CLEAN DEVELOPMENT MECHANISM
SMALL-SCALE PROGRAM ACTIVITY DESIGN DOCUMENT FORM (CDM-SSC-CPA-DD)
Version 01

CONTENTS

A. General description of CDM programme activity (CPA)

B. Eligibility of CPA and Estimation of Emission Reductions

C. Environmental Analysis

D. Stakeholder comments

Annexes

Annex 1: Contact information on entity/individual responsible for the CPA

Annex 2: Information regarding public funding

Annex 3: Baseline information

Annex 4: Monitoring plan

NOTE:

(i) This form is for submission of CPAs that apply a small scale approved methodology using the provision of the proposed small scale CDM PoA.

(ii) The coordinating/managing entity shall prepare a CDM Small Scale Programme Activity Design Document (CDM-SSC-CPA-DD)[1,2] that is specified to the proposed PoA by using the provisions stated in the SSC PoA DD. At the time of requesting registration the SSC PoA DD must be accompanied by a CDM-SSC CPA-DD form that has been specified for the proposed SSC PoA, as well as by one completed CDM-SSC CPA-DD (using a real case). After the first CPA, every CPA that is added over time to the SSC PoA must submit a completed CDM-SSC CPA-DD.

---

[1] The latest version of the template form CDM-CPA-DD is available on the UNFCCC CDM web site in the reference/document section.

[2] At the time of requesting validation/registration, the coordinating managing entity is required to submit a completed CDM-POA-DD, the PoA specific CDM-CPA-DD, as well as one of such CDM-CPA-DD completed (using a real case).

SECTION A. General description of small scale CDM programme activity (CPA)

A.1. Title of the small-scale CPA:

>>

Title: Animal Manure Treatment Programme in Henan Province and Shaanxi Province--CPA -XXXX

Version: 02

Date: 23/04/2012

A.2. Description of the small-scale CPA:

>>

Animal Manure Treatment Programme in Henan Province and Shaanxi Province--CPA-XXXX (hereafter referred to as the CPA) is to recover methane from manure treatment in XX livestock farm(s) by changing the manure management practice from uncovered anaerobic lagoon to biogas digester and then to utilize the recovered methane to generate energy. The activity/ies is/are defined in **Scenario I** or **II** or **III**[3].

The CPA consists of XX small scale project activity/ties. Each small scale project activity will involve installation of an anaerobic digester. The detailed information regarding each small scale project activity is as follows:

[3] Three scenarios for energy generation may be involved in a CPA, which are thermal energy generation based on biogas fired (Hereafter referred to as **Scenario I**), electricity generation based on biogas fired (Hereafter referred to as **Scenario II**), and both coexist separately (Hereafter referred to as **Scenario III**).

Table 1. Detailed information with regard to small scale project activities

Farm No	Name of livestock farm	Volume of biogas digester	Annual average number of marketing swine	Annual average number of breeding swine	Annual average number of cattle	Annual average number of dairy cattle	Annual average number of chicken	Annual average number of other animal	Expected biogas production	Installed capacity of power generator	Installed capacity of boiler	Biogas stove number
		m^3	-	-	-	-	-	-	m^3/yr	MW_e	MW_{th}	-
Farm 1	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Farm 2	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
……	……	……	……	……	……	……	……	……	……	……	……	……
Farm N	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX

In the absence of the Programme, animal manure would be left to decay anaerobically in uncovered anaerobic lagoons and equivalent amount of thermal would be generated based on coal fired (only for **Scenario I** or **III**) as well as equivalent electricity would be generated by Central China Power Grid/Northwest Power Grid (only for **Scenario II** or **III**). This is also the baseline scenario.

By recovery and utilization of biogas, the CPA can contribute to the reduction of greenhouse gases in 2 ways: 1) the biogas recovery system reduces methane emission into atmosphere; 2) the recovered biogas replaces conventional fossil fuels for energy generation, and therefore avoids CO_2 emissions from energy generation by the fossil fuel; The estimated annual emission reductions achieved by the CPA is XXX tCO_2e.

As a waste treatment and renewable energy utilization project activity, it can contribute to sustainable development in the following aspects:

Social benefits:

- Provide job position during the Programme operation;
- Avoid epidemic disease spread from animal to people because of innocuous treatment of dung;

Environmental benefits:

- Improve the dung treatment system and avoid smoke in kitchens, which make the living environment in the region improved;
- Reduce GHG and pollutant emission by avoiding methane emission and replacing fossil fuel for energy generation;

Economic benefits:

- Reduce fuel, pesticide and fertilizer expenses, and therefore increase local rural farmers income;
- Move the development of animal raising industry forward, and furthermore increase the tax revenue ;

Technological benefits:

Boost the development of application of biogas technology;

A.3. Entity/individual responsible for the small-scale CPA:

