Programme of activities design document form

(Version 08.1)

Complete this form in accordance with the instructions attached at the end of this form.

BASIC INFORMATION	
Title of the PoA	Sichuan Rural Poor-Household Biogas Development Programme
Version number of the PoA-DD	2
Completion date of the PoA-DD	30/10/2017
Coordinating/ managing entity	Chengdu Oasis Science & Technology Co., Ltd
Host Parties	People's Republic of China
Applied methodologies and standardized baselines	AMS-I.I.– *Biogas/biomass thermal applications for households/small users* (version 04) (EB68, Annex 25); AMS-III.R.– *Methane recovery in agricultural activities at household/small farm level* (version 02) (EB59, Annex 4)
Sectoral scopes linked to the applied methodologies	Scope 1 – Energy Industries (Renewable /non-Renewable Sources) Scope 15 - Agriculture

PART I. Programme of activities (PoA)

SECTION A. Description of PoA

A.1. Purpose and general description of the PoA

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1. General operating and implementing framework of PoA

The Sichuan Rural Poor-Household Biogas Development Programme (hereafter referred to as "The proposed PoA") aims to reduce a large amount of greenhouse gases (GHG) by facilitating the installation of a large number of household biogas digesters. To achieve this target, the proposed PoA will generate additional incentives to install digesters to households that are supported by existing subsidy schemes. Target group of the proposed PoA are low-income households located in Sichuan Province, China. The primarily targeted areas are thirteen cities (however, the PoA shall not be limited to this thirteen cities exclusively): Yibin, Neijiang, Suining, Ziyang, Zigong, Ruzhou, Leshan, Meishan, Mianyang,Guang'An, Ganzi, Aba and Dazhou, all of which are located in Sichuan.

Currently, households in the area of the proposed PoA store animal manure produced by micro-scale animal husbandries in deep pits for several months before applying it to their farmland. In the meantime, coal is used as source of energy for cooking in daily life. During the project activity, each household is equipped with a household biogas digester that will treat the manure anaerobically and recover the generated methane. After installation of the biogas systems, both sources of emissions will be reduced: No methane is emitted from the existing manure management systems, as the manure will be treated within the biogas digesters and furthermore, all recovered methane will be utilized for cooking to reduce the coal consumption of each household.

To support local households, the Sichuan Rural Energy Office implements the existing governmental subsidy schemes by providing a financial support during the construction of the biogas digesters.. Target of the subsidy schemes is to reduce methane emissions from the pits, generate biogas as renewable source of energy and use the digester effluent as high-efficient fertilizer. However, after reaching mid-and high-income families, the Sichuan Rural Energy Office came to the conclusion, that low-income families still face barriers and cannot participate in the digester installation programme. Therefore, these households need further promotion to participate in the existing programmes and install a biogas digester.

Furthermore, technical difficulties that occur during the operation of household biogas digesters resulted in a low rate of successful long-term operation among the digesters that have been installed in the past. A fundamental reason is that technical support and maintenance of the digesters and related equipment are not covered by the subsidy schemes. Individual technical support for households is expensive and difficult to obtain in remote areas. Therefore, the acceptance of the technology and the willingness to pay for the instalment of bio digesters without guaranteed, regular and proper maintenance is very low.

The proposed PoA will be managed, implemented, operated and monitored by the Coordinating Entity (C/ME) Chengdu Oasis Science & Technology Co., Ltd. The C/ME will take care of all CDM related tasks. This includes the writing of all related documents, quantitative calculation of emission reductions, the management of CDM related procedures like validation, registration and verification, and the allocation of CER revenues for the distribution to the farmers and the technical service network.

The technical implementation of the digesters, the operation of the service network, as well as all necessary surveys and monitoring will be undertaken by the Sichuan Rural Energy Office and their subsidiaries, the city, county and village level Rural Energy Offices. After the CER revenue has been provided by the C/ME, the Sichuan Rural Energy Office also ensures the distribution of the revenues to the individual households and the service network.

Each CPA under the proposed PoA will have two CPA implementers:

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

2. Policy measure or stated goal of the PoA

Stated goal of the proposed PoA is to enable the poor population of the rural areas in Sichuan to participate in the existing biogas subsidy programme provided by the Sichuan Rural Energy Office. The approach adopted to achieve this is twofold:

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 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.

3. Confirmation that the proposed PoA is a voluntary action by the coordinating/managing entity

Currently, there is no mandatory policy or regulation requiring the installation of household biogas technology by rural farmers. The Coordinating Entity aims to set up the PoA as a voluntary action and plans all measures needed to increase the acceptance of the existing subsidy programme additionally and beyond the said system. All households included participate voluntarily and would face severe barriers without the proposed PoA.

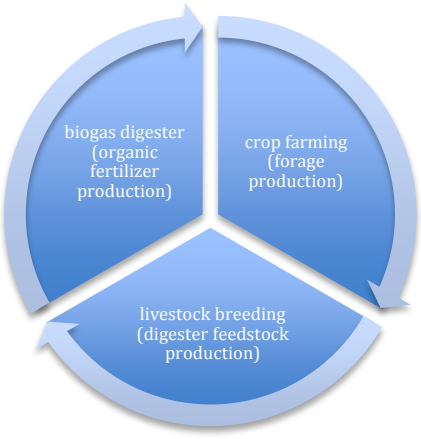
Furthermore, the installation of biogas digesters under existing subsidy schemes that are currently implemented by the Sichuan Rural Energy Office and that will be further promoted by the proposed programme is a voluntary action as well. In the existing structures, the households receive a financial support for the construction of digesters. However, the farmers make the investment decision on a voluntary basis. No existing subsidy, law or regulation does give a provincial mandatory target number of constructed biogas digesters that has to be reached by the provincial government or imply any mandatory obligation for the farmers to install the systems.

4. Positive effects of the proposed PoA beyond reducing GHG emissions

As the most obvious and measurable effect, the proposed programme will result in a reduction of carbon emissions. The first CPA (SN: SCHHBG-2010-001) that will be registered with this PoA, is estimated to result in an annual emission reduction of 2,282 tCO_2e and a total emission reduction of 22,820 tCO_2e in the entire 10-year crediting period.

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 PoA, 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 PoA 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 PoA, 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 PoA will provide technical service to the farmers and thereby reduce the risk of such accidents.



Through the effects described above, the proposed PoA 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.2. Physical/ Geographical boundary of the PoA

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The geographical boundary for the proposed PoA is the administrative boundary of Sichuan province, China as shown in Figure 1.

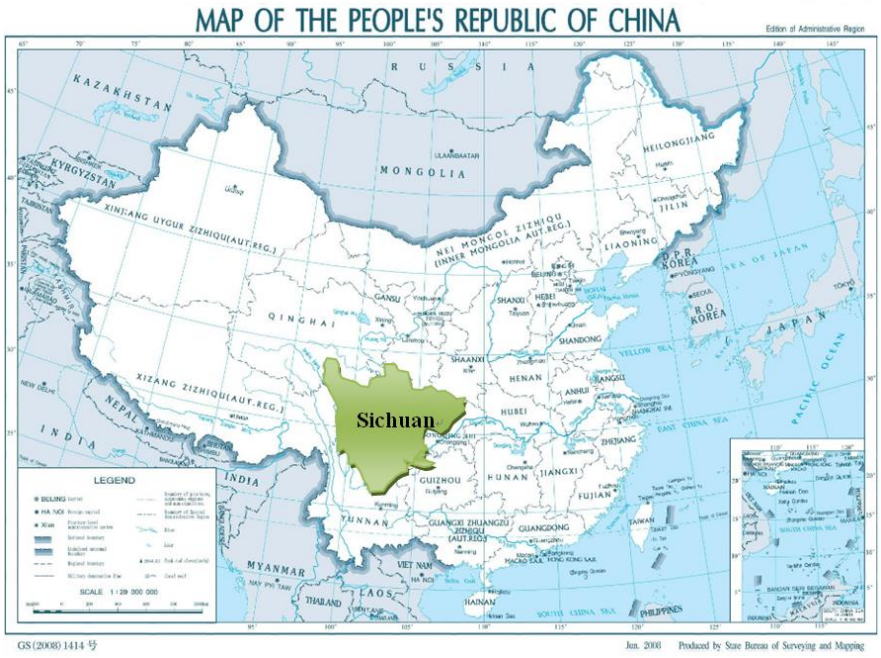

Figure 1: Location of the Sichuan Province in China.

All SSC-CPAs that will be included under the SSC-PoA will be within the defined geographical location of the SSC-PoA area and follow applicable national, provincial and/or sectoral policies and regulations in this region.

A.3. Technologies/measures

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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 2.

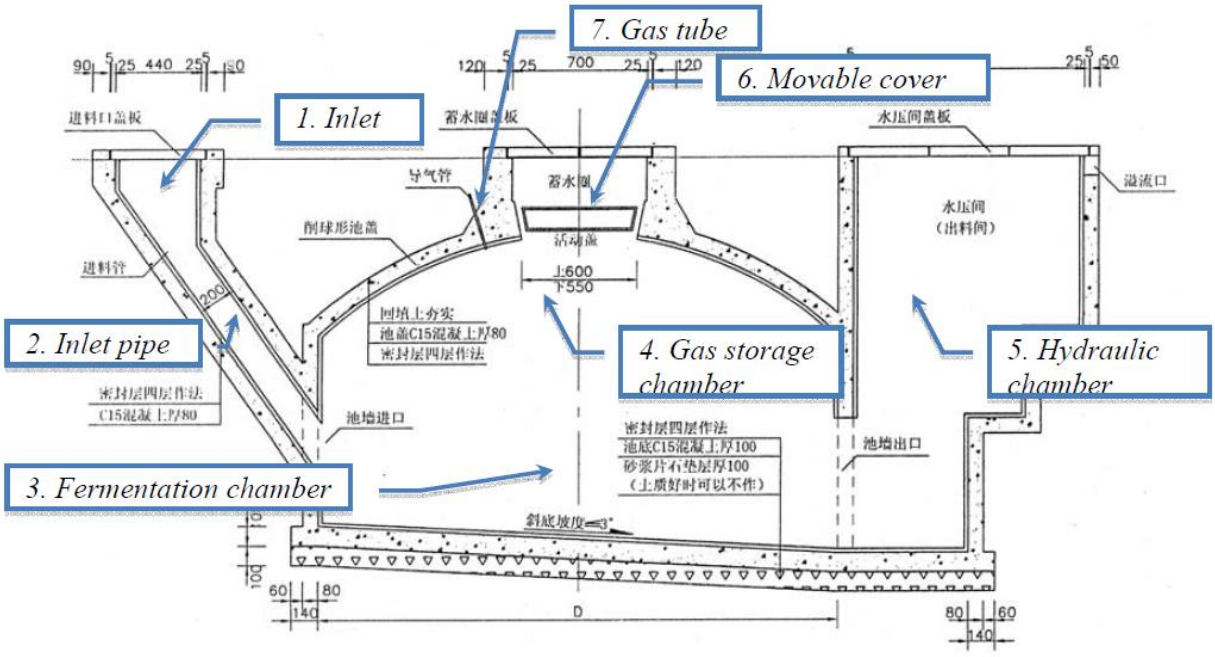

Figure 2: Typical design of a household biogas digester installed under the proposed PoA.

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 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.

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

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 Digesters
5.	NY/T 465-2001	Household-Scaled Biogas &Integrated Farming System-Specification on Design, Construction and Use for Southern Model

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 3：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

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. 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 proposed PoA and will be introduced in more detail in section B.

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.4. Coordinating/managing entity

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The C/ME is Chengdu Oasis Science & Technology Co., Ltd (Hereafter to referred as “Chengdu Oasis” or “Oasis”).

