animals will be determined based on city averages of the number of pigs per households and the number of households in a given city.
$VS_{LT,y}$	Volatile solids for livestock LT entering the animal manure management system in year y (on a dry matter weight basis, kg dm/animal/year)
$MS\%_{i,j}$	Fraction of manure handled in system i in year y. As the index i covers the different climate conditions of the cities, this fraction reflects the share of household in a given city.

AMS I.C - *Thermal energy production with or without electricity*

Similar to the baseline emissions from fossil fuel, the project emissions will be calculated:

$$PE_{CO_2,y} = \sum_{j,LT} FC_{PE,y} \cdot COEF_{i,y} \quad (6)$$

Where:

$PE_{CO_2,y}$	Project carbon dioxide emissions from fossil fuel combustion in year y (tCO_2e)
$FC_{PE,y}$	Quantity of fuel type i combusted in process j during the year y (mass volume or volume unit/yr).
$COEF_{i,y}$	Is the CO_2 emission coefficient of fuel type *I* in year *y* (tCO_2/mass or volume unit). This will be calculated using national data.

The possible project emissions from electricity or other sources that are listed in the methodology are not applicable, as no electricity consumption occurs and not other greenhouse gases are emitted by the project activity.

According to the explanations for the baseline emissions, this equation can be further developed to:

$$PE_{CO_2,y} = FC_{PE,y} \cdot NCV_{coal,y} \cdot EF_{CO_2,coal,y} \quad (7)$$

Where:

$PE_{CO_2,y}$	Baseline carbon dioxide emissions from fossil fuel combustion in year y (tCO_2e)
$FC_{PE,y}$	Quantity of coal combusted for domestic use in year y (mass volume or volume unit/yr).
$NCV_{coal,y}$	Is the CO_2 emission coefficient of coal in year *y* (tCO_2/mass or volume unit).
$EF_{CO_2,coal,y}$	Is the weighted average CO_2emission factor of raw coal in year *y* (tCO_2/GJ). According to the national data, the emissions factor for raw coal is 87,300 tCO_2/TJ. This value reflects the lower value of the 95% confidence level of the values provided in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories and is therefore conservative.

3. Leakage

The leakage will be determined by paragraph 11 of AMS III.R and paragraphs 47 and 48 of AMS I.C:

> *11. If the methane recovery and combustion equipment is transferred from another activity or if the existing equipment is transferred to another activity, leakage is to be considered.*
>
> *47. If the energy generating equipment currently being utilized is transferred from outside the boundary to the project activity, leakage is to be considered.*
>
> *48. In case collection/processing/transportation of biomass residues is outside the project boundary CO_2emissions from collection/processing/transportation of biomass residues to the project site.*

All three paragraphs are not applicable to the proposed project as no equipment will be transferred from or to another activity and no collection/processing/transportation takes place outside the project boundary.

Furthermore, AMS I.C refers to the *General guidance on leakage in biomass project activities* (Attachment C to Appendix B) to determine possible leakage. Following this guidance, the animal manure, kitchen and toilet wastes that are fed into the digesters are identified as "Biomass residues or wastes". For this type of biomass, only leakage occurring due to competing use of biomass has to be considered.

Although the animal manure is used as fertilizer in the baseline scenario, no leakage emissions are considered. As the utilization within the biogas digester and the direct application as fertilizer are no competing forms biomass utilization as the digester effluent can also be applied as fertilizer after the biogas generation. In fact, the digester effluent is an even more effective fertilizer than the raw animal manure[9]. Therefore, the leakage emissions according to the *General guidance on leakage in biomass project activities* are assumed 0.

4. Emission Reduction

AMS-III.R - ***Methane recovery in agricultural activities at household/small farm level***

The emission reduction due to avoided methane emissions is calculated as:

$$ER_{CH_4,y} = BE_{CH_4,y} - PE_{CH_4,y} - Leakage \quad (8)$$

Where:

$ER_{CH_4,y}$	Emission reduction due to methane avoidance in year y (tCO_2e)
$BE_{CH_4,y}$	Baseline methane emissions in year y (tCO_2e)
$PE_{CH_4,y}$	Project methane emissions in year y (tCO_2e)

AMS I.C - *Thermal energy production with or without electricity*

The emission reduction due to reduced coal consumption is calculated as:

$$ER_{CO_2,y} = BE_{CO_2,y} - PE_{CO_2,y} - Leakage \quad (9)$$

Where:

$ER_{CH_4,y}$	Emission reduction due to reduced coal consumption in year y (tCO_2e)
$BE_{CH_4,y}$	Baseline carbon dioxide emissions from coal combustion in year y (tCO_2e)
$PE_{CH_4,y}$	Project carbon dioxide emissions from coal combustion in year y (tCO_2e)