>>

Name of Party involved (*) (host indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
P.R.China (Host Country)	Zhongruihe International New Energy Science and Technology (Beijing) Co. Ltd.	No
United Kingdom of Great Britain and Northern Ireland	A&T Carbon Asset Co., Limited	No

A.4. Technical description of the small-scale CPA:

A.4.1. Identification of the small-scale CPA:

>>

A.4.1.1. Host Party:

>>

The People's Republic of China

A.4.1.2. Geographic reference or other means of identification allowing the unique identification of the small-scale CPA (maximum one page):

>>

XX small scale project activity/ies is/are involved in the CPA. The detailed information for them including address and geographic coordinate and etc are listed in the Table 2, and the location(s) of them/it are/is shown in Figure 1.

Table 2. Detailed information for the farm or a bundle of farms under CPA

Farm No	Address	Geographic coordinate
Farm 1	XXXX	XXXX
Farm 2	XXXX	XXXX
…	…	…
Farm N	XXXX	XXXX

Henan Province/Shaanxi Province in China
Cities in Henan Province/Shaanxi Province
The CPA location

Figure 1. Locations of the livestock farms included in the CPA

A.4.2. Duration of the small-scale CPA:

A.4.2.1. Starting date of the small-scale CPA:

>>

According to the *Glossary of CDM terms*, "the starting date of a CDM program activity as: the earliest date at which either the implementation or construction or real action of a project activity begins", and "The starting date of the CPA cannot be prior to the commencement of validation of the programme of activities, i.e. the date on which the CDM-POADD is first published for global stakeholder consultation".

The start date of the CPA is determined as the earliest start date of CDM activities contained in it. In this case, the activity owned by XXXX has the earliest CDM starting date, which is XXXX. The timeline of CDM related events of this activity is shown as the table below[4].

Date	Event
XXX	FSR completion date
XXX	Project approval date
XXX	EIA completion date
XXX	EIA approval date
XXX	Construction agreement date
XXX	Electricity generator purchasing contract date
XXX	Biogas stove contract date
XXX	biogas boiler contract date
XXX	Contract signing date between the CME and the farm owner

A.4.2.2. Expected operational lifetime of the small-scale CPA:

>>

15 years

A.4.3. Choice of the crediting period and related information:

Renewable Crediting Period

A.4.3.1. Starting date of the crediting period:

>>

XXXX (The date of inclusion of the CPA into the PoA or the date the CPA put into operation, whichever is later.)

[4] The timelines of CDM related events of other projects in the CPA have been provided to the auditor as attachment.

A.4.3.2. Length of the crediting period, first crediting period if the choice is renewable CP:

>>
7 years and 0 month (the crediting period should not exceed the end date of the PoA)

A.4.4. Estimated amount of emission reductions over the chosen crediting period:

>>
The renewable crediting period is adopted and the estimation of the emission reduction in the first crediting period is presented in the following table.

Year	Estimated emission reductions ($t\ CO_2e$)
XX/XX/XXXX~XX/XX/XXXX	XXX
XX/XX/XXXX~XX/XX/XXXX	XXX
XX/XX/XXXX~XX/XX/XXXX	XXX
XX/XX/XXXX~XX/XX/XXXX	XXX
XX/XX/XXXX~XX/XX/XXXX	XXX
XX/XX/XXXX~XX/XX/XXXX	XXX
XX/XX/XXXX~XX/XX/XXXX	XXX
Total estimated emission reduction ($t\ CO_2e$)	XXX
Total number	XXX
Annual average over the crediting period of estimated reductions (tCO_2e)	XXX

A.4.5. Public funding of the CPA:

>>
There is no public funding from Annex I countries available to the CPA.

A.4.6. Information to confirm that the proposed small-scale CPA is not a de-bundled component

>>
The CME does not manage a large scale PoA of the same sectoral scope. In addition, there is no any activity[5] with the same sectoral scope, whose boundary is within 1km of the boundary of the proposed small-scale CPA. Therefore, it is considered that the CPA is not a de-bundled component of another CDM programme activity (CPA) or CDM project activity.

[5] Which may be a (i) registered small-scale CPA of a PoA, (ii) an application to register another small-scale CPA of a PoA or (iii) another registered CDM project activity

A.4.7. Confirmation that small-scale CPA is neither registered as an individual CDM project activity or is part of another Registered PoA:

>>

The CPA Owner confirms that the CPA is neither registered as an individual CDM project activity or is part of another Registered PoA.