A.5. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (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.6 Public funding of PoA

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No public funding from Annex 1 countries is provided for the proposed programme of activities (PoA).

However, co-funding for the installation of bio digesters is provided by SREO under a public Chinese subsidy scheme. The source of funding of the subsidy scheme does not comprise international funding or any other form of ODA. Besides, no bilateral or multilateral fund project participants are involved in the PoA.

SECTION B. Management system

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Description of the operational and management arrangements established by the coordinating/managing entity for the implementation of the PoA, including:

(i) A record keeping system for each CPA under the PoA,
(ii) A system/procedure to avoid double accounting e.g. to avoid the case of including a new CPA that has been already registered either as a CDM project activity or as a CPA of another PoA,
(iii) The SSC-CPA included in the PoA is not a de-bundled component of another CDM programme activity (CPA) or CDM project activity.
(iv) The provisions to ensure that those operating the CPA are aware of and have agreed that their activity is being subscribed to the PoA;

The C/ME in cooperation with the Sichuan Rural Energy Office will implement the proposed PoA.

(i) A record keeping system for each CPA under the PoA.

To manage the PoA and all included CPAs, the C/ME – Oasis Chengdu – is responsible for maintaining several databases that hold all relevant information related to the implementation of all CPAs and their households.

The record that is kept for the CPA organisation is displayed in Table 2. It comprises the number of the CPA and the contact data for the employee in the City REO that is responsible for the CPA management. If one CPA includes households of more than one city, this record will be extended to comprise the data for all involved cities.

	CPA Information
CPA Number:	
CPA City:	
Contact Name in CPA city:	
Telephone Number:	
Fax Number:	
Email:	
Address:	
ZIP Code:	

Table 2: CPA record keeping system

Furthermore, a household database will be set up to manage the necessary household data for each CPA. The minimum data contained in this database is shown in following table:

Table 3: Minimum data for the household database

HH ID	**Name**	**City**	**County**	**Town**	**Village**	**Digester ID**	**Construction finished**
00001	Name A	City A	County A	Town A	Village A	CityA-CountyA-ID	Date A
00002	Name B	City B	County B	Town B	Village B	CityB-CountyB-ID	Date B
00003	Name	City C	County C	Town	Village	CityC-	Date C

	C			C	C	CountyC-ID	
…	…	…	…	…	…	…	

HH ID: This ID number will be an identification number independently from the ID number provided within the subsidy scheme.

Name: This field will be the name of the household leader.

City, County, Town, and Village: Detailed information on the village in which the household is located. Some households cannot be assigned to one specific village. In that case, the two (or sometimes more) neighbouring villages will be named in the field "Village".

Digester ID: This data field contains the ID number that is used for the digester within the subsidy scheme. The ID numbers are unique within counties and additionally contain the city and county information.

Construction finished: To record when the digester construction has been finished and the actual reduction of emission begins, the date of construction finalization will be recorded for each digester. Therefore, it can be ensured, that the digesters only contribute to the emission reduction calculation once they are fully constructed. This parameter will be determined after the CPAs have been included to the PoA.

These databases will be kept as electronic versions in the office of the C/ME in Chengdu and backed up regularly.
All data acquired within this data recording system will be kept at least until two years after the end of the crediting period of the PoA.

The databases of the participating households and the implementing rural energy offices, as well as the close contact with all relevant stakeholders will allow a comprehensive system of control over the implementation of the PoA and its CPAs.

By organizing regular briefings and project meetings with the rural energy offices, the C/ME will ensure that the local implementers are familiar with the PoA guideline and all relevant tasks. In case of any uncertainties, the C/ME can be contacted in its local office in Chengdu or by any other means of communication to support the local staff.

Furthermore, Oasis will also conduct regular spot checks of included households to ensure that all digesters included into the PoA have passed the technical acceptance. To do so, the initial list of households is compared to the records of the technical acceptance procedures. In case of any conflicts, the C/ME will clarify the open points and provide further support to the offices that manage the groundwork.

The ongoing operation of the digesters is part of the monitoring plan and will be determined for the monitoring sample group. The monitoring system will be described in section I.7 of this PoA DD.

(ii) A system/procedure to avoid double accounting e.g. to avoid the case of including a new CPA that has been already registered either as a CDM project activity or as a CPA of another PoA.

In order to avoid double accounting and to ensure that those operating the CPA are aware of and have agreed that their activity is being subscribed to the PoA, the implementing entity of a CPA shall, in accordance with the eligibility criteria stipulated in section K confirm with a written statement or enter into a respective contractual arrangement with the C/ME providing that:

1. The CPA and all biogas systems to be installed under the CPA have not been and will not be registered as a single CDM project activity nor as a CPA under another PoA.
2. The implementing entity is aware that the CPA will be subscribed to the present PoA.

3. In the event that the CPA implementer is distinct from the C/ME: The implementing entity cedes its rights to claim and own emission reductions under the Clean Development Mechanism of the UNFCCC to the C/ME of the proposed PoA.

To further ensure that no double counting occurs due to the participants breaking the signed contract, an additional checking on two levels will be undertaken by the C/ME:

1. Internal cross-check procedure: Whenever a new CPA is included in the PoA, the C/ME will confirm that no household is included within the new CPA that is already included in a CPA that has been included previously. To ensure this, comprehensive comparison of the unique digester serial numbers of new CPA and all previous CPAs will be performed and documented.

2. External cross-check procedure: The inclusion of households biogas digesters that are already included in another registered CDM project or CPA of another registered PoA is not possible for the following reason:

    a. All households that construct biogas digesters in Sichuan province will be managed by the SREO.
    b. The Sichuan Rural Energy Office is the only authority that implements household biogas digesters in Sichuan province.
    c. The C/ME has signed an exclusive agreement with the Sichuan Rural Energy Office to develop to proposed PoA to further support the household beyond the national subsidy scheme using the CDM as a financial resource in the targeted areas[1].

    To further prove the validity of this agreement, a cross check of the boundaries of all registered CDM projects and registered PoAs that target the installation of household biogas digesters in rural areas, will be performed and documented. If such CDM project or PoA with an overlapping project boundary is registered and its project documents are available on the official CDM websites, the C/ME will confirm that the new CPA and the existing registered CDM project or PoA do not comprise overlapping households by checking the location of the involved households. In case a published CDM project or CPA comprises the installation of household biogas digesters in cities that are also part of the CPA region of a newly to be included CPA of the proposed PoA, the household databases will be checked in cooperation with the project developer of the respective CDM activity. The data of such check will be available for other relevant CDM projects, due to a regulation that was issued by the Sichuan Rural Energy Office. Before a CDM developer submits CDM documents that include household biogas systems implemented under the national subsidy scheme in Sichuan, to any entity involved in the CDM registration process, he is obliged to submit the household information to the SREO first. This data can then be used for possibly necessary double counting checks.

    In case during these checks households are found that are identical to households that have already been included in a previous CPA or third-party CDM project or CDM project activity, the respective CPA is set on hold. The responsible REO is contacted to confirm all data. If the data is correct and the household has been included in any prior activity, it will be removed from the databases before the CPA is reactivated and submitted for inclusion. A record on such households will be kept and provided on demand to any DOE during inclusions or verifications.

[1]The exclusive agreement between the C/ME and the Sichuan Rural Energy Office will be provided as evidence.

(iii) The SSC-CPA included in the PoA is not a de-bundled component of another CDM programme activity (CPA) or CDM project activity.

According to Guidelines on Assessment of Debundling for SSC Project Activities, the CPA of a PoA is exempted from performing de-bundling check if each of the independent subsystems/measures (e.g., biogas digester, solar home system) included in the CPA is no larger than 1% of the small-scale thresholds defined by the methodology applied, i.e. the CPA is considered as not being a de-bundled component of a large scale activity.

To demonstrate that the independent subsystems will stay well below 1% of the small-scale thresholds, two values have to be considered:

1. 1% of the maximum thermal energy provided by the CPA referring to the type-I component of the project activity:
   Considering the small-scale threshold of $15MW_{thermal}$, is has to be proven that the subsystems do not exceed a maximum capacity of 150 kW.
2. 1% of the maximum emission reduction due to methane avoidance referring to the type-III component of the project activity:
   As the emission reduction due to methane avoidance for a small-scale methodology is 60 $ktCO_2e$, it should be shown that the individual subsystems do not exceed 1% of this, i.e. 600 tCO_2e. The actual emission reduction from methane avoidance per unit will be calculated for each CPA, explained in Appendix 4, and compared to the threshold of 600 tCO_2e in the SSC-CPA-DD.

   The compliance with these two criteria is part of the eligibility criteria for each new CPA. During the inclusion of a new CPA, evidence will be provided to demonstrate, that each subsystem will stay well below 1% of the small-scale threshold and therefore, the CPAs are exempted from performing a de-bundling check.

   To prove the compliance with both criteria, two checks are performed:

1. The capacity threshold of 150 kW will be compared to a biogas stove test report provided as evidence together with the CPA during the inclusion.

   The stove test record provided to the DOE shows a rated capacity of 2.955 kW. As it is highly unlikely that the stove capacity will increase by more than 5,000%, it can be concluded that the rated capacity of each single household will stay well below the threshold of 150 kW.

2. Following the equations derived in Appendix 4, the emission reduction per methane recovery unit will be calculated for each CPA to prove that the value does not exceed the threshold.

   To demonstrate the unlikeliness of the emission reduction exceeding the threshold of 600 tCO_2e, the emission reduction due to methane avoidance is calculated exemplary in the following. The formula derived in Appendix 4 shows that apart of the methane conversion factor of the baseline manure management system and the number of pigs, all other values are constants. According to the table 9 provided in Appendix 4, the methane conversion factor depends on the annual average temperature. Therefore, the two input values needed to calculate the emission reduction due to methane avoidance for a single household are the number of pigs and the mean annual temperature. The baseline emission shows a proportional dependence on both factors, which means that for increasing temperature and number of pigs, the emission reductions will also increase.

The calculation shall be carried out exemplary for the highest annual average temperatures of all cities in the Sichuan Province in 2015. According to the table 8 provided in Appendix 4, the highest annual average temperature of 21.2ºC (rounded to 21ºC for the following analysis) was measured in Panzhihua, a goal seek analysis to determine the number of pigs in one household for which the threshold of 600 tCO_2e is exceeded delivers a number of 4040. Even if the annual temperature should increase up to 28ºC[2], the number of pigs for which the emission reduction passes the threshold is still 2,060.

Due to data determined in the preparing studies and the fact, that household biogas digesters are not designed to process the manure of such big number of pigs, it can be concluded that no single household will ever exceed the threshold of 600 tCO_2e.

The positive result of the check against both criteria is part of the eligibility criteria (criterion 7). The outcome of the check will be discussed in each CPA-DD.

(iv) The provisions to ensure that those operating the CPA are aware of and have agreed that their activity is being subscribed to the PoA;

As per the eligibility criteria for CPAs in section K literals 3.b) and 4.e) both the CPA implementers and the households operating the biogas systems are aware and have agreed that their activity is being subscribed to the proposed PoA.

Tentative Operating Framework of the PoA

In the paragraphs below a tentative operating structure for the PoA is described. If unexpected events should make certain changes in the structure necessary, such changes will be recorded precisely and be provided to any relevant party in the future.