Finally, the combined emission reduction due to methane avoidance and reduced coal consumption can be calculated:

$$ER_y = ER_{CH_4,y} + ER_{CO_2,y} \quad (10)$$

Where:

ER_y	Total emission reduction year y (tCO_2e)

[9]See Section 1.2.2, Al Seadi, Rutz, Prassl, Koettner, Finsterwalder, Volk, Janssen – Biogas Handbook; University of Southern Denmark Esbjerg, 2008

$ER_{CH_4,y}$	Emission reduction due to methane avoidance in year y (tCO_2e)
$ER_{CO_2,y}$	Emission reduction due to reduced coal consumption in year y (tCO_2e)

The following parameters will be fixed for all CPAs included during the first crediting period of the PoA.

D.6.2. Data and parameters that are to be reported ex-ante

(Copy this table for each data and parameter.)

Data / Parameter	$FC_{BL,y}$
Unit	Tonnes of coal
Description	Average annual coal consumption before the installation of the digesters.
Source of data	Comprehensive baseline survey.
Value(s) applied	XXX
Choice of data or Measurement methods and procedures	Data has been collected in a comprehensive baseline survey and fixed ex ante in the whole crediting period of this CPA. The sample size has been determined in line with the latest requirements by methodologies and EB. Currently, the Standard For Sampling And Surveys For CDM Project Activities And Programme Of Activities, version 02 requires a level of confidence of 95% and a maximum error of 10%. Methodology AMS III.R has the same requirements of 90/10. Therefore, the study shall at least meet a level of accuracy of 95/10.
Purpose of data	Calculation of baseline emissions;
Additional comment	

Data / Parameter	$FC_{PE,y}$
Unit	Tonnes of coal
Description	Average annual coal consumption after the installation of the digesters.
Source of data	Contrast group survey.
Value(s) applied	XXX
Choice of data or Measurement methods and procedures	Data has been collected in a comprehensive baseline survey and fixed ex ante in the whole crediting period of this CPA. The sample size has been determined in line with the latest requirements by methodologies and EB. Currently, the *Standard For Sampling And Surveys For CDM Project Activities And Programme Of Activities, version 02* requires a level of confidence of 95% and a maximum error of 10%. Methodology AMS III.R has the same requirements of 90/10. Therefore, the study shall at least meet a level of accuracy of 95/10.
Purpose of data	Calculation of project emissions;
Additional comment	

Data / Parameter	$VS_{LT,y}$
Unit	kg dry matter animal-1 year-1
Description	Daily volatile solid excreted per animal.
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, and Chapter 10, Table 10A-7 (swine).
Value(s) applied	109.5
Choice of data or Measurement methods and procedures	The applied value reflects the 2006 IPCC value for the daily solid excreted by Asian swines multiplied with 365 days in a year. ($VS_{LT,y} = 0.3 * 365 kg\ dry\ matter\ animal^{-1}\ year^{-1}$)
Purpose of data	Calculation of baseline emissions; Calculation of project emissions;
Additional comment	

Data / Parameter	$B_{0,LT}$
Unit	m^3 CH_4 kg-1
Description	Maximum methane producing capacity for manure produced by livestock, of VS excreted.
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories, Volume 4, and Chapter 10, Table 10A-7 (swine).
Value(s) applied	0.29
Choice of data or Measurement methods and procedures	The applied value reflects the 2006 IPCC value for Asian swine. Although animals of western genetic origin account for a large share of the pigs in Sichuan province, the more conservative standard value for Asian swine is applied for all animals in the calculations of emission reduction of the proposed PoA.
Purpose of data	Calculation of baseline emissions; Calculation of project emissions;
Additional comment	

D.6.3. Ex-ante calculation of emission reductions

>> In this section, only the input values will be applied and the result calculated. For a detailed description of the calculation methods, see the related PoA-DD.

1. **Baseline emissions**

AMS-III.R – ***Methane recovery in agricultural activities at household/small farm level***

$$BE_{CH_4,y} = GWP_{CH_4} \cdot D_{CH_4} \cdot UF_b \cdot \sum_{j,LT} MCF_j \cdot B_{0,LT} \cdot N_{LT,y} \cdot VS_{LT,y} \cdot MS\%_{Bl,j} \quad (11)$$

Where:

$BE_{CH_4,y}$	Baseline methane emissions in year y (tCO_2e)	XXXtCO_2e
GWP_{CH_4}	Global Warming Potential for CH_4	25
D_{CH_4}	CH_4 density (0.00067 t/m^3 at room temperature (20 °C) and 1 atm	0.00067

	pressure)	t/m^3
UF_b	Model correction factor to account for model uncertainties	0.94
j	Index for animal manure management system. As – according to the applicability criteria – all households use pits to store the animal manure, this index is used for the different climate conditions on a city basis. For CPAs with households of only one city, this index reduces to one element.	
LT	Index for all types of livestock. As only pigs are considered for the calculation of emission reductions, this index is reduced to one element.	
MCF_j	Annual methane conversion factor (MCF) for the baseline animal manure management system j. To pay respect to different annual mean temperatures in the covered region, the pits in different cities are considered different manure management systems with different MCF values.	XXX
$B_{0,LT}$	Maximum methane producing capacity for the volatile solid generated for animal type LT (m^3 CH_4(kgdm)$^{-1}$)	0.29
$N_{LT,y}$	Number of animals of type LT in year y for the entire CPA (numbers). (The average number of pigs per household multiplied with the number of households.)	XXX
$VS_{LT,y}$	Volatile solids for livestock LT entering the animal manure management system in year y (on a dry matter weight basis, kg dm/animal/year)	109.5
$MS\%_{Bl,j}$	Fraction of manure handled in baseline animal manure management system j. As the index j is covered the different climate conditions of the cities, this fraction reflects the share of animals in a climatic region to the total number of animals.	XXX

AMS I.C – *Thermal energy production with or without electricity*

$$BE_{CO_2,y} = FC_{BE,y} \cdot NCV_{coal,y} \cdot EF_{CO_2,coal,y} \quad (12)$$

Where:

$BE_{CO_2,y}$	Baseline carbon dioxide emissions from fossil fuel combustion in year y (tCO_2e)	XXX tCO_2e
$FC_{BE,y}$	Quantity of coal combusted for domestic use in year y (mass volume or volume unit/yr).	XXXt
$NCV_{coal,y}$	Is the CO_2 emission coefficient of coal in year *y* (tCO_2/mass or volume unit).	XXXGJ/t
$EF_{CO_2,coal,y}$	Is the weighted average CO_2emission factor of raw coal in year *y* (tCO_2/GJ). According to the national data, the emissions factor for raw coal is 87.300 tCO_2/TJ. This value reflects the lower value of the 95% confidence level of the values provided in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories and is therefore conservative.	XXXtCO_2/TJ

2. Project emissions

AMS-III.R – ***Methane recovery in agricultural activities at household/small farm level***

$$PE_{CH_4,y} = 0.10 \cdot GWP_{CH_4} \cdot D_{CH_4} \cdot \sum_{i,LT} B_{0,LT} \cdot N_{LT,y} \cdot VS_{LT,y} \cdot MS\%_{i,y} \quad 13$$

Where:

$PE_{CH_4,y}$	Project methane emissions in year y (tCO_2e)	XXXtCO_2e
GWP_{CH_4}	Global Warming Potential for CH_4	25
D_{CH_4}	CH_4 density (0.00067 t/m^3 at room temperature (20 ^oC) and 1 atm pressure)	0.00067 t/m^3
i	Index for animal manure management system. As – according to the applicability criteria – all households use pits to store the animal manure, this index is used for the different climate conditions on a city basis.	
LT	Index for all types of livestock	
$B_{0,LT}$	Maximum methane producing capacity for the volatile solid generated for animal type *LT* (m^3 CH_4 $(kg\ dm)^{-1}$)	0.29
$N_{LT,y}$	Number of animals of type LT in year y for the entire CPA (numbers). (The average number of pigs per household multiplied with the number of households.)	XXX
$VS_{LT,y}$	Volatile solids for livestock LT entering the animal manure management system in year y (on a dry matter weight basis, kg dm/animal/year)	109.5
$MS\%_{i,j}$	Fraction of manure handled in system I in year y. As the index I covers the different climate conditions of the cities, this fraction reflects the share of household in a given city.	XXX

AMS I.C – *Thermal energy production with or without electricity*

$$PE_{CO_2,y} = FC_{PE,y} \cdot NCV_{coal,y} \cdot EF_{CO_2,coal,y} \quad 14$$

Where:

$PE_{CO_2,y}$	Project carbon dioxide emissions from fossil fuel combustion in year y (tCO_2e)	XXX tCO_2e
$FC_{PE,y}$	Quantity of fuel type I combusted in process j during the year y (mass volume or volume unit/yr).	XXX t
$NCV_{coal,y}$	Is the CO_2 emission coefficient of coal in year *y* (tCO_2/mass or volume unit).	XXX GJ/t
$EF_{CO_2,coal,y}$	Is the weighted average CO_2emission factor of raw coal in year *y* (tCO_2/GJ). According to the national data, the emissions factor for raw coal is 87.300 tCO_2/TJ. This value reflects the lower value of the 95% confidence level of the values provided in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories and is therefore conservative.	XXX tCO_2/TJ

3. Leakage

According to the PoA-DD, leakage emissions are assumed 0.