SECTION B. Eligibility of small-scale CPA and Estimation of emissions reductions

B.1. Title and reference of the Registered PoA to which small-scale CPA is added:

>>

Animal Manure Treatment Programme in Henan Province and Shaanxi Province

B.2. Justification of the why the small-scale CPA is eligible to be included in the Registered PoA :

>>

The proposed SSC-CPA is eligible for inclusion in the PoA because it meets all of the criteria outlined in section A.4.2.2. of the SSC-CDM-PoA-DD, as below:

No.	Criteria for inclusion of a CPA in the PoA	Situation of the CPA	Satisfied the criteria?Y/N
1	The CPA should be located in the boundary of the PoA, i.e. within Henan Province or Shaanxi Province	The locations of small scale project activity/ies included in the CPA are governed by Henan Province or Shaanxi Province, i.e. within Henan Province and Shaanxi Province.	Y
2	The CPA should pass the procedure of avoiding double counting described in A.4.4.1 (ii);	The CPA passed the procedure of avoiding double counting.	Y
3	The CPA should meet any one of following criteria for assessing additionality: (a) Meets relevant requirement in "*Guidelines for demonstrating additionality of microscale project activities*" (Ver. 04.0), including: • The geographic location of the project activity is in a special underdeveloped zone of the host country identified by the Government via any one of the following methods: - The proportion of population with income less than USD 2 per day (PPP) in the region is greater than 50% calculated by using the most recent available data in	The CPA meets the criterion (a/b/c)	Y

	official notifications for development assistance including for planning, management, and investment; - The GNI per capita in the country is less than USD 3000 and the population of the region is among the poorest 20% in the poverty ranking of the host country as per the applicable national policies and procedures which is calculated by using the most recent available data in official notifications for development assistance including for planning, management, and investment; - Based on the recommendation of the designated national authority of the host country, the SUZ in the host country has been approved by EB of the CDM and published on the UNFCCC website. • The total installed capacity of the CPA is : For ***Scenario I***, the total installed capacity of the CPA is no more than $15MW_{th}$; For ***Scenario II***, the total installed capacity of the CPA is no more than $5MW_e$; For ***Scenario III***, the total installed capacity of the CPA (for electricity capacity, multiply by 3 to derive thermal units as per the latest version of "General Guidelines to SSC CDM methodologies") is no more than $15MW_{th}$;		

	• The emission reductions from type III components of the CPA is no more than 20 ktCO_2e per year (b) Meets relevant requirement for the positive list of technologies and project activity types that are defined as automatically additional in "*Guidelines for demonstrating additionality of small-scale project activities*", including: • Project activities solely composed of isolated units where the users of the technology/measure are households or communities or Small and Medium Enterprises (SMEs); • The emission reductions from type III components of the CPA is no more than 3,000 tCO_2e per year; • The installed capacity of each unit in the activities included in the CPA is less than 2,250 KW_{th} (c) The project IRR (before tax) of the project included in the CPA is lower than the benchmark of 7%;		
4	The CPA crediting period does not exceed 31/10/2040 (the PoA end date).	The CPA crediting period end date is XX/XX/XXXX.	Y

5	There is no any activity[6] with the same sectoral scope, whose boundary is within 1km of the boundary of the proposed small-scale CPA.	According to the information from the CME and each project owner involved in this CPA, there is no any activity with the same sectoral scope, whose boundary is within 1km of the boundary of the proposed small-scale CPA.	Y
6	The start date of the CPA is not prior to 24/11/2011(GSC date of the PoA); Construction Agreement, Electricity Generator Purchasing Contract, Biogas Stove Contract and Biogas Boiler Contract involved in the CPA will be used to check the start date.	The start date of the CPA is XX/XX/XXXX.	Y
7	Each activity included in the CPA must have obtained approval of EIA.	Each activity included in the CPA has obtained approval of EIA.	Y
8	The CPA has no public funding from Annex I Parties;	Each activity included in the CPA has no public funding from Annex I Parties.	Y
9	No fossil fuel is used in each activity included in the CPA other than for transportation;	No fossil fuel is used in each activity included in the CPA other than for transportation.	Y
10	Each activity included in the CPA will introduce newly anaerobic manure treatment systems with biogas recovery replacing uncovered anaerobic	Each activity included in the CPA will introduce newly anaerobic manure	Y

[6] Which may be a (i) registered small-scale CPA of a PoA, (ii) an application to register another small-scale CPA of a PoA or (iii) another registered CDM project activity

	lagoons for animal manure treatment;	treatment systems with biogas recovery replacing uncovered anaerobic lagoons for animal manure treatment.	
11	All activities under the CPA are to install anaerobic animal manure management systems to achieve methane recovery and destruction by flaring/combustion or gainful use of the recovered methane; ***For Scenario I*** The recovered methane will be used for thermal energy generation (including supplied to households as life fuel for thermal energy generation and utilized as fuel of boiler for thermal energy generation.). ***For Scenario II*** The recovered methane will be used for electricity generation by newly installed electricity generator. ***For Scenario III*** One part of the recovered methane will be used to generate thermal energy, another part will be used to generate electricity by newly installed electricity generator. Biogas storage tank will be also installed in each **Scenario** to achieve that	All activities under a CPA are to install anaerobic animal manure management systems to achieve methane recovery and destruction. The activities fall into **Scenario I/II/III**.	Y