As C/ME, Chengdu Oasis is in charge of all tasks related to the CDM and the proposed PoA. These tasks include (inter alia):

- Defining criteria for the participating households,
- bundling the households to form the CPAs,
- managing and maintaining the household databases for the separate CPAs,
- initiating the inclusion of new CPAs to the PoA,
- collecting and calculating necessary monitoring data in cooperation with the Chinese Academy of Agricultural Engineering,
- writing monitoring reports,
- organizing verifications and representing the CPAs including all relevant data to the DOE,
- communicating with the relevant CDM stakeholders,
- selling the CERs to the designated buyer
- and distributing the carbon revenues to support farmers, finance the technical service network, etc.

The Sichuan Rural Energy Office will be entrusted by the C/ME to take over the technical responsibilities like:

- Conducting baseline surveys to determine and monitor the baseline emissions,
- promoting the PoA and resulting CER revenue support especially for poor households,

[2] This is the maximum temperate listed in IPCC 2006, V4_10_Ch10_Livestock that is used to determine the MCF factor of the baseline manure management system. If the annual average temperature increases above this temperature, the MCF value for 28ºC is to be used for the following calculations.

- selecting the households that will be included in the PoA according to the criteria provided by the CE,
- constructing and commissioning of the digesters,
- establishing and operating service centers and providing free technical support to the included households,
- cooperating with a representative sample of households to raise data needed for the monitoring
- and recording and collecting data from the sample households.

By managing the work of city, county and district level Rural Energy Offices, as well as cooperating with existing Agricultural Technology Service Centers and Village Committees, the PoA management already has a widely spread structure that will allow a very close cooperation with all related households. By providing trainings to the local Rural Energy Offices, the SREO will ensure the completion of the tasks at county and district levels.

Of special importance during the successful implementation of the PoA is the installation and management of the service network that will be financed by the carbon revenues. The SREO will operate the service centers via the county level Rural Energy Offices to provide service to 300 – 500 households per service center.

The detailed structure of the PoA management can be seen in Figure 3:

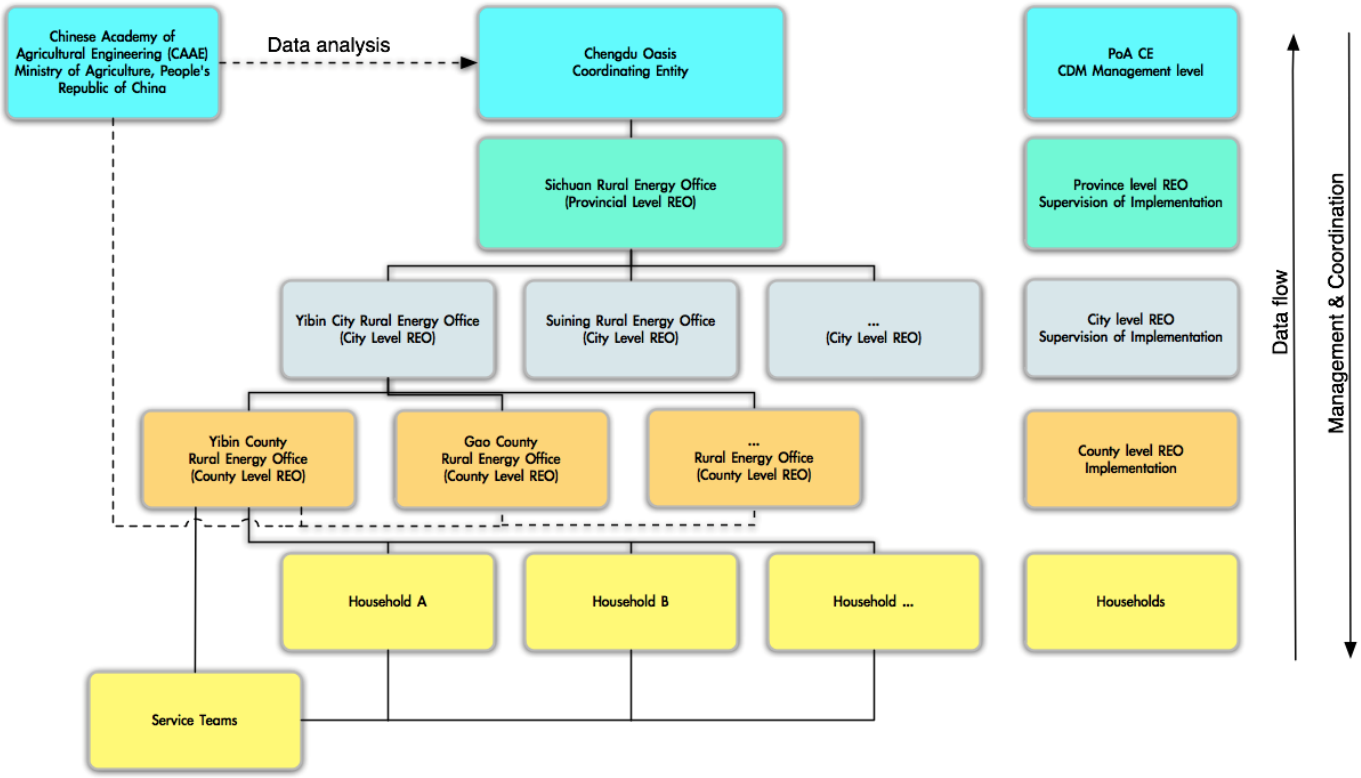

Figure 3: Operational structure of the PoA. In this chart, only the branch following the SREO, down to the Yibin City REO and the Yibin County REO is expanded. All other branches are collapsed for simplicity.

A description of the main tasks of the PoA and the responsible entities is given inTable 4:

Table 4: Description of the PoA responsibilities

Activities	Task Description	Entity in Charge
Writing PoA guideline	Writing PoA guideline with instructions for all involved stakeholders to clarify responsibilities and tasks.	The C/ME will provide the guideline and the SREO will be responsible for the implementation.
Baseline identification	The baseline emission shall be defined during a comprehensive baseline survey.	Under the overall management of the Sichuan Rural Energy Office, the local Rural Energy Offices will conduct the survey and determine the baseline emissions.
Household screening	Recruiting households that meet the applicability criteria of the PoA.	SREO in cooperation of the local REOs will comprise lists of the households that meet the criteria compiled by Chengdu Oasis.
CPA structuring	Bundle the households to the CPAs.	The C/ME and the SREO will structure the data provided by the city level REOs and determine which areas and households are to be bundled together to form the CPAs.
Digester construction	Construct the digesters and install the related equipment.	The Rural Energy Offices at the city and county level will organize and supervise the technical team to construct the digesters.
Household instruction	Instruct the local farmers on the use of household biogas digesters and provide briefings on the CDM requirements.	Under the supervision of the provincial SREO, the local REOs will provide basic trainings according to technical principal and CDM related requirements provided by the C/ME.
Monitoring	Collection of monitoring data.	Monitoring data will be collected by the local REOs according to instructions by the C/ME.
Data archiving and analysis	Receiving monitoring data, structuring and maintaining the databases and provide the data in a suitable format for calculating emission reductions.	The collected data will be handled, maintained and archived by the Chinese Academy of Agricultural Engineering in coordination with the C/ME.
CDM application	Develop and register the PoA as along the CDM regulations	Chengdu Oasis as C/ME will take the full responsibility for the CDM application.
CER trading and revenue allocation	Trading the certificated CERs and allocate the revenue	Chengdu Oasis as C/M E will in charge of trading the CERs and allocating the revenue based on the agreement with the related participants.
Service support	Establish a functional service network to provide the necessary service support to the programme households.	The SREO in cooperation with the local subsidiaries will implement the service network and provide free service to the programme households.

SECTION C. Demonstration of additionality of PoA

The following shall be demonstrated here:

(i) The proposed PoA is a voluntary coordinated action;

Currently, different laws and policies in China including The Agricultural Law (2003), Energy Conservation Law (2007), Renewable Energy Law (2004) and the 2006-2010 Rural Energy Development Plan, promote the utilization of renewable resources including biogas. However, the implementation of all the above-mentioned laws and policies in which biogas construction in rural areas is involved, is based on subsidized voluntary measures by the farmers. There is no mandatory regulation in China or Sichuan Province that requires the change of current manure management systems or cooking methods for rural households. Additionally, the PoA requires individual households to take voluntary action to participate in project activities. The proposed PoA invites eligible farm households to participate in the programme and to benefit from all the advantages technical services offered by the activity. Therefore, the proposed PoA is a completely voluntary coordinated action.

Furthermore, the C/ME Chengdu Oasis is a private company that voluntarily engages in the promotion of household biogas systems in Sichuan.

(ii) If the PoA is implementing a voluntary coordinated action, it would not be implemented in the absence of the PoA;

As the coordination of the proposed PoA and the management of the two benefits for the rural households (financial support and technical service financed by the CDM) is a voluntary action that is not required by any national or provincial law or regulation, it will not be implemented in the absence of the CDM. By allocating a share[3] of the achieved carbon revenues for management purposes, the CDM provides the financial capacity to manage the proposed PoA and allows its implementation.

(iii) If the PoA is implementing a mandatory policy/regulation, this would/is not enforced;

Not applicable. The proposed PoA is not implementing a mandatory policy/regulation.

(iv) If mandatory a policy/regulation is enforced, the PoA will lead to a greater level of enforcement of the existing mandatory policy/regulation.

Not applicable. No mandatory policies and/or regulations are being enforced by the proposed PoA.

SECTION D. Start date and duration of PoA

D.1. Start date of PoA

>>
10/05/2012 – or the date of POA registration, whichever is later.

D.2. Duration of PoA

>>
28 years

[3]Evidence: Contract between the C/ME and the Sichuan Rural Energy Office.

SECTION E. Environmental impacts

E.1. Level at which environmental impacts analysis is undertaken

>>

An Environmental Impact Assessment (EIA) for household biogas digesters is not required by the Chinese governmental regulations. However, a basic evaluation of the environmental impacts has been carried out by the SREO on the PoA level.

The technology to be installed by the project is the same for all CPA that will be included in the future. The measures applicable to the PoA are clearly defined by the technical standards that apply to the national subsidy that defines the framework for the proposed PoA. Therefore, an analysis on a PoA level that is valid for the entire Sichuan province is considered representative for the entire PoA.

As an EIA on CPA level is not required, neither by national, provincial nor local authorities, the EIA was not conducted on the CPA level.

E.2. Analysis of environmental impacts

>>

The environmental evaluation that was carried out by the Sichuan Rural Energy Office came to the result that the proposed PoA is in line with all relevant national industrial policies and environmental requirements.

Furthermore, additionally to a global contribution to climate change mitigation by GHG reduction, the following environmental impacts have been identified:

- Through anaerobic treatment of swine manure and domestic sewage in biogas digester, agricultural area pollution will be reduced to a great extent.
- Odour pollution caused by the animal manure stored in an open pit without further treatment will be reduced.
- Through anaerobic treatment of farm-yard manure, water pollution and zoonotic diseases (diseases that can be transmitted from animals to people) will be reduced by improving the living environment of households and communities. Furthermore, due to the integrated toilet, kitchen and animal shed facilities, the project will improve sanitary and hygienic conditions. This will help to reduce the risk of spreading infectious diseases.
- The household's indoor air quality will be improved by replacing coal, fuel-wood, and straw with clean biogas.
- No transboundary impacts have been identified.

E.3. Environmental impact assessment

>>

No EIA is required for the installation of household biogas digesters at farms of the targeted size.

The requirement for an EIA is construction projects or livestock breeding projects are described in two relevant regulations, the related documents, the "Classification of Construction Project Management Directory of Environmental Impact Assessment" and the "Discharge standard of pollutants for livestock and poultry breeding (GB_18596-2001)". Based on these two documents, it can be concluded, that an EIA is only required for digesters at animal farms with more than 500 animals in their stables. Therefore, small household biogas digesters are exempted from the conduction of an EIA.