4. Emission Reduction

AMS-III.R – ***Methane recovery in agricultural activities at household/small farm level***

$$ER_{CH_4,y} = BE_{CH_4,y} - PE_{CH_4,y} - Leakage \quad (15)$$

Where:

$ER_{CH_4,y}$	Emission reduction due to methane avoidance in year y (tCO_2e)	XXX tCO_2e
$BE_{CH_4,y}$	Baseline methane emissions in year y (tCO_2e)	XXX tCO_2e
$PE_{CH_4,y}$	Project methane emissions in year y (tCO_2e)	XXX tCO_2e

AMS I.C – *Thermal energy production with or without electricity*

$$ER_{CO_2,y} = BE_{CO_2,y} - PE_{CO_2,y} - Leakage \quad (16)$$

Where:

$ER_{CO_2,y}$	Emission reduction due to reduced coal consumption in year y (tCO_2e)	XXX tCO_2e
$BE_{CO_2,y}$	Baseline carbon dioxide emissions from coal combustion in year y (tCO_2e)	XXX tCO_2e
$PE_{CO_2,y}$	Project carbon dioxide emissions from coal combustion in year y (tCO_2e)	XXX tCO_2e

Finally, the combined emission reduction due to methane avoidance and reduced coal consumption can be calculated:

$$ER_y = ER_{CH_4,y} + ER_{CO_2,y} \quad (17)$$

Where:

ER_y	Total emission reduction year y (tCO_2e)	XXX tCO_2e
$ER_{CH_4,y}$	Emission reduction due to methane avoidance in year y (tCO_2e)	XXX tCO_2e
$ER_{CO_2,y}$	Emission reduction due to reduced coal consumption in year y (tCO_2e)	XXX tCO_2e

With the input values used for this CPA, the estimated annual emission reduction is XXX tCO_2e.

D.6.4. Summary of the ex-ante estimates of emission reduction

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
Year 1	XXX	XXX	0	XXX
Year 2	XXX	XXX	0	XXX
Year 3	XXX	XXX	0	XXX
Year 4	XXX	XXX	0	XXX
Year 5	XXX	XXX	0	XXX
Year 6	XXX	XXX	0	XXX
Year 7	XXX	XXX	0	XXX
Year 8	XXX	XXX	0	XXX
Year 9	XXX	XXX	0	XXX
Year 10	XXX	XXX	0	XXX
Total	XXX	XXX	0	XXX
Total number of crediting years	10			
Annual average over the crediting period	XXX	XXX	0	XXX

D.7. Application of the monitoring methodology and description of the monitoring plan
D.7.1. Data and parameters to be monitored

(Copy this table for each data and parameter.)

Data / Parameter	N_k
Unit	1
Description	Number of systems operating.
Source of data	Monitoring sampling study
Value(s) applied	XXX
Measurement methods and procedures	Sampling monitoring survey with a sampling size determined following the latest guidelines and the applied methodologies.
Monitoring frequency	Annually
QA/QC procedures	This monitoring parameter will be determined through a comprehensive monitoring survey that follows the latest guidelines of the EB. Currently, the *Standard For Sampling And Surveys For CDM Project Activities And Programme Of Activities, version 02*, the level of confidence should be at least 95%, while the acceptable error is 10%.
Purpose of data	Calculation of baseline emissions; Calculation of project emissions;
Additional comment	

Data / Parameter	t
Unit	hours
Description	Mean annual operation hours of the digesters.
Source of data	Monitoring sampling study
Value(s) applied	8,424 hours (351 days)
Measurement methods and procedures	The figure will be obtained through a sampling monitoring survey with a sampling size determined following the latest guidelines and the applied methodologies. To determine the annual running hours, the number and lengths of times when the digesters where not providing sufficient gas supply (during maintenance, cleaning, etc.) will be recorded and with this input, the final value can be calculated.
Monitoring frequency	Annually
QA/QC procedures	This monitoring parameter will be determined through a comprehensive monitoring survey that follows the latest guidelines of the EB. Currently, the *Standard For Sampling And Surveys For CDM Project Activities And Programme Of Activities, version 02*, the level of confidence should be at least 95%, while the acceptable error is 10%.
Purpose of data	-
Additional comment	

Data / Parameter	T
Unit	˚C
Description	Mean annual temperature in city k. This parameter determines the emission factors of the existing manure management systems.
Source of data	Data from official sources (e.g. the Sichuan Statistical Yearbook). Should the Sichuan Statistical Yearbook be not available for certain years, or in case this publication is renamed, etc. other official data will be used.
Value(s) applied	XXX
Measurement methods and procedures	This value will be obtained each year from the latest officially published data available. City-specific date will be taken to guarantee a precise and suitable value to be applied for each manure management system.
Monitoring frequency	Annually
QA/QC procedures	
Purpose of data	Calculation of baseline emissions.
Additional comment	