	in case of emergency all methane produced from anaerobic digestion can be stored but not emitted to atmosphere, and therefore ensure that all methane produced by the digester is destroyed. Besides, it is also possible that flaring system is installed in some activities.		
12	The livestock population in the farms included in the CPA under the PoA should be managed under confined conditions;	The livestock population in the farms included in the CPA is managed under confined conditions;	Y
13	Manure or the streams obtained after treatment are not discharged into natural water resources;	Manure or the streams obtained after treatment will be utilized as fertilizer but not discharged into natural water resources.	Y
14	The annual average temperature of baseline site where anaerobic manure treatment facility is located is higher than 5°C;	The annual average temperature of baseline site where anaerobic manure treatment facilities locate are from X°C to X°C, and all of them are higher than 5°C. The annual average temperatures for all project activity in this CPA are presented in Table 3	Y
15	In the baseline scenario the retention time of manure waste in the anaerobic treatment system should be greater than one month;	In the baseline scenario the retention time of manure waste in the anaerobic treatment systems are from XX days to XX days, and are greater than one month. The baseline retention time for all activities are presented in Table 3	Y

16	The baseline scenario for the manure treatment is that the manure waste from the livestock would be treated in anaerobic lagoons with the depth of more than 1m;	The baseline lagoon depth of the activities are from X meters to X meters, and are all deeper than one meter. The baseline lagoon depths for all activities are presented in Table 3	Y
17	No methane recovery and destruction by flaring, combustion or gainful use takes place in the baseline scenario;	In the baseline scenario, animal manure would be left to decay anaerobically in uncovered anaerobic lagoons and the generated methane would be directly and fully emitted to atmosphere.	Y
18	The residual waste from the animal manure management system must be handled aerobically, e.g. land application;	The residual waste from the animal manure management system will be handled aerobically.	Y
19	Only animal manure will be anaerobically treated but no other organic matters are involved in the CPA;	According to FSR and technical flow, only animal manure will be anaerobically treated but no other organic matters are involved in the CPA.	Y
20	Technical measures will be used to ensure that all biogas produced by the digester is used or flared.	Technical measures will be used to ensure that all biogas produced by the digester is used or flared.	Y
21	The storage time of the manure after removal from the animal barns,	The storage time of the manure after	Y

	including transportation, should not exceed 45 days before being fed into the anaerobic digester.	removal from the animal barns of the activities are from X days to X days, and are all shorter than 45 days. storage time of the manure after removal from the animal barns for all activities are presented in Table 3	
22	For CPA using option (c) of eligibility (3) for assessing additionality, to demonstrate that emission reductions from type III components of the CPA be less or equal to 60 000 tCO_2/yr.	In the CPA, the emission reductions from type III components is XXXX tCO_2/yr, which is below 60,000tCO_2/yr;	Y
23	The total installed capacity of the CPA is as below: For ***Scenario I***, according to AMS-I.C., the total installed capacity of the CPA is no more than 45MW_{th}; For ***Scenario II***, according to AMS-I.F./AMS-I.D., the total installed capacity of the CPA is no more than 15MW_e; For ***Scenario III***, according to AMS-I.C. and AMS-I.F/AMS-I.D. as well as "General Guidelines to SSC CDM methodologies", the total installed capacity of the CPA (for electricity capacity, multiply by 3 to derive thermal units as per the latest version of "General Guidelines to SSC CDM methodologies") is no more than 45MW_{th};	The total installed capacity of the CPA is XX MW_{th}/MW_e.	Y
24	According to AMS-I.C./AMS-I.F, in case electricity and/or steam/heat and/or biogas produced by the project activity is delivered to another party,	A contract between the supplier and the consumer(s) has been signed to state that,	Y

	a contract between the supplier and the consumer(s) shall be signed to state that, only the supplier can claim emission reductions from the energy displaced.	only the supplier can claim emission reductions from the energy displaced.	

Table 3. Summary of the information required for inclusion criteria judgement

Farm No	Depth of anaerobic lagoons	Retention time of manure waste in the baseline	ER of type III	Storage time of the manure after removal from the animal barns	Total installed thermal capacity	Local average temprature	Total installed power capacity
Unit	m	days	tCO_2e/year	days	$KW_{thermal}$	℃	KW
Farm 1	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Farm 2	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
…	…	…	…	…	…	…	…
Farm N	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX

To sum up, the CPA is eligible for inclusion in the PoA.