Furthermore, no EIA is required for a CPA of household biogas digesters by any host Party law or regulation.

SECTION F. Local stakeholder consultation

F.1. Level at which local stakeholder consultation is undertaken

>>

No stakeholder consultation is required for the installation of household biogas digesters. As described above, no national or local law or regulation requires an Environmental Impact Assessment for such project. As national mandatory stakeholder meetings are part of the regulations on EIA procedures, no stakeholder meeting is required for household biogas digester installations.

As the project comprises the similar installation of digesters throughout the PoA boundary and the CPA-clusters are not combined due to a technical or structural difference, but only due to the CDM regulatory aspects, a random sample group of households is considered representative for the entire PoA. Therefore, the stakeholder comments were invited on the PoA level.

F.2. Modalities for local stakeholder consultation

To allow a representative sample of all possible stakeholders to give their comments and concerns about the project, two different types of stakeholder consultations have been conducted:

1. Stakeholder meeting for provincial and local Rural Energy Office staff
   During one meeting, representatives of all local Rural Energy Offices, who will implement the project, have been invited to get introduced about CDM, the proposed PoA and the details of implementation. Afterwards, questionnaires have been handed out to invite comments, questions and concerns about the project.

2. To also invite comments of rural stakeholders, like the farmers themselves, their families and neighbors, questionnaires have been distributed to a representative sample of households. Within these documents, the farmers were informed about the PoA and questions/comments have been asked for.

The stakeholders have been invited and commented:

1. Central stakeholder meeting for the REO staff

Tuesday, 19/10/2010, SREO and Oasis invited delegates of all City and County level Rural Energy Offices of the initial targeted 11 cities to Chengdu for a comprehensive stakeholder meeting. During this meeting, the principle of carbon trading, the Clean Development Mechanism and the impacts to the work of the Rural Energy Offices have been presented.

In the presentations, special focus has been laid on the impacts that CDM will have to the households and the additional benefit that is offered by CDM. Additionally, the requirements for the baseline studies, the monitoring work and the distribution of carbon revenues have been introduced.

During the meeting, all present delegates have been encouraged to ask questions, express concerns and give ideas and suggestions. Several questions about the principle of CDM and emission trading have been discussed and explained. Additionally to an open discussion, questionnaires have been distributed to facilitate further comments and give the participants the chance to address open issues.

In the 78 questionnaires collected, all attendees expressed their support to the project. From the open question in the questionnaire, the following comments have been derived and answered as below:

- Suggest using the CER revenue to support the service network to ensure the biogas operation in a long period.

- Require proper CER revenue allocation for household.

  These two comments are already part of the proposed PoA. The financial details of the shares of carbon revenues to be provided to the service network and the local households are part of the contract that has been signed between the SREO and the C/ME.

- Should pay more attention to after-sale service.

  This is one of the central points of the proposed PoA. No after-sale service for the digesters was available prior to the proposed project. By providing free technical service to the farmers, this will be different once the PoA is registered.

- Implement the project well and get registered as soon as possible to promote the biogas development as well as living improvement

  The project participants will try their best to register the proposed PoA as soon as possible.

2. Questionnaire distribution to the rural stakeholders

As a representative sample for the Sichuan province, 352 questionnaires have been distributed to one project household and one neighbouring household in each of the 176 towns in Yibin. In the questionnaires, the rural stakeholders had the chance to address concerns and problems openly and provide their feedback back to the developer.

None of the rural stakeholders addressed general problems with the proposed PoA. The comments identified in the questionnaires are as follows:

- After sale service for the digesters should be improved compared to the present situation.

- Strengthen the technical service

  This is one of the central points of the proposed PoA. No after-sale service for the digesters was available prior to the proposed project. By providing free technical service to the farmers, this will be different once the PoA is registered.

- Implement the project as soon as possible.

  The project participants will try their best to register the proposed PoA as soon as possible and implement the support for the households and the technical service.

- The subsidy should be increased to overcome the high investment for the digesters.

Unfortunately, the subsidy is out of reach for the project participants. The amount of subsidy for each household is fixed by the central government and cannot be increased by the proposed project. However, the proposed PoA will provide an annual cash flow for the households to help them to overcome this barrier.

- Ensure the revenue for the households

  The revenue of CER sales will be distributed between the households, the technical service centers and the C/ME to cover the administrative costs. The existing infrastructure of the Sichuan Rural Energy Office that is also in charge for distributing the national subsidy to the households will take care of the distribution of carbon revenues to the rural households.

No general objection against the proposed PoA was raised by any of the stakeholder comments. All comments received were either already implemented by the project or will be taken care of in the future (e.g. the smooth distribution of revenues).

F.3. Summary of comments received

>>

1. Central stakeholder meeting for the REO staff

In the 78 questionnaires collected, all attendees expressed their support to the project.From the open question in the questionnaire, the followingcomments have been derived and answered as below:

- Suggest using the CER revenue to support the service network to ensure the biogas operation in a long period.

- Require proper CER revenue allocation for household.

  These two comments are already part of the proposed PoA. The financial details of the shares of carbon revenues to be provided to the service network and the local households are part of the contract that has been signed between the SREO and the C/ME.

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F.4. Consideration of comments received

>>

All interview stakeholders were positive towards the project and all questions raised where answered sufficiently or the proposed ideas already implemented by the proposed PoA.

SECTION G. Approval and authorization

>>
The PoA has got the letter of approval issued by United Kingdom of Great Britain and Northern Ireland on 19/01/2012 and letter of approval issued by People's Republic of China (host) in December 2011.

PART II. Generic component project activity (CPA)

SECTION H. Description of generic CPA

H.1. Title of generic CPA

>>

Sichuan Rural Poor-Household Biogas Development Programme, CPA Nb. SCHHBG-XXX-XXX

H.2. Reference number of generic CPA

>>

CPA Nb. SCHHBG-XXX-XXX

H.3. Purpose and general description of generic CPA

>>

A CPA under the proposed PoA involves the instalment and operation of a large number of household biogas systems during a certain time period at households located within a confined geographical area in Sichuan Province, China. To simplify management, validation and verification, the Coordinating/Managing Entity will try to bundle the CPAs in a geographically reasonable way, i.e. to only include households in one specific city in one CPA. However, this is only a target and it might be necessary to bundle households from different cities.

A 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. A CPA consists of the extension of the existing program towards low-income households that are not able to participate under the SREO program without further support.

Therefore, a CPA involves:

(i) The installation of a large number of bio digesters at low-income households
(ii) Free technical support to facilitate continuous operation of the installed systems

Implementation, operation, maintenance and monitoring of the CPAs 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 deep pits that are used to store the manure and other waste will be abandoned and GHG emissions will be avoided. All digesters within the CPAs will be installed by qualified and certified technicians from SREO. 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 bought biogas stove that can be used for cooking. 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 residue effluent can be extracted from the biogas digesters easily. It can be used as organic fertilizer thereby resulting in an aerobic application of the sludge instead of additional CH_4 emissions, which are generally experienced in conventional manure treatment.

SECTION I. Application of selected methodologies and standardized baselines

I.1. Reference to methodologies and standardized baselines

>>

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The residue effluent can be extracted from the biogas digesters easily. It can be used as organic fertilizer thereby resulting in an aerobic application of the sludge instead of additional CH_4 emissions, which are generally experienced in conventional manure treatment.

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

AMS-I.I– *Biogas/biomass thermal applications for households/small users* (version 04) (EB68, Annex 25);

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

I.2. Applicability of methodologies and standardized baselines

>>

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

Table 5: Relevant applicability criteria for AMS I.I.

AMS I.I

Criteria	Applicability of the proposed CPA
1. This category comprises activities for generation of renewable thermal energy using renewable biomass or biogas for use in residential, commercial, institutional applications (e.g. for supply to households, small farms or for use in built environment of institutions such as schools). Examples of these technologies that displace or avoid fossil fuel use include but are not limited to biogas cook stoves, biomass briquette cook stoves, small scale baking and drying systems, water heating, or space heating systems	As per the eligibility criteria for CPAs presented in section K the technology installed under a CPA is a renewable energy technology and supplies residential users with biogas for use. Methodology is applicable.
2. The total installed/rated thermal energy generation capacity of the project equipment is equal to or less than 45 MW thermal	As per the eligibility criteria for CPAs presented in section K it will be safeguarded that the number of biogas systems installed under each individual CPA does not lead to a total installed thermal energy generation capacity above 45 MW thermal. Methodology is applicable.
3. Each unit (e.g. cook stove, heater) shall have a rated capacity equal to or less than 150 kW thermal.	Each unit of biogas stove has capacity less than 150 kW thermal. Methodology is applicable.

Table 6: Relevant applicability criteria for AMS III.R.

AMS III.R	
Criteria	**Applicability of the proposed CPA**
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.	As per the eligibility criteria for CPAs presented in section K a CPA covers the installation of methane recovery and combustion systems to an existing source of methane emissions. Methodology is applicable.
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.	As per the eligibility criteria for CPAs presented in section K a CPA comprises the installation of biogas digesters at individual households and small farms. The individual devices will achieve emission reductions of less than 5 tCO_2e. Methodology is applicable.

AMS III.R	
Criteria	**Applicability of the proposed CPA**
3. This project category is only applicable in combination with AMS-I.C, AMS-I.I and/or AMS-I.E.	The proposed PoA and the connected CPAs combine methodologies AMS I.I and AMS III.R. Methodology is applicable.
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.	As per the eligibility criteria for CPAs presented in section K under a CPA the digester effluent (sludge) will be handled aerobically; the biogas will be destroyed efficiently. Methodology is applicable.
5. Aggregated annual emission reductions of all systems included shall be less than or equal to 60 kt CO_2 equivalent.	As per the eligibility criteria for CPAs presented in section K it will be safeguarded that annual emission reduction of all systems included in one CPA will be less than or equal to 60 ktCO_2e. Methodology is applicable.

In accordance with the project standard, the design of the Generic CPA includes two components, i.e. renewable energy biogas generation (replaces fossil fuel) and methane avoidance, and qualified as Type I and Type III, as the installed capacity of renewable energy generation (Type I) is less than 45MW thermal and the annual emission reduction of the methane avoidance (Type III) is less than 60k tCO2e.

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

I.3. Application of multiple methodologies

The generic CPA applies for combination of two small scale methodologies, i.e. AMS III.R (version 02) and AMS I.I (version 04).

As per the Appendix 1 (Instructions for the consideration of cross effects for the application of multiple methodologies for programmes of activities) of project standard for POA (version 01.0):

Type I: Cross effects could occur when there is an exchange of energy (thermal, mechanical or electrical) or mass transfer between different measures within a CPA or between CPAs, where the transfer occurs from a primary or independent measure to a dependent measure;

For the type I component of the Generic CPA under this POA, it employs only one measure, i.e. biogas generation using animal manures for households, there is not any exchange of energy or mass transfer between different measures within a CPA or between CPAs. Therefore, no cross effects exist.

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

In paragraph 5 of the methodology AMS I.I, the project boundary is the physical, geographical sites of the equipment producing thermal energy during the crediting period.