Data / Parameter	$MCF_{j,k}$
Unit	%
Description	Methane conversion factors for each manure management system j in climate region k.
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 10, Table 10.17. The MCF values for the most likely mean annual temperatures (refer to mean annual temperature in 2008, displayed in Annex 3, Section 1) are shown in Annex 3, Section 2
Value(s) applied	XXX
Measurement methods and procedures	This value will be determined annually for XXX based on the mean annual temperature and the standard values provided in IPCC 2006 Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 10, Table 10.17 (swine). While the temperature ranges listed there, should cover most climate conditions, the guideline advises the PP to utilize the end-of-range (i.e., 10 or 28 degree) for areas that have extreme high or low annual average temperatures outside the 10 to 28 degree Celsius range. Therefore, the end-of-range will be applied for such cases. The value applied will be chosen depending on the mean annual temperature (Parameter ID M04) in the specific climate region for each manure management system.
Monitoring frequency	Annually
QA/QC procedures	
Purpose of data	Calculation of baseline emissions.
Additional comment	

Data / Parameter	$N_{LT,y}$
Unit	1
Description	Annual average number of animals of type LT in year y (numbers).
Source of data	Monitoring sampling study.
Value(s) applied	Ex-ante values are taken from the comprehensive baseline survey conducted prior to validation.
Measurement methods and procedures	The number of animals will be determined based on the number of pigs per households and the number of households in a given CPA.
Monitoring frequency	Annually
QA/QC procedures	This monitoring parameter will be determined through a comprehensive monitoring survey that follows the latest guidelines of the EB. Currently, the *Standard For Sampling And Surveys For CDM Project Activities And Programme Of Activities, version 02*, the level of confidence should be at least 95%, while the acceptable error is 10%.
Purpose of data	Calculation of baseline emissions; Calculation of project emissions;
Additional comment	

Data / Parameter	Proper sludge application ratio
Unit	N/A
Description	Land application of digestate from biogas digesters to avoid anaerobic digestion.
Source of data	Monitoring sampling study.
Value(s) applied	XXX
Measurement methods and procedures	Sampling monitoring survey with a sampling size determined following the latest guidelines and the applied methodologies. By interviewing the sample households, a factor of correct sludge application (not resulting in methane emissions) will be determined. In case a single application has not been carried out according to the requirements, the respective household will not claim any emission reductions for the respective households. After the monitoring sample survey, a factor between 0 and 1 will be determined to reduce the claimed emission reductions by the share of households that did not apply the sludge according to the requirements.
Monitoring frequency	Annually
QA/QC procedures	This monitoring parameter will be determined through a comprehensive monitoring survey that follows the latest guidelines of the EB. Currently, the *Standard For Sampling And Surveys For CDM Project Activities And Programme Of Activities, version 02*, the level of confidence should be at least 95%, while the acceptable error is 10%.
Purpose of data	Calculation of baseline emissions; Calculation of project emissions;
Additional comment	

Data / Parameter	$EF_{CO_2,i,y}$
Unit	tCO2/TJ
Description	Emission Factor of raw coal
Source of data	Official data from Chinese DNA: http://qhs.ndrc.gov.cn/qjfzjz/W020090703644238739485.xls.
Value(s) applied	XXX
Measurement methods and procedures	National publications of emission factors will be followed every monitoring period. If the Chinese DNA should publish updated or changed data, this value will be updated.
Monitoring frequency	Annually
QA/QC procedures	
Purpose of data	Calculation of baseline emissions; Calculation of project emissions;
Additional comment	

Data / Parameter	$NCV_{i,y}$
Unit	GJ/t
Description	Net Calorific Value of raw coal
Source of data	Official data from Chinese DNA: http://qhs.ndrc.gov.cn/qjfzjz/W020090703644238739485.xls.
Value(s) applied	XXX
Measurement methods and procedures	National publications for the Net Calorific Value will be followed every monitoring period. If the Chinese DNA should publish updated or changed data, this value will be updated.
Monitoring frequency	Official data publications will be followed including a cross-check prior to the end of each monitoring period. If new data are published, it shall be checked if this data is within the range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines. If the values fall below this range collect additional information from the testing laboratory to justify the outcome or conduct additional measurements.
QA/QC procedures	
Purpose of data	Calculation of baseline emissions; Calculation of project emissions;
Additional comment	

D.7.2. Description of the monitoring plan
>>

1. **Organizational setup**

The Sichuan Rural Energy Office will be responsible for the monitoring management of the CPAs. The conduction of the monitoring and collection of the data will be forwarded to the city and county level REOs. Thereby, a decentralized data collection system will compile the data and submit it to the Chinese Academy of Agricultural Engineering (CAAE) for statistical analysis. The complete data will finally be submitted to the C/ME, which evaluates the data and compiles the monitoring reports for the single CPAs.