B.3. Assessment and demonstration of additionality of the small-scale CPA , as per eligibility criteria listed in the Registered PoA:

>>

A SSC-CPA argues additionality based on Approach (1/2/3) mentioned in Section E.5.1 and Section E.5.2 in the PoA-DD.

The additionatlity of the CPA will be assessed as per Approach (1/2/3).

Approach 1

No.	Criteria in the guideline	Detailed criteria for the CPA under the PoA	Real situation of the CPA	Applicable? (Y/N)
1	Project activities up to five megawatts that employ renewable energy technology	The total installed capacity of the CPA is : For ***Scenario I***, the total installed capacity of the CPA is no more than $15MW_{th}$; For ***Scenario II***, the total installed capacity of the CPA is no more than $5MW_{e}$; For ***Scenario III***, the total installed capacity of the CPA (for electricity capacity, multiply by 3 to derive thermal units as per the latest version of "General Guidelines to SSC CDM	According to the Table 3, the total installed capacity of the CPA is XX MW_{th}/MW_{e}.	Y/N

		methodologies") is no more than 15MW$_{th}$;		
2	The emission reductions from type III components of the project is no more than 20 ktCO_2e per year	The emission reductions from type III components of the CPA is no more than 20 ktCO_2e per year	The emission reduction from type III components of the CPA is XXXX tCO_2e per year	Y/N
3	The geographic location of the project activity is in one of the Least Developed Countries or the Small Island Countries (LDCs/SIDs) or in a special underdeveloped zone of the host country identified by the Government via any one of the following methods: - The proportion of population with income less than USD 2 per day (PPP) in the region is greater than 50% calculated by using the most recent available data in official notifications for development assistance including for planning, management, and investment; - The GNI per capita in the country	The geographic location of the projects in the CPA is in a special underdeveloped zone of the P.R. China identified by the Government via any one of the following methods: - The proportion of population with income less than USD 2 per day (PPP) in the region is greater than 50% calculated by using the most recent available data in official notifications	The CPA is located in XXXXX, XXXXX, Henan Province/Shaanxi Province, which is/is not defined as underdeveloped zones by the Chinese government via any one of the following methods: - The proportion of population with income less than USD 2 per day (PPP) in the region is greater than 50% calculated by using the most recent available data in official notifications for development assistance including for planning, management, and investment; - The GNI per capita in the country is less than USD 3000 and the population of the region is among the poorest 20% in the poverty ranking of the host country as per the applicable national policies and procedures which is calculated by using the most recent available data in official notifications for development assistance including for planning, management, and investment; - Based on the recommendation of the designated national	Y/N

	is less than USD 3000 and the population of the region is among the poorest 20% in the poverty ranking of the host country as per the applicable national policies and procedures which is calculated by using the most recent available data in official notifications for development assistance including for planning, management, and investment; - Based on the recommendation of the designated national authority of the host country, the SUZ in the host country has been approved by EB of the CDM and published on the UNFCCC website.	for development assistance including for planning, management, and investment; - The GNI per capita in the country is less than USD 3000 and the population of the region is among the poorest 20% in the poverty ranking of the host country as per the applicable national policies and procedures which is calculated by using the most recent available data in official notifications for development assistance including for planning, management, and investment; - Based on the	authority of the host country, the SUZ in the host country has been approved by EB of the CDM and published on the UNFCCC website.	

		recommendation of the designated national authority of the host country, the SUZ in the host country has been approved by EB of the CDM and published on the UNFCCC website.		

According to the paragraph 2 (a) and 4 (a) of "*Guidelines for demonstrating additionality of microscale project activities*" (Ver.04.0), project activities are additional if the conditions above are satisfied.

Approach 2

According to the paragraph 2 (c) of "*Guidelines for demonstrating additionality of small-scale project activities*" (Ver.09.0), project activities solely composed of isolated units where the users of the technology/measure are households or communities or Small and Medium Enterprises (SMEs) and where the size of each unit is no larger than 5% of the small-scale CDM are defined as automatically additional for project sizes up to and including the small-scale CDM thresholds.

According to CPA Eligibility criteria (22) and (23), the installed capacity and project size of all the activities included in the CPA are below the limitation of small-scale CDM projects. Thus, the following table is applied to check whether or not the activities in the proposed CPA are applicable for this Approach on the additionality demonstration.

No.	Criteria in the guideline	Detailed criteria for the activity in the CPA under the PoA	Real situation of the activity in the CPA	Applicable? (Y/N)
1	Project activities solely composed of isolated units where the users of the technology/measure are households or communities or Small and Medium Enterprises (SMEs)	All the equipment units in the activity is solely isolated where the users are households or communities or Small and Medium Enterprises (SMEs)		
2	the size of each unit is no larger than 5% of the small-scale CDM	- The installed capacity of each unit for the Type I measure that employ renewable energy technology is no larger than 2.25MW (thermal); - The annual emission reduction of each unit for the Type III measure is no larger		

		than 3,000 tCO_2e.		