And additionally, AMS III.R defines the project boundary as (paragraph 6): *The project boundary is the physical, geographical site of the methane recovery and combustion systems.*

Therefore, following paragraph 5 of AMS I.I as well as paragraph 6 of AMS III.R, the project boundary of each CPA is defined as the geographic sites of all individual biogas systems and the households that combust the recovered biogas, included in the CPA. A biogas system consists of a bio digester and a cooking/combustion unit. The figure below visualizes the SSC-CPA boundary:

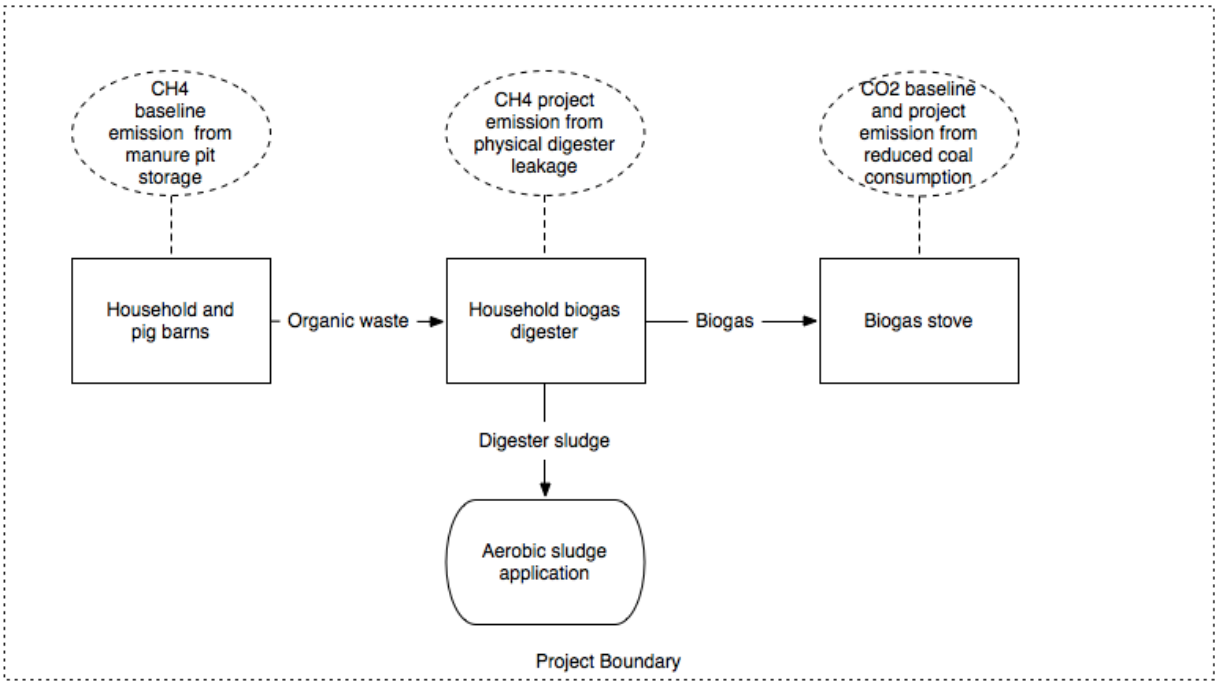

Figure 4: Project boundary for one sample household

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

Table 7: Sources of GHG emissions included and excluded in the project boundary.

	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.
	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 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.
	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.

I.5. Establishment and description of baseline scenario

>>

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

Baseline of AMS III.R:

> *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[4,5]. 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 PoA and to not contribute to the overall achieved emission reduction.

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

Baseline of AMS I.I:

> *The baseline is the fuel consumption of the thermal application used or that would have been used in the absence of the project activity times an emission factor for the fossil fuel displaced.*

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[6,7]. 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 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 B.6.2.

I.6. Estimation of emission reductions

I.6.1. Explanation of methodological choices

>>

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

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

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

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

AMS I.I - Biogas/biomass thermal applications for households/small users (version 04):

Within the broad applicability of AMS I.I (version 04) only elements pertinent to household-size biogas systems should be used. Therefore, throughout sections I.6.1 to I.6.3 the following paragraphs apply for the calculation of ex-ante and monitoring/calculation of ex-post emission reductions:

- Baseline: paragraph 9, 10.
- Project emissions: paragraph 11.
- Leakage: paragraphs 15. and 16.
- Monitoring: paragraph 17 -19.
- PoA specific: 20.

All other elements of the methodology do not apply and are disregarded in the context of the proposed PoA.

AMS III.R– *Methane recovery in agricultural activities at household/small farm level* (version1):

No methodological choices need to be made within AMS III.R (version 02). The methodology is applied in its entirety.

I.6.2. Data and parameters fixed ex-ante

>>

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	

Data / Parameter	GWP_{CH_4}
Unit	1
Description	Global Warming Potential for CH_4.
Source of data	Methodology AMS III.D, v.17, Equation 1
Value(s) applied	25 from 01/01/2013 onwards
Choice of data or Measurement methods and procedures	
Purpose of data	Calculation of baseline emissions; Calculation of project emissions;
Additional comment	

Data / Parameter	D_{CH_4}
Unit	kg/m^3
Description	Conversion factor of $m^3CH_4$to kilogram CH_4.
Source of data	2006 IPCC guidelines, Volume 4, Chapter 10, Page 10.42.
Value(s) applied	0.67
Choice of data or Measurement methods and procedures	
Purpose of data	Calculation of baseline emissions; Calculation of project emissions;
Additional comment	

Data / Parameter	UF_b
Unit	
Description	Model correction factor to account for model uncertainties (0.94)
Source of data	Methodology AMS III.D
Value(s) applied	0.94
Choice of data or Measurement methods and procedures	Fixed parameter listed in methodology AMS III.D
Purpose of data	Calculation of baseline emissions; Calculation of project emissions;
Additional comment	

I.6.3. Modalities for ex ante calculation of emission reductions

>>

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 (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.*
>
> *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.I), 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.I - *Biogas/biomass thermal applications for households/small users*

The Option 1 is selected to determine emission reductions of the project activity as per AMS I.I (version 04):

Option 1: Based on avoided quantity of fossil fuel consumption (applicable only to biogas projects)

Following paragraph 9 of AMS I.I, version 04, the baseline emissions are calculated as:

$$BE_{CO_2,y} = \sum_k \sum_j N_{k,0} * n_{k,y} * FC_{BL,k,j} * NCV_j * EF_{FF,j}$$

Where:

$BE_{CO_2,y}$	Baseline carbon dioxide emissions from fossil fuel combustion in year y (tCO_2e)
K	Index for the type of thermal applications introduced by the project activity (e.g. cook stove, water heater). Only one type of thermal application, i.e. cook stove is considered.
j	Index for the type of baseline fossil fuel consumed. Here *j* is 1 as only coal is considered. This is conservative.
$N_{k,0}$	Number of thermal applications k commissioned;
$n_{k,y}$	Proportion of $N_{k,0}$ that remain operating in year y (fraction)
$FC_{BL,k,j}$	Annual consumption of baseline fossil fuel *j* (mass or volume unit). For this project, only baseline emissions from coal consumption are considered in the calculation of emission reductions. This is a conservative approach.
NCV_j	Net calorific value of the fossil fuel *j* (GJ/mass or volume unit). According to national data published by NDRC (http://cdm.ccchina.gov.cn/archiver/cdmcn/UpFile/Files/Default/20150511145355964897.pdf), at the time of PDD writing, the NCV of raw coal is 20.908 GJ/t.
$EF_{FF,j}$	Is the CO_2 emission coefficient of fuel *j* in year *y* (tCO_2/GJ). National data of coal is applied. According to the national data

	(http://cdm.ccchina.gov.cn/archiver/cdmcn/UpFile/Files/Default/20150511145355964897.pdf), the emissions factor for raw coal is 87.3 tCO_2/TJ.

Following paragraph 10 of AMS I.I, version 04, the Annual consumption of baseline fossil fuel *j* ($FC_{BL,k,j}$) could be determined using method (a) Option (ii):

> *Option (ii):*
> *Determining the average quantity of fossil fuel consumption in a year from a representative sample survey of targeted households prior to the installation/commissioning of the project equipment. This data on annual baseline fuel consumption obtained from households shall be cross checked with purchase receipt(s) submitted by the household. The value obtained is multiplied by 0.89 to account for uncertainties. This option can only be applied for residential applications.*
> *The data collected through sample-based measurements shall comply with the 90% confidence interval and 10% margin of error requirement. Account shall be taken of possible stratification of the sampled population (e.g. average income level, household occupancy, food or heating habits, climate/temperature zone, availability, price and type of fuel used). The latest version of "Standard for sampling and surveys for CDM project activities and programme of activities" shall be complied with. Fuel consumption will be directly determined as mass or volume consumed per unit time;*

Regarding the parameter the Annual consumption of baseline fossil fuel *j* ($FC_{BL,k,j}$), the target population is all the potential to-be-included households in the proposed PoA which includes the households in the 13 regions, who will replace their original pit manure management by household biogas digester system and replace their original cooking coal consumption by biogas.

All of households are located in Sichuan, in a similar and limited area, target low-income households, they have similar food and heating habits and availability of fuel used, have similar climatic conditions and similar animal raising habits as well as similar pit storage of manure, etc. It indicates that the entire households population is relatively homogeneous.

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.

$$PE_{CH_4,y} = 0.10 \cdot GWP_{CH_4} \cdot D_{CH_4} \cdot \sum_{i,LT} B_{0,LT} \cdot N_{LT,y} \cdot VS_{LT,y} \cdot MS\%_{i,y} \quad (2)$$

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.I - *Biogas/biomass thermal applications for households/small users*

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

$$PE_{CO_2,y} = \sum_m \sum_j N_{m,y} * FC_{m,j} * NCV_j * EF_{FF,j} \quad (3)$$

Where:

$PE_{CO_2,y}$	Project carbon dioxide emissions from fossil fuel combustion in year y (tCO_2e)
m	Index for thermal application (e.g. cook stove, water heater) not decommissioned by the project activity. In this POA, only cook stove is involved, here m is 1.
$N_{m,y}$	Number of thermal application m remaining in use in year y
$FC_{m,j}$	Annual consumption of fossil fuel type j (physical units, mass/volume) by application m (use 90/10 precision for sampling and sampling requirements specified for baseline sampling described in paragraph 10(a) above may be applied). Option (ii) under paragraph 10(a) is chosen, the value obtained is multiplied by 1.12 to account for uncertainties. Here, coal as fossil fuel is accounted for.
NCV_j	Net calorific value of the fossil fuel j (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.
$EF_{FF,j}$	Is the CO_2 emission coefficient of fuel *j* in year *y* (tCO_2/GJ). National data of coal is applied. According to the national data, the emissions factor for raw coal is 87.3 tCO_2/TJ.

3. Leakage

The leakage will be determined by paragraph 11 of AMS III.R and paragraph 15 of AMS I.I:

> *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.*
>
> *15. If the energy generating equipment introduced by the project activity is transferred from outside the boundary to the project activity, leakage is to be considered.*

Both 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.