2. **Data monitored**

One special monitoring parameter is the proper sludge application ratio (M07), required by the methodology AMS III.R. This parameter is monitored to avoid the issuance of any credits for households that caused project emissions. Therefore, a household that had a single application of sludge that was not carried out in a way that avoids project emissions, will be excluded from the respective monitoring period. Therefore, the emission reductions from each monitoring period will be multiplied with the fraction of households that applied the sludge correctly.

3. **Monitoring sampling study**

Several monitoring parameters will be determined using a sampling study. The details of this sampling approach are discussed and described in the Monitoring Sampling Plan that is provided to the DOE.

4. **Data Management and Quality Control.**

The tentative system of data management and quality control is described below. As the system is improved constantly, improvements to increase the data accuracy might be implemented. In such case, all improvements will be documented and clearly described in all subsequent documents such as CPA-DDs and Monitoring Reports and provided to all involved stakeholders.

a) Step 1: Supervisor Check

When the monitoring data is collected, the supervisor of the county needs to review all questionnaires collected from each interviewer. Data on the questionnaires need to be subject to five kinds of checks: range checks (outlier data), checks against reference data, skip checks, consistency checks and typographic checks.

b) Step 2: Data Entry

A data entry program should be used with suspect range and logical consistency triggers. One simple solution is to set up a spreadsheet data entry template with validity check triggers.

c) Step 3: Data Check Algorithms

A project data management software will check for inconsistencies, missing values, identification numbers, double data entry. One simple solution is to use sort and filter function of spreadsheet.

d) Step 4: Analytical Checks:

By basic descriptive statistics, the outliers can be easily figured out. Further statistical analysis can work out more characteristics of the data by professional analysis tools.

5. Data Archives

The Chinese Academy of Agricultural Engineering will collect electronic data from the local Rural Energy Offices. The data will be structured and forwarded to the C/ME.

Together with the hard copies that will be collected by the SREO and forwarded to the C/ME, all data and documents will be archived by the C/ME and provided to the verifying DOE on demand.

All data and documents will be archived by the C/ME at two different locations to avoid data loss and allow a data restore in the unlikely event of a data loss. All data will be stored until at least two years after the CPA crediting period is finished.

SECTION E. Approval and authorization

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United Kingdom of Great Britain and Northern Ireland
People’s Republic of China (host)

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Appendix 1. Contact information of CPA implementer(s) and responsible person(s)/ entity(ies) for completing the CDM-SSC-CPA-DD-FORM

CPA implementer and/or responsible person/ entity	☐ CPA implementer(s) ☐ Responsible person/ entity for completing the CDM-SSC-CPA-DD-FORM
Organization	Chengdu Oasis Science & Technology Co. Ltd.
Street/P.O. Box	Renmin South Road, Section 4, No. 27 (Sun Dynasty International)
Building	Building 2, Entrance 1, 1841
City	Chengdu
State/Region	Sichuan Province
Postcode	610041
Country	P.R. China
Telephone	+86 10 6468 8669
Fax	
E-mail	hyptpmc@gmail.com
Website	
Contact person	Wang Hai
Title	General Manager
Salutation	Mr.
Last name	Wang
Middle name	Hai
First name	
Department	
Mobile	
Direct fax	
Direct tel.	
Personal e-mail	

Organization	Sichuan Rural Energy Office
Street/P.O. Box	Nijiaqiao Road, No. 5 ,Wuhou District
Building	
City	Chengdu
State/Region	Sichuan Province
Postcode	610041
Country	
Telephone	
Fax	
E-mail	str575885@sina.com
Website	
Contact person	Yumin Song
Title	Office Director of Carbon Emission Reduction
Salutation	Mr.
Last name	Song
Middle name	Yumin
First name	
Department	
Mobile	
Direct fax	
Direct tel.	
Personal e-mail	

Appendix 2. Affirmation regarding public funding

As per the PoA-DD and the eligibility criteria of this CPA, neither the Sichuan Rural Poor-Household Biogas Development Programme and its CPAs nor the household biogas subsidies are supported by any public funding from Annex-I countries.