The activity in the proposed CPA is additional if all the requirements are met.

Approach 3

The CPA is additional only if all the projects under the CPA are proved to be additional according to the "**Guidelines on the Demonstration of Additionality of Small-scale Project Activities**" (Ver. 09.0)

According to the "**Guidelines on the Demonstration of Additionality of Small-scale Project Activities**" (Ver. 09.0), following methods could be used for the demonstration of additionality:

(a) Investment barrier: a financially more viable alternative to the project activity would have led to higher emissions;

(b) Technological barrier: a less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions;

(c) Barrier due to prevailing practice: prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions;

(d) Other barriers: without the project activity, for another specific reason identified by the project participant, such as institutional barriers or limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies, emissions would have been higher.

Investment barrier analysis will be applied for all the projects under the CPA. The following steps in the "*Tool for the Demonstration and Assessment of Additionality*" (Ver 06.0.0) will be applied:

Step 1 Determine appropriate analysis method

Step 2 Determine the benchmark

Step 3 Calculation and comparison of financial indicators

Step 4 Sensitivity analysis

Step 1 Determine appropriate analysis method

The "Tool for the Demonstration and Assessment of Additionality" (Ver. 06.0.0) suggests three analysis

methods which are simple cost analysis (Option I), investment comparison analysis (Option II) and benchmark analysis (Option III).

Since each project under the CPA will earn revenues not only from the CERs sales but also from biogas sales or electricity replacement, the simple cost analysis method is not appropriate.

Investment comparison analysis method is only applicable to projects whose alternatives are similar investment projects. However, the project scenario of each project in the CPA has more output service than the baseline scenario (mainly includes the biogas supply to the rural people or electricity replacement), thus they are not comparable. Therefore, the investment comparison analysis is not preferable.

Each project in the CPA will use benchmark analysis method (Option III) and demonstrate that it is not likely to be the most financially attractive option.

Step 2 Determine the benchmark

The project total investment internal rate of return (before tax) of 7% is suggested for the livestock industry in the *Economic Evaluation Code for Construction of Project* (Ver 03), which is selected as the financial benchmark for the project under the CPA. Only if the total investment IRR of the project is higher than or equivalent to the benchmark, the project is financially feasible.

Step 3 Calculation and comparison of financial indicators

Basic parameters for calculation of financial indicators of each project are shown in Table 4.

Table 4. Financial Parameters of a project in the CPA

Farm No	Parameter	Value	Units	Source
Farm 1	Fixed asset investment	XXXX	RMB	FSR
	Annual biogas output	XXXX	m^3	FSR
	Biogas sale price (incl. VAT)	XXXX	RMB/m^3	FSR
	Coal saving	XXXX	t	FSR
	Coal price (incl. VAT)	XXXX	RMB/t	FSR
	Annual power output	XXXX	MWh	FSR
	Electricity purchase price (incl. VAT)	XXXX	RMB/MWh	FSR
	Project lifetime (include construction period)	XXXX	Years	FSR
	Annual O&M cost	XXXX	RMB	FSR
	Value added tax rate	XXXX	%	FSR
	Income tax rate	XXXX	%	FSR

	Expense for city maintenance and construction	XXXX	%	FSR
	Education fee addition	XXXX	%	FSR
	CER price	100	RMB /tCO_2e	Estimated
Farm No	**Parameter**	**Value**	**Units**	**Source**
Farm 2	Fixed asset investment	XXXX	RMB	FSR
	Annual biogas output	XXXX	m^3	FSR
	Biogas sale price (incl. VAT)	XXXX	RMB/m^3	FSR
	Coal saving	XXXX	t	FSR
	Coal price (incl. VAT)	XXXX	RMB/t	FSR
	Annual power output	XXXX	MWh	FSR
	Electricity purchase price (incl. VAT)	XXXX	RMB/MWh	FSR
	Project lifetime (include construction period)	XXXX	Years	FSR
	Annual O&M cost	XXXX	RMB	FSR
	Value added tax rate	XXXX	%	FSR
	Income tax rate	XXXX	%	FSR
	Expense for city maintenance and construction	XXXX	%	FSR
	Education fee addition	XXXX	%	FSR
	CER price	100	RMB /tCO_2e	Estimated
Farm No	**Parameter**	**Value**	**Units**	**Source**
…	Fixed asset investment	…	RMB	FSR
	Annual biogas output	…	m^3	FSR
	Biogas sale price (incl. VAT)	…	RMB/m^3	FSR
	Coal saving	…	t	FSR
	Coal price (incl. VAT)	…	RMB/t	FSR
	Annual power output	…	MWh	FSR
	Electricity purchase price (incl. VAT)	…	RMB/MWh	FSR
	Project lifetime (include construction period)	…	Years	FSR
	Annual O&M cost	…	RMB	FSR
	Value added tax rate	…	%	FSR
	Income tax rate	…	%	FSR
	Expense for city maintenance and construction	…	%	FSR
	Education fee addition	…	%	FSR
	CER price	100	RMB /tCO_2e	Estimated