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:

$$ER_{CH_4,y} = BE_{CH_4,y} - PE_{CH_4,y} - Leakage$$ 4

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.I - *Biogas/biomass thermal applications for households/small users*

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

$$ER_{CO_2,y} = BE_{CO_2,y} - PE_{CO_2,y} - Leakage$$ 5

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:

$$ER_y = ER_{CH_4,y} + ER_{CO_2,y}$$ 6

Where:

ER_y	Total emission reduction year y (tCO_2e)

$ER_{CH_4,y}$	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)

I.7. Monitoring plan

i.7.1. Data and parameters to be monitored

Data / Parameter	$FC_{BL,k,j}$
Data Unit	Tonnes
Description	Annual consumption of baseline fossil fuel j (mass or volume unit)
Source of data	Comprehensive baseline survey.
Value(s) applied	This value will be determined and reported in the CPA-DDs specifically for the different CPAs.
Measurement methods and procedures	As per Paragraph 10 (a) of AMS I.I (version 04), data will be determined from a representative sample survey of targeted households prior to the installation/commissioning of the project equipment. The value obtained is multiplied by 0.89 to account for uncertainties. According to the sampling description in I.6.3, the mean value of $FC_{BL,k,j}$ is 0.987t. The relative error is 1.51% at the 95% confidence level. The value obtained 0.987t will multiply by 0.89 to account for uncertainties, i.e. 0.987t *0.89.
Monitoring frequency:	N/A as per paragraph 10(a) AMS I.I (version 04). The value is fixed *ex ante* in the whole crediting period of each CPA in the CPA-DD.
QA/QC procedures:	This data on annual baseline fuel consumption obtained from households shall be cross-checked with purchase receipt(s) submitted by the household. The data collected through sample-based measurements shall comply with the 95% confidence interval and 10% margin of error requirement, in line with the latest version of ”Standard for sampling and surveys for CDM project activities and programme of activities”.
Purpose of data	Calculation of baseline emissions;
Additional comment	

Data / Parameter	$FC_{m,j}$
Data Unit	Tonnes
Description	Annual consumption of fossil fuel type j (physical units, mass/volume) by application m Here, only coal as fossil fuel is involved, so j refers to coal. Regarding the application m, only biogas stove is involved in the proposed POA, therefore, m refers to biogas stove
Source of data	Monitoring survey
Value(s) applied	This value will be determined via monitoring survey and reported in the CPA-DDs specifically for the different CPAs.
Measurement methods and procedures	Data will be collected via monitoring survey of targeted households after the installation/commissioning of the project equipment. The value obtained is multiplied by 1.12 to account for uncertainties.
Monitoring frequency:	Annually
QA/QC procedures:	As per table 1 of AMS I.I (version 04), the difference between $FC_{BL,k,j}$ and $FC_{m,j}$ shall be cross-checked with biogas generation estimated as per relevant national standard.
Purpose of data	Calculation of project emissions;
Additional comment	

Data / Parameter:	$N_{k,0}$
Data unit:	1
Description:	Number of thermal applications k commissioned.
Source of data:	Commission record
Value(s) applied	Determined by the specific CPA
Measurement methods and procedures:	After the installation of the bio-digesters and biogas stoves, they shall be inspected as acceptance testing (commissioning) for proper operation in compliance with specifications. The acceptance check date of each subsystem shall be recorded.
Monitoring frequency:	at the time of commission
QA/QC procedures:	The systems should be operated in compliance with manufacturer required maintenance.
Purpose of data	Baseline emission calculation
Additional comment:	

Data / Parameter:	$n_{k,y}$
Data unit:	%
Description:	Proportion of $N_{k,0}$ that remain operating at year y (fraction)
Source of data:	Monitoring sampling study
Value(s) applied	100

Measurement methods and procedures:	The CME will inspect that the biogas units are operational and in compliance with the required maintenance procedures from the manufacturers at least once every two years during the crediting period. Monitoring will be done through a statistically valid sample of the households where the systems are installed as per the relevant requirements for sampling in the latest standard for sampling and surveys using a 95% confidence interval and a 10% margin of error.
Monitoring frequency:	Annually
QA/QC procedures:	The systems should be operated in compliance with manufacturer required maintenance at least once every two years (biennial) during the crediting period. A statistically valid sample of the residences where the systems are installed, with consideration, in the sampling design, of occupancy and demographic differences can be used to determine the percentage of systems operating, as per the relevant requirements for sampling in the General guidelines for sampling and surveys for small-scale CDM project activities.
Purpose of data	
Additional comment:	

Data / Parameter:	$N_{m,y}$
Data unit:	1
Description:	Number of thermal application m remaining in use in year y Here, m refers to coal stove.
Source of data:	Monitoring sampling study
Value(s) applied	Determined by the specific CPA
Measurement methods and procedures:	Sampling monitoring survey with a sampling size determined following the latest guidelines and the applied methodologies. The CME will inspect that the biogas stoves remaining in use in year y, in compliance with the required maintenance procedures from the manufacturers annually during the crediting period. Monitoring will be done through a statistically valid sample of the households where the systems are installed as per the relevant requirements for sampling in the latest standard for sampling and surveys using a 95% confidence interval and a 10% margin of error.
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 07*, the level of confidence should be at least 95%, while the acceptable error is 10%.
Purpose of data	Project emissions calculation
Additional comment:	

Data / Parameter:	t
Data 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 07*, the level of confidence should be at least 95%, while the acceptable error is 10%.
Purpose of data	
Additional comment:	

Data / Parameter:	T
Data 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	At the time of PDD writing, the latest available data from official sources was data for 2015 taken from the 2016 Sichuan Statistical Yearbook.
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	
Additional comment:	

Data / Parameter:	$MCF_{S,k}$
Data unit:	%
Description:	Methane conversion factors for each manure management system *S* in climate region *k*.
Source of data:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 10, Table 10.17 (swine).
Value(s) applied	The MCF values for the most likely mean annual temperatures (refer to mean annual temperature in 2015, displayed in Appendix 4

Measurement methods and procedures:	This value will be determined annually for each city 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 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 07*, 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	$MS\%_{i,y}$
Unit	1
Description	Fraction of manure handled in project animal manure management system i (i.e. digestion in the newly installed biogas digester)
Source of data	Monitoring sampling study.
Value(s) applied	100%
Measurement methods and procedures	The CPA only covers one animal manure management system, i.e. the newly built biogas digester. As indicated in the section A.3, all the manure generated will be fed into biogas digesters directly. The amount of pig manure fed into the biogas digesters is same to what the pig manure generated.
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 07*, the level of confidence should be at least 95%, while the acceptable error is 10%.
Purpose of data	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	1
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 07*, 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	87.3
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://cdm.ccchina.gov.cn/archiver/cdmcn/UpFile/Files/Default/20150511145355964897.pdf.
Value(s) applied	20.908
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	

I.7.2. Sampling plan

Sampling objective:

The objective of sampling effort is to obtain unbiased and reliable estimates of the mean value of parameters used in the calculations of greenhouse gas emission reductions as follows:

- Annual consumption of fossil fuel type j coal (physical units, mass/volume) by

application m ($FC_{m,j}$);

- Proportion of $N_{k,0}$ that remain operating at year y (fraction) ($n_{k,y}$);
- Number of thermal application m remaining in use in year y ($N_{m,y}$);
- Mean annual operation hours of the digesters (t);
- Annual average number of animals of type LT in year y (numbers). ($N_{LT,y}$);
- Fraction of manure handled in project animal manure management system i (i.e. digestion in the newly installed biogas digester) ($MS\%_{i,y}$);
- Land application of digestate from biogas digesters to avoid anaerobic digestion (Proper sludge application ratio);

Target population:

The target population is the whole households in the proposed PoA which includes the households in the 13 regions, who replace their original pit manure management by household biogas digester system and replace their original cooking coal consumption by biogas.

For the included households of all CPAs in the 13 regions of Sichuan, they are located in as similar and limited area, have similar food and heating habits and availability of fuel used, have similar climatic conditions and similar animal raising habits as well as similar pit storage of manure, etc. It indicates that the entire households population is relatively homogeneous.

Sampling method:

As mentioned above, all the households are located in Sichuan province, which is a limited area. Simple random sampling (SRS) approach is selected for this PoA due to relatively homogenous population being studied, given the similar average ambient temperature and similar living habit of residents in Sichuan. Therefore simple random sampling approach is followed by the PP to determine the sample size.

The unbiased estimation of mean value and proportion is:

$$\bar{y} = \frac{1}{n}\sum_{i=1}^{n} y_i \qquad 7$$

$$p = \frac{a}{nm} \qquad 8$$

The unbiased variation estimators of $V(\bar{y})\ and\ V(p)$ with a sufficiently small f are:

$$v(\bar{y}) = \frac{1-f}{n}s^2 = \frac{1-f}{n(n-1)}\sum_{i=1}^{n}(y_i - \bar{y})^2 \approx \frac{1}{n(n-1)}\sum_{i=1}^{n}(y_i - \bar{y})^2 \qquad 9$$

$$v(p) = \frac{1-f}{n-1}p(1-q) \approx \frac{1}{n-1}p(1-q) \qquad 10$$

Relative error of the sample is to be calculated by formula:

$$r = t_{0.05}\frac{\sqrt{v(\bar{\bar{y}})}}{\bar{\bar{y}}} \qquad 11$$

Where:

n	*Sample size*
f	*Sampling fraction*
N	*Total size of population*
y_i	*Observation of a sample household*
$\bar{y}_i$	*Mean value of sample*
p	*Proportion of the sample*
r	*Relative error. Default is 10%.*
$t_{0.05}$	*1.96*

Sample size calculation:

***Step 1**: Confidence/precision*

The proposed PoA adopts the methodologies AMS I.I and AMS III.R. It is defined in *Standard For Sampling And Surveys For CDM Project Activities And Programme Of Activities, version 07* that a confidence/precision of 95/10 should be used if one survey covers several CPAs. Since this is the highest confidence/precision mentioned in the applied methodologies and standards, these values shall be used for the sample size calculation.

***Step 2**: Initial Sample size*

For mean value, the following formula is to calculate the initial sample size:

$$n_0 = \frac{t^2 S^2}{r^2 \bar{Y}^2} \qquad 12$$

To determine population parameter S^2 and $\bar{Y}^2$, the following options can be taken: (a) taking a small scale pre-survey small scale simple random sampling pre-survey, or (b) reference of similar survey, or (c) double sampling scheme.

For proportion, conservatively, initial sample size can be calculated by formula:

$$n_0 = \frac{t^2 PQ}{r^2} \qquad 13$$

Conservatively, $\mathrm{n}_0 \approx 97$, while $\mathrm{t}_{0.05} = 1.96$, r =10% and PQ=0.25.

***Step 3**: Other considerations of sample size*

Sample size should be corrected according to the size of target population by formula:

$$n_1 = \frac{n_0}{1 + \frac{n_0}{N}} \qquad 14$$

Then, be corrected Respond Rate r_R (initially 90%) by formula:

$$n_2 = \frac{n_1}{r_R} \qquad 15$$

In case, the survey covers more than one expected parameters, conservatively, sample size should not be less than the maximum calculated sample size of those indicators.

$$n \geq max(\, n_2^1,\, n_2^2, \ldots,\, n_2^n) \qquad 16$$

Supplementary survey is needed, in case, the data analysis of the baseline survey shows the pre-

defined sample size is not sufficient to fulfill the requirement of confidence/precision.

Data collection:

Selection and Training of Survey Staff. A Chinese survey plan, tools and training materials should be prepared before training activities. All survey staffs including county supervisors and interviewers are locally selected from county governmental agencies with at least 2 years of working experience in rural energy sector. Selected survey staffs needs to be trained and ensured clearly understanding of purpose, method, and procedures of survey. Simulated test interview is required at the end of the training course, to ensure each trainee are qualified to undertaken household survey.

Prepare Sampling Frame. The households of the target CPA should be prepared according to the project plan. Potential problems should be considered and cross checked to ensure the quality of the sampling frame, such as none-coverage, blanks and duplicate listings.

Interview and Data Collection. The interview activity should be conducted by trained interviewer with the assistant of local (township or village) supportive staff. Up to 90% of respond rate is required according to the sampling design, accordingly, awareness of the project and data confidentiality is very important as precondition to get the farmers' cooperation. Respondent self-report is the main survey method, visual inspection is also needed as cross-check evident. Other cross-check methods are also welcomed to determine the accuracy of respondent self-report. Questionnaire should be filled by interviewer and confirmed by farmer, supportive staff and the interviewer himself. Memo and record is needed if altered.

I.7.3. Other elements of 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

The monitoring data will be collected as described in Section I.7.1 of this document.