Appendix 3. Applicability of methodology(ies) and standardized baseline(s)

NA

Appendix 4. Further background information on ex ante calculation of emission reductions

Average Temperature of Project Cities(˚C)(2008)

Source: Sichuan Statistical Yearbook 2009,Page 310

No.	City	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual Average
1	Mianyang	4.2	5.7	13.9	17.5	22.6	25	26.7	24.9	22.6	18.4	12.5	7.5	16.8
2	Guang'an	5	6.3	14.4	18.1	22.8	25	27.9	24.8	24	18.6	13.1	8	17.3
3	Suining	4.2	6.3	14.5	18	22.7	25	27.8	24.5	23.3	18.6	12.6	7.7	17.1
4	Dazhou	4.6	6.5	14.2	18	22.9	25.5	28.5	25.5	23.8	18.2	12.7	7.6	17.3
5	Ziyang	4.2	6.1	14.8	18.3	23.3	25.6	27.1	24.6	23.3	18.7	13	8.2	17.3
6	Meishan	4.7	6.4	14.6	18.4	23.4	25.7	27.1	25.1	23.4	19.3	13.2	8.5	17.5
7	Neijiang	4.7	6.3	14.8	17.9	22.5	24.9	27.4	24.7	23.6	18.9	13	8.4	17.3
8	Leshan	5	6.7	15.1	18.7	23.3	25.3	27	24.5	23.3	19.1	13.3	8.8	17.5
9	Zigong	5.5	7	15.6	18.9	23.4	25.7	27.9	25	23.6	19.7	14	9.3	18
10	Yibin	5.7	7	15.5	19.1	23.7	26.1	28.3	25.8	24.7	20	14.4	10	18.4
11	Luzhou	5.5	6.8	15.3	18.6	22.8	25.1	27.2	24.9	24.3	19.2	13.7	9.2	17.7
12	Chengdu	3.8	5.5	13.5	17.2	22.1	24.5	25.7	24.1	22.2	18.2	12.2	7.1	16.3
13	Panzhihua	14.9	14.3	19.7	25.5	23.8	25.2	24.8	24.4	24.2	21.4	16.0	13.3	20.6
14	Deyang	4.1	5.9	14.0	17.7	22.6	25.1	26.8	25.2	23.1	18.7	12.8	7.2	16.9
15	Guangyuan	3.4	5.8	13.8	17.2	22.9	25.3	26.7	25.1	21.8	17.5	10.9	6.4	16.4
16	Nanchong	4.7	6.8	14.6	18.3	23.2	25.5	28.3	25.1	24.0	18.8	12.7	7.8	17.5
17	Yaan	4.2	5.7	14	17.3	21.9	24.3	25.8	23.9	22.4	18	12.2	8.3	16.5
18	Bazhou	4.0	6.0	13.7	17.2	22.7	24.8	27.5	25.1	22.9	17.8	12.0	6.8	16.7
19	Maerkang	1.8	0.8	5.7	10.9	13.4	14.6	17.3	16	14.8	9.6	3.7	0.1	9.1
20	Kangding	-3.5	-3.8	4.4	8.8	11.6	13.8	15.8	13.8	13.6	9.5	3.2	0.4	7.3
21	Xichang	12.4	6.7	15.4	21.4	20.6	21.8	22.9	21.8	22,1	18.3	13.3	10.9	17.3

Table 6: Temperature data for the Sichuan Province (2008).

Appendix 5. Further background information on monitoring plan

CPA-specific data for automatic completion of the CPA-DD template		
Variable	**Value**	**Explanation**
CPA Number	XXX	CPA number, increasing by one with each new CPA. Format: XX
CPA Year of Inclusion	XXX	Year in which the CPA was submitted to the DOE. Format: YYYY
Starting date of the CPA	XXX	Date on which the first digesters was installed. Format: DD/MM/YYY
Starting date of the crediting period	XXX	Starting date of the CPA crediting period. Format: DD/MM/YYY
Household location	XXX	Location of the CPA households. Format: "City of Yibin" or "Cities of Yiban and Ziyang".
Range of geographic coordinates (latitude)	XXX	Latitudinal range of the municipality Format: XX°XX′XX″N – XX°XX′XX″N
Range of geographic coordinates (longitude)	XXX	Longitudinal range of the municipality Format: XXX°XX′XX″E – XXX°XX′XX″E
Number of households	XXX	The number of included households. Format: XX,XXX.
Total installed capacity	XXX	In MW
Single stove capacity	XXX	In KW
Annual baseline emission/household	XXX	The annual baseline emission per household in tCO_2e. Format: X.X
Annual methane baseline/household	XXX	Annual baseline emissions from pig manure per household in tCO_2e. Format: X.X
Annual project emission/household	XXX	The annual project emission per household in tCO_2e. Format: X.X
Emission reduction per households from methane avoidance	XXX	Emission reduction per households from methane avoidance, Format X.XX tCO_2e.
Total emission reduction from methane avoidance	XXX	Total emission reduction from methane avoidance, Format X,XXX tCO_2e.
Total annual emission reduction	XXX	The annual emission reduction in tCO_2e. Format: XX,XXX
Total annual baseline emission	XXX	The annual baseline emission in tCO_2e. Format: XX,XXX

CPA-specific data for automatic completion of the CPA-DD template		
Total annual project emission	XXX	The annual project emission in tCO_2e. Format: XX,XXX
Total annual leakage	XXX	The annual leakage in tCO_2e. Format: XX,XXX
Total emission reduction	XXX	The total emission reduction in tCO_2e. Format: XXX,XXX
Total baseline emission	XXX	The total baseline emission in tCO_2e. Format: XXX,XXX
Total project emission	XXX	The total project emission in tCO_2e. Format: XXX,XXX
Total leakage	XXX	The leakage in tCO_2e. Format: XXX,XXX

Input values for the calculation of emission reduction:

$MCF_{S,k}$ [%]	XXX	Methane conversion factor for the deep pits, based on the mean annual temperature. Format: XX
LN_k [1]	XXX	Average swine population at the households in city k, before the installation of the biogas digesters. Format: X.XX
$BG_{Coal,k}$	XXX	Coal consumption prior to the installation of the digesters in tonnes of coal per year. Format: X.XXX
$PG_{Coal,k}$	XXX	Coal consumption before the installation of the digesters in tonnes of coal per year. Format: X.XXX
T	XXX	Minimum average annual temperature of the included cities. Format: XX.X
NCV coal	XXX	
EF coal	XXX	

Appendix 6. Summary of post registration changes

Issue: In the CPA-DDs, parameters $FC_{BL,y}$ (average annual coal consumption before the installation of the digesters) and $FC_{PE,y}$ (average annual coal consumption after the installation of the digesters) are fixed ex ante, however in the CPA-DDs, it also states that the data will be collected in a comprehensive baseline survey that is repeated tri annually. Discrepancy of information is found/shown here.

Clarification: The information above in the CPA-DDs was copied directly from the registered PoA-DD, whereas the requirement to repeat the baseline survey is at the PoA level and the survey will be repeated every three years (instead of tri annually).

For the specific CPAs, the parameters $FC_{BL,y}$ and $FC_{PE,y}$ are determined based on the baseline survey at PoA level (repeated every three years) and fixed *ex ante* in the whole crediting period of the CPAs after completion of CPAs inclusion. The repeated baseline survey at PoA level every three years will not affect the parameters (fixed *ex ante*) in the whole crediting period of of the included CPAs.

Based on the clarifications above, corrections[10] have been made as follows:
- In the PoA-DD, the parameters $FC_{BL,y}$ and $FC_{PE,y}$ will be collected in a comprehensive baseline survey that is repeated every three years. The value will be determined and reported in the CPA-DDs specifically for the different CPAs during CPA inclusion process. In addition, the value is fixed *ex ante* in the whole crediting period of each CPA in the CPA-DD.
- In the generic DD and CPA-DDs of CPA 2898-0001 to CPA 2898-0087, the parameters $FC_{BL,y}$ and $FC_{PE,y}$ has been collected in a comprehensive baseline survey and fixed *ex ante* in the whole crediting period of the CPAs.

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Document information

Version	*Date*	*Description*
05.0	15 April 2016	Revision to ensure consistency with the "Standard: Applicability of sectoral scopes" (CDM-EB88-A04-STAN) (version 01.0).
04.0	9 March 2015	Revisions to: • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; • Editorial improvement.
03.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the component project activity design document form for small-scale CDM component project activities (these instructions supersede the "Guidelines for completing the component project activity design document form for small-scale component project activities" (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a CPA implementer and/or responsible person/ entity for completing the CDM-SSC-

[10] the clarifications and corrections are made based on direct communication with EB on 26/11/2015 during last issuance process for this PoA for the monitoring period 01/03/2014 – 31/12/2014

Version	*Date*	*Description*
		CPA-DD-FORM in A.14. and Appendix 1; • Add general instructions on post-registration changes in paragraph 4 and 5 of general instructions and Appendix 6; • Change the reference number from *F-CDM-SSC-CPA-DD* to *CDM-SSC-CPA-DD-FORM*; • Editorial improvement.
02.0	13 March 2012	EB 66, Annex 17 Revision required to ensure consistency with the "Guidelines for completing the component project design document form for small-scale component project activities".
01.0	27 July 2007	EB33, Annex44 Initial adoption.

Decision Document Business	Class: Type: Function:	Regulatory Form Registration

Keywords: component project activity, project design document, SSC project activities