One special monitoring parameter is the proper sludge application ratio, 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. 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 J. Crediting period type and duration

>>
10 year fixed crediting period is chosen for each generic CPA.

SECTION K. Eligibility criteria for inclusion of CPAs

>>

The eligibility criteria under the PoA shall be stated and checked in each CPA document as following:

Nb.	Eligibility criterion -Required condition	Eligibility criterion - Category	Supporting evidence for inclusion

Nb.	Eligibility criterion -Required condition	Eligibility criterion - Category	Supporting evidence for inclusion
1.	The CPA has been approved by the C/ME.	The C/ME manages the CDM implementation of the proposed PoA. It shall therefore approve the CPA in a written statement.	• Written approval letter of the C/ME
2.	The geographic boundary of the CPA lies within Sichuan province.	The boundary of each CPA shall be a subset of and not exceed the PoA boundary.	• CPA-DD
3.	Measures to avoid double counting are implemented.		
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 ***b)*** That he is aware and agrees with the inclusion of the CPA to the proposed PoA.	The written statements of the CPA implementer compose the first layer of measures to avoid double counting.	• CPA inclusion letter
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 written statement of the technology implementer comprises the second layer of measures to avoid double counting.	• Written statement by the implementer of the technology (SREO).

Nb.	Eligibility criterion -Required condition	Eligibility criterion - Category	Supporting evidence for inclusion
3.3.	A check for double counting of single households came to a negative result.	The check performed by the C/ME (procedures described in section B) composes the third layer of measures.	• CPA household databases of all previously included CPAs. • CPA household database of new CPA. • Exclusive agreement between SREO and the C/ME. • Documented outcome of the double counting check performed by the C/ME. This report should cover the source of information used (documents available on unfccc.int and household databases in case of overlapping regions).
4.	All relevant applicability criteria of methodology AMS-III.R shall be met.		
4.1.	The project installs methane recovery and combustion systems to existing sources of methane emissions.	Applicability criterion 1 (a) of methodology AMS-III.R.	• Written statement by the technology implementer (SREO).

Nb.	Eligibility criterion -Required condition	Eligibility criterion - Category	Supporting evidence for inclusion
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.	Applicability criterion 2 of methodology AMS-III.R. The calculations and explanations carried out in Appendix 4 demonstrate that for an average annual temperature of 21ºC and below, the maximum number of pigs for which the emission reductions stay below 5 tCO_2e is 33.7. Therefore, these two figures will be used as a simplified criterion. In case the mean annual temperature should exceed 21ºC for a new CPA, the detailed calculation will be provided during the inclusion.	• Baseline survey (annual average number of pigs) • Temperature data from official sources (e.g. the Sichuan Statistical Yearbook). • ER calculation sheet (in case the annual mean temperature should exceed 21ºC.
4.3.	• Methodology AMS-III.R is used in combination in with methodology AMS-I.I.	Applicability criterion 3 of methodology AMS-III.R.	• CPA-DD
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.	Applicability criterion 4 (a) of methodology AMS-III.R. The households are advised on the aerobic sludge handling according to a guideline from the Sichuan Biogas Society. To confirm the compliance with this criterion, the claimed emission reductions are reduced by the share of households that do not apply the correct procedures after the monitoring.	• Statement on aerobic application by the Sichuan Biogas Society

Nb.	Eligibility criterion -Required condition	Eligibility criterion - Category	Supporting evidence for inclusion
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.	Applicability criterion 4 (b) of methodology AMS-III.R.	• Written statement on household advice by the technology implementer (SREO). • Technical standard NY_T 1639-2008 that describes the necessity of a biogas stove to be installed with the biogas digester.
4.6.	• Aggregated annual emission reductions of all systems included shall be less than or equal to 60 kt CO_2equivalent.	Applicability criterion 5 of methodology AMS-III.R.	• CPA-DD
5.	All relevant applicability criteria of methodology AMS-I.I shall be met[8].		
5.1.	This category comprises activities for generation of renewable thermal energy using renewable biomass or biogas for use in residential, commercial, institutional applications (e.g. for supply to households, small farms or for use in built environment of institutions such as schools). Examples of these technologies that displace or avoid fossil fuel use include but are not limited to biogas cook stoves, biomass briquette cook stoves, small scale baking and drying systems, water heating, or space heating systems.	Applicability criterion 1 of methodology AMS-I.I.	• CPA-DD
5.2.	The total installed/rated thermal energy generation capacity of the project equipment is equal to or less than 45 MW thermal.	Applicability criterion 2 of methodology AMS-I.I.	• CPA-DD • Biogas stove test report
5.3.	Each unit (e.g. cook stove, heater) shall have a rated capacity equal to or less than 150 kW thermal	Applicability criterion 3 of methodology AMS-I.I.	• CPA-DD • Biogas stove test report

[8]The applicability criteria described in paragraph 4 provide requirements for projects that are based on biomass residues (e.g. briquettes, wood chips). Therefore, this paragraph is not applicable to the new CPAs and will not be included in the eligibility criteria for new CPAs.

Nb.	Eligibility criterion -Required condition	Eligibility criterion - Category	Supporting evidence for inclusion
6.	All households meet the inclusion criteria for households to be included in a certain CPA. They		
6.1.	• are located within the geographic boundary of the CPA.	No household should be located outside the defined CPA boundary.	• CPA household database • CPA-DD
6.2.	• generate animal manure and wastes from agricultural activities that are currently stored under anaerobic conditions in deep pits.	To allow the identical application of the baseline and monitoring methodologies to all households, only households with an existing pit for manure storage are accepted.	• Written statement from SREO after choosing the households for the PoA.
6.3.	• currently use coal as source of energy for cooking.	To allow the identical application of the baseline and monitoring methodologies to all households, only households with an existing pit for manure storage are accepted.	• Written statement from SREO after choosing the households for the PoA.
6.4.	• install a new household biogas system, considering the relevant technical standards.	To ensure that all households actually generate emission reductions, it has to be ensured that the planned technology is actually installed at the programme's households.	• Written statement by the technology implementer (SREO). • All applicable and latest versions of the standards listed in Table 1 of the PoA-DD.
6.5.	• are considered low-income households.	The PoA focuses on poor households. Therefore, only low-income households should be chosen for the PoA.	• Written statement from SREO after choosing the households for the PoA.
6.6.	• No recovery or combustion equipment is transferred from or to other activities	Leakage due to replacement of equipment should be avoided. The transferring of an existing digester from one activity to another is technically not feasible as the digesters are built of bricks and concrete.	• Written statement on household advice by the technology implementer (SREO).

Nb.	Eligibility criterion -Required condition	Eligibility criterion - Category	Supporting evidence for inclusion
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).	This criterion is applied to discuss whether the CPAs are a de-bundled component of a large scale CDM project. To check the thermal capacity, a biogas stove test report will provide the stove capacity. To emission reductions calculated using the formulas derived in Appendix 4 will be compared to the limit of 600 tCO_2e. According to the analysis carried out in section B, this criterion is automatically fulfilled, if no household raises more than 2,060 pigs at the same time (which is far beyond the technical capacity of household biogas digesters). This will be demonstrated using a representative survey.	• CPA-DD • Thermal capacity: ○ Biogas stove test report • Methane avoidance: ○ Baseline survey ○ ER calculation
8.	The proposed project and the new CPA do not lead to a diversion of official development assistance (ODA).	Avoidance of CDM leading to a diversion of official development assistance.	• Written letters to state that neither the CDM development process, nor the sources of any applicable national biogas subsidy are funded by ODA.
9.	The CPA implements a monitoring plant that is in line with the monitoring plan described in the PoA-DD (section I.7.2)	The monitoring plan of each CPA should be in line with the monitoring plan validated by the DOE and registered with the PoA.	• PoA-DD • CPA-DD
10.	The starting date of the CPA is determined and not prior to the Global Stakeholder Consultation of the PoA.		

Nb.	Eligibility criterion -Required condition	Eligibility criterion - Category	Supporting evidence for inclusion
10.1.	The start date of the CPA can be determined with suitable evidence.	Requirement of EB 93, Annex 7 (CDM project standard for programmes of activities)	• City and County REO household list with all digester construction dates.
10.2.	The start date of the CPA is not before the date of public web hosting of the PoA documentation (28/10/2010).	Requirement of EB 93, Annex 7 (CDM project standard for programmes of activities)	• City and County REO household list with all digester construction dates.
11.	The end date of the CPA does not exceed the PoA end date.	The CPAs will automatically be terminated when the PoA reached the end of its end date.	• CPA-DD
12.	The CPA meets the additionality criteria relevant for Type I.		
12.1.	The total thermal capacity installed at all households of the CPA does not exceed 15 MW_{th}.	A test record of the typical biogas stoves will be provided as evidence during the inclusion. The number of households should not exceed the maximum capacity of 15 MW_{th} divided by the capacity of one stove.	• Test record of implemented stoves • CPA household list
12.2.	The thermal capacity of a single stove does not exceed 4,500 kW_{th}.	Requirement of the *Guidelines for demonstrating additionality of microscale project activities.*	• Test record of implemented stoves
12.3.	The users of the subsystems will be households.	Requirement of the *Guidelines for demonstrating additionality of microscale project activities.*	• CPA household list
13.	The CPA meets the additionality criteria relevant for Type III.	Requirement of the *Guidelines for demonstrating additionality of microscale project activities.*	
13.1.	The total annual emission reduction from methane avoidance (type II activity) aimed by the CPA does not exceed 20 $ktCO_2e$ in any year of the crediting period.	Requirement of the *Guidelines for demonstrating additionality of microscale project activities.*	• CPA-DD • Baseline survey
13.2.	The annual emission reduction from methane avoidance (type III activity) of	To emission reductions calculated using the formulas derived in	• CPA-DD

Nb.	Eligibility criterion -Required condition	Eligibility criterion - Category	Supporting evidence for inclusion
	one single household does not exceed 600 tCO_2e.	Appendix 4 will be compared to the limit of 600 tCO_2e.	• Baseline survey
13.3.	The users of the subsystems will be households.	Requirement of the *Guidelines for demonstrating additionality of microscale project activities.*	• CPA household list
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.	The data quality of the sampling survey should meet the minimum requirements.	• Statistical survey analysis.

Appendix 1. Contact information of coordinating/managing entity and project participants

Coordinating/managing entity and/or project participants	☐ Coordinating/managing entity ☒ Project participant
Organization name	UPM Umwelt-Projekt-Management GmbH
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Coordinating/managing entity and/or project participants	☒ Coordinating/managing entity ☒ Project participant
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Website	
Contact person	Hai Wang

Appendix 2. Affirmation regarding public funding

NA

Appendix 3. Applicability of methodologies and standardized baselines

NA

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

4.1 Average annual temperatures

Table 8: Temperature data for the Sichuan Province (2015)

No.	City	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual Average
1	Mianyang	7.7	9.8	14.6	19.6	23.6	25.4	27.0	25.9	22.0	19.2	13.9	8.4	18.1
2	Guang'an	7.7	9.7	14.6	19.2	21.5	24.2	27.0	26.1	22.3	18.8	14.1	8.0	17.8
3	Suining	8.1	10.1	15.4	19.6	22.7	24.8	27.2	26.2	22.3	19.0	14.6	8.9	18.2
4	Dazhou	8.0	9.9	14.9	19.6	22.1	24.8	28.0	27.5	23.4	19.3	14.3	8.5	18.4
5	Ziyang	8.5	10.5	15.6	19.8	23.5	25.6	27.2	26.0	22.4	19.4	15.0	9.1	18.6
6	Meishan	8.4	10.3	15.2	19.9	23.4	25.5	26.6	25.5	22.3	19.5	15.1	9.1	18.4
7	Neijiang	8.4	10.6	15.6	19.5	23.0	25.0	26.6	25.8	22.4	19.0	15.2	9.2	18.4
8	Leshan	9.2	11.1	15.7	19.9	23.5	25.5	26.8	25.9	22.6	20.2	15.6	10.0	18.8
9	Zigong	9.3	11.5	16.2	20.5	23.6	25.6	27.2	26.4	22.7	20.0	16.1	10.0	19.1
10	Yibin	9.8	11.8	16.4	20.4	23.7	25.9	27.2	26.4	22.6	20.2	16.1	10.2	19.2
11	Luzhou	9.1	11.3	15.9	19.7	22.4	25.0	26.2	25.9	22.3	19.7	15.6	9.4	18.5
12	Chengdu	6.8	8.6	13.3	17.6	22.0	23.9	25.1	23.9	21.1	18.2	13.5	7.4	16.8
13	Panzhihua	13.1	17.0	23.5	23.2	28.0	28.9	24.4	23.5	23.6	19.6	16.5	13.1	21.2
14	Deyang	7.0	9.0	13.9	18.7	23.2	24.9	26.2	25.1	21.6	18.7	13.4	7.8	17.5
15	Guangyuan	6.5	8.0	13.1	18.0	22.3	24.2	26.0	24.5	20.8	16.9	12.0	6.9	16.6
16	Nanchong	8.5	10.3	15.8	20.2	23.1	25.5	28.5	27.5	23.1	19.6	15.0	9.3	18.9
17	Yaan	8.0	9.6	14.0	18.4	22.1	23.9	25.3	24.3	21.0	18.6	14.0	8.4	17.3
18	Bazhong	6.7	9.1	14.3	18.9	22.4	24.7	27.1	26.7	22.5	18.5	13.9	8.4	17.8
19	Maerkang	-0.6	3.6	8.8	10.1	13.2	16.2	14.8	14.7	14.8	9.7	5.7	-0.6	9.2
20	Kangding	0.2	1.9	5.7	8.7	12.2	14.4	14.7	14.3	12.2	9.6	6.2	-0.6	8.3
21	Xichang	10.5	13.9	19.6	19.0	22.2	23.8	21.4	21.2	20.4	17.5	15.4	9.6	17.9

Source: Sichuan Statistical Yearbook 2016, Table 7-1

4.2 Methane Conversion Factors (MCF) for the pit storage for different mean annual temperatures as defined by IPCC 2006

Table 09: MCF values for the most likely mean annual temperatures

Manure Management System	Retention time	Annual mean temperature C										
		≤10	11	12	13	14	15	16	17	18	19	20
Pit storage	> 1 month	17 %	19 %	20 %	22 %	25 %	27 %	29 %	32 %	35 %	39 %	42 %

Source: IPCC 2006 Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 10, Table 10.17 (swine).

4.3 Emission reduction per methane recovery system

To demonstrate that the emission reduction per methane recovery unit is below 5 tCO_2e (applicability criteria of methodology AMS III.R) and below 600 tCO_2e (1% of small-scale maximum for de-bundling-check), the formulae for baseline and project emissions are combined as follows:

Baseline emissions:

$$BE_{CH_4,y} = GWP_{CH_4} \cdot D_{CH_4} \cdot UF_b \cdot \sum_{j,LT} MCF_j \cdot B_{0,LT} \cdot N_{LT,y} \cdot VS_{LT,y} \cdot MS\%_{Bl,j} \quad (7)$$

Project emissions:

$$PE_{CH_4,y} = 0.10 \cdot GWP_{CH_4} \cdot D_{CH_4} \cdot \sum_{i,LT} B_{0,LT} \cdot N_{LT,y} \cdot VS_{LT,y} \cdot MS\%_{i,y} \quad (8)$$

Where:

$BE_{CH_4,y}$	Baseline methane emissions in year y (tCO_2e)
$PE_{CH_4,y}$	Project methane emissions in year y (tCO_2e)
GWP_{CH_4}	Global Warming Potential for CH_4 (21)
D_{CH_4}	CH_4 density (0.00067 t/m3 at room temperature (20 °C) and 1 atm pressure)
UF_b	Model correction factor to account for model uncertainties (0.94)
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)
$MS\%_{i,y}$	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.

Emission reductions:

$$ER_{CH_4,y} = BE_{CH_4,y} - PE_{CH_4,y} \quad (9)$$

$$ER_{CH_4,y} = GWP_{CH_4} \cdot D_{CH_4} \cdot UF_b \cdot \sum_{j,LT} MCF_j \cdot B_{0,LT} \cdot N_{LT,y} \cdot VS_{LT,y} \cdot MS\%_{Bl,j} - 0.10 \cdot GWP_{CH_4} \cdot D_{CH_4} \cdot \sum_{i,LT} B_{0,LT} \cdot N_{LT,y} \cdot VS_{LT,y} \cdot MS\%_{i,y} \quad (10)$$

The figures GWP_{CH_4}, D_{CH_4}, UF_b are constants by itself and $B_{0,LT}$ and $VS_{LT,y}$ are constant for each CPA under this PoA. Furthermore, the value for MCF_j only depends on the mean annual temperature (in this PoA, only households with deep pit storage of manure are accepted) and the values for $N_{LT,y}$ and $MS\%_{Bl,j}$ only depend on the average number of pigs per household in each city. Therefore, these two values – mean annual temperature and average number of pigs per

household – determine the emission reduction per methane recovery system. Based on these two city specific input values and the formula above, the desired value can be calculated and compared to the threshold values of 5 tCO_2e and 600tCO_2e.

To demonstrate the unlikeliness of the emission reduction exceeding the threshold of 5 tCO_2e, the emission reduction due to methane avoidance is calculated exemplary in the following. (The practically impossible event of exceeding the threshold of 600 tCO_2e is discussed in section B. The formula derived above shows, that apart of the methane conversion factor of the baseline manure management system and the number of pigs, all other values are constants. According to the table provided in Appendix 4, the methane conversion factor depends on the annual average temperature. Therefore, the two input values needed to calculate the emission reduction due to methane avoidance for a single household are the number of pigs and the mean annual temperature. The baseline emission shows a proportional dependence on both factors, which means that for increasing temperature and number of pigs, the emission reductions will also increase.

The calculation shall be carried out exemplary for the highest annual average temperatures of all cities in the Sichuan Province in 2015. According to the table provided in Appendix 4, the highest annual average temperature of 21.2ºC was measured in Panzhihua. Using equation **10**, a goal seek analysis to determine the number of pigs in one household for which the threshold of 5 tCO_2e is exceeded delivers a number of 33.7. Even if the annual temperature should increase up to 28ºC[9], the number of pigs for which the emission reduction passes the threshold is still 17.2.

As a simplification for criterion 4.2, it can therefore be concluded, that a combination of the annual input temperature of 21ºC and a average annual number of pigs (for one specific household) of 33.7 results in emission reductions due to methane avoidance of 5 tCO_2e. Therefore, if the annual average temperature is 21ºC or below and the annual average number of pigs does not exceed 33.7, the CPA is applicable to criterion 1 and no further calculations need to be provided (as they are carried out here and in the ER calculation sheet provided to the DOE). In case the temperature exceeds 21ºC, the calculation will be provided to the DOE to demonstrate the applicability with the criterion.

[9] This is the maximum temperate listed in IPCC 2006, V4_10_Ch10_Livestock that is used to determine the MCF factor of the baseline manure management system. If the annual average temperature increases above this temperature, the MCF value for 28ºC is to be used for the following calculations.

Appendix 5. Further background information on the monitoring plan

NA

Appendix 6. Summary report of comments received from local stakeholders

NA

Appendix 7. Summary of post registration changes

This PoA (UNFCCC Ref no. 2898) has been registered as CDM POA on 11 Apr 2012. The applied methodologies are AMS-III.R (version 02) and AMS-I.C (version 19).

As per Paragraph 239, CDM Project Standard for programmes of activities (version 01), the post-registration change is voluntary change to other methodologies, provided that all requirements in the updated/changed methodologies are met.

This change is a voluntary change by PP and no reasons are included.

This PoA voluntary changes AMS-I.C. (version 19) to AMS-I.I. (version 04), the impacts of such change to the registered PoA and included CPA are as follows:

a) The applicability conditions of AMS-I.C (version 19) have been updated to be the ones of AMS-I.I (version 04). AMS-I.I (version 04) is applicable to the PoA and included CPAs;
b) Fixed parameters $FC_{BL,y}$ and $FC_{PE,y}$ have been moved tobe monitoring parameters $FC_{BL,k,j}$ and $FC_{m,j}$ in line with the AMS-I.1. Furthermore, additional monitoring parameters $N_{k,o}$, $n_{k,y}$ (formerly N_k), $N_{m,y}$ & $MS_{\%i,y}$ have been added in line with the new methodology AMS–I.I (version 04) See section I.6.2 and I.7.1 of PoA DD and section B.4.2 and B.5.1 of the of CPA DD for more details;
c) The additionality is not affected. Requirement of the *Guidelines for demonstrating additionality of microscale project activities* are fully met, as indicated in section F of CPA DD;
d) Scale is not affected, still small scale;
e) Level of accuracy and conservativeness of the monitoring of the PoA is not affected. All CPA specific input parameters that are determined by sampling will be determined by a sampling survey that fulfils the minimum confidence/error as per the latest sampling standard;
f) Eligibility criteria for inclusion of CPAs in the PoA is updated to include the applicability conditions of AMS-I.I (instead of applicability conditions of AMS-I.C in the registered PoA DD and CPA DD), the remaining criteria is not affected. See section K of PoA DD for more details.

Based on above, in each CPA, AMS-III.R (version 19) and AMS-I.I (version 04) will be applied.

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Document information

Version	*Date*	*Description*
08.1	28 June 2017	Revision to: • Remove a duplicated instruction; • Make editorial improvement.
08.0	7 June 2017	Revision to: • Improve consistency with the "CDM project standard for programmes of activities" and with the PDD and CPA-DD forms; • Make editorial improvement.
07.0	25 May 2017	Revision to: • Ensure consistency with the "CDM project standard for programmes of activities" (CDM-EB93-A07-STAN) (version 01.0); • Incorporate the "Programme design document form for small-scale CDM programmes of activities" (CDM-SSC-PoA-DD-FORM); • Make editorial improvement.
06.0	15 April 2016	Revision to ensure consistency with the "Standard: Applicability of sectoral scopes" (CDM-EB88-A04-STAN) (version 01.0).
05.0	9 March 2015	Revision to: • Include provisions related to choice of start date of PoA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Add exception for generic CPA where technology is under positive lists; • Make editorial improvement.
04.1	5 August 2014	Editorial revision to correct the document information table.
04.0	25 June 2014	Revision to: • Include the Attachment: Instructions for filling out the project design document form for CDM programme of activities (these instructions supersede the Guideline: Completing the programme design document form for CDM programme of activities (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the PoA in B.4 and Appendix 1; • Add general instructions on post-registration changes in paragraphs 2 and 3 of general instructions and Appendix 6; • Change the reference number from F-CDM-PoA-DD to CDM-PoA-DD-FORM; • Make editorial improvement.

Version	*Date*	*Description*
03.0	3 December 2012	EB 70 Revision to reflect changes to the *Guideline: Completing the programme design document form for CDM programmes of activities* (EB 70, Annex 6).
02.0	13 March 2012	EB 66 Revision required to ensure consistency with the "Guidelines for completing the programme design document form for CDM programmes of activities" (EB 66, annex 12).
01.0	27 July 2007	EB 33, Annex 41 Initial publication.

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