Farm No	Parameter	Value	Units	Source
Farm N	Fixed asset investment	XXXX	RMB	FSR
	Annual biogas output	XXXX	m^3	FSR
	Biogas sale price (incl. VAT)	XXXX	RMB/m^3	FSR
	Coal saving	XXXX	t	FSR
	Coal price (incl. VAT)	XXXX	RMB/t	FSR
	Annual power output	XXXX	MWh	FSR
	Electricity purchase price (incl. VAT)	XXXX	RMB/MWh	FSR
	Project lifetime (include construction period)	XXXX	Years	FSR
	Annual O&M cost	XXXX	RMB	FSR
	Value added tax rate	XXXX	%	FSR
	Income tax rate	XXXX	%	FSR
	Expense for city maintenance and construction	XXXX	%	FSR
	Education fee addition	XXXX	%	FSR
	CER price	100	RMB /tCO_2e	Estimated

Based on the data above, without CERs revenue, the IRR of the livestock farms included in the CPA is presented in the following table, which shows that the project IRR of each activity is lower than 7%.

Table 5. IRR result (without and with ER revenue) of all the activities in the CPA

Farm No	IRR (without CER)	IRR (with CER)
-	%	%
Farm 1	XXX	XXX
Farm 2	XXX	XXX
…	…	…
Farm N	XXX	XXX

The tool states that: *If the CDM project activity has a less favorable indicator (e.g. lower FIRR) than the benchmark, then the CDM project activity cannot be considered as financially attractive.*

Therefore, it is not considered this CPA is financially attractive.

(4) Sensitivity analysis

According to "Guidance on the Assessment of Investment Analysis"**,** only variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues

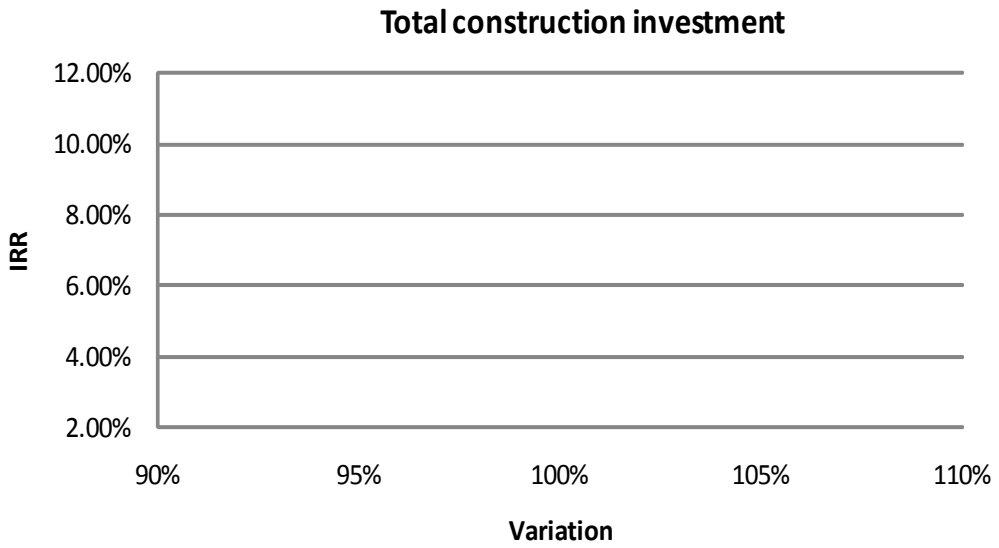
should be subjected to reasonable variation. For the project, the following financial parameters were taken as uncertain factors for sensitivity analysis of financial attractiveness:

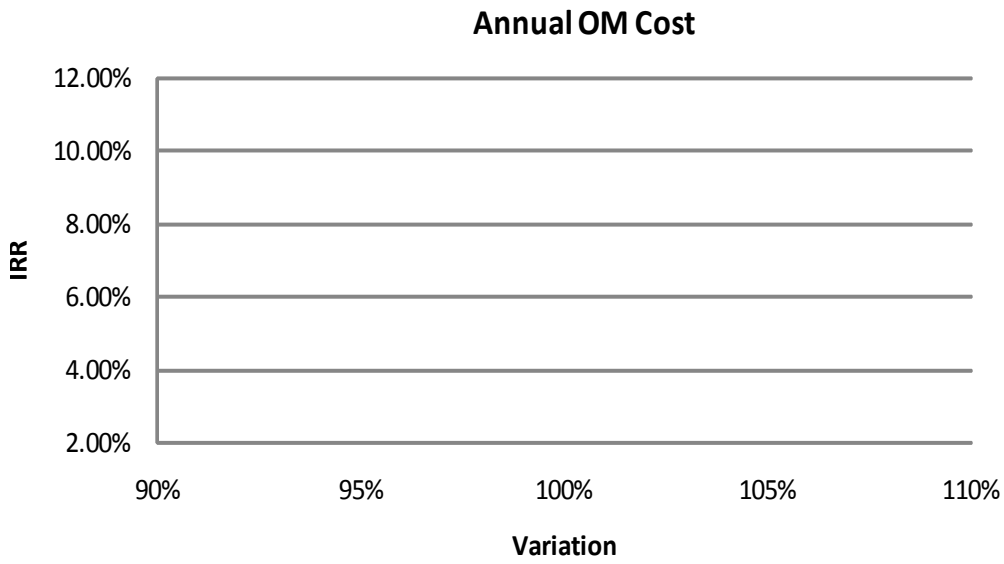
- Fixed assets investment
- Annual O&M cost
- Annual revenues

A sensitivity analysis should be carried out to estimate whether the conclusion regarding the financial/economic attractiveness is robust to reasonable variation in the critical assumptions. An assessment is conducted assuming the above three indicators varied in the range of -10%-+10%. The result is shown in Table 6 and Figure 2.

Table 6. Sensitivity Analysis of the CPA without CDM revenues

Farm 1					
Validation	-10%	-5%	0%	5%	10%
Construction					
Annual generation					
Annual O&M cost					
Farm 2					
Validation	-10%	-5%	0%	5%	10%
Construction					
Annual generation					
Annual O&M cost					
…					
Validation	-10%	-5%	0%	5%	10%
Construction					
Annual generation					
Annual O&M cost					
Farm N					
Validation	-10%	-5%	0%	5%	10%
Construction					
Annual generation					
Annual O&M cost					


Total construction investment
12.00%
10.00%
8.00%
6.00%
4.00%
2.00%
IRR
90%
95%
100%
105%
110%
Variation


Annual OM Cost
12.00%
10.00%
8.00%
6.00%
4.00%
2.00%
IRR
90%
95%
100%
105%
110%
Variation

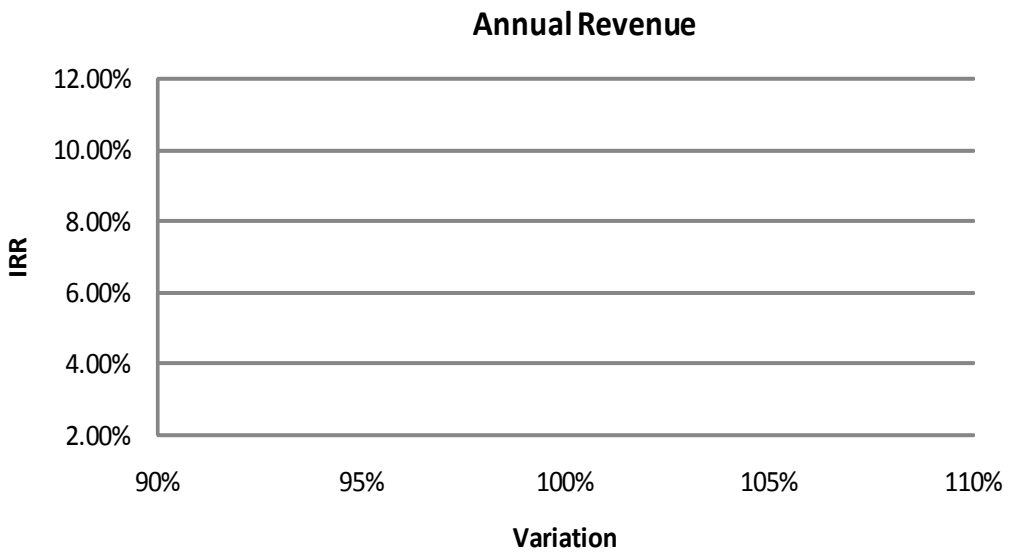


Figure 2. Sensitivity analysis of all activities in the CPA

It could be seen that, the IRR of each activity included in the CPA could not reach the benchmark even within a reasonable variation range of the factors.

Besides, as shown in the Table 5, if the CER revenue is considered, the project IRR of each activity in the CPA could be improved significantly, and will meet the benchmark of 7%.

Therefore, each activity in the CPA and the whole CPA is additional.

B.4. Description of the sources and gases included in the project boundary and proof that the small-scale CPA is located within the geographical boundary of the registered PoA.

>>

The CPA belongs to Scenario **I/IIa/IIb/IIIa/IIIb**[7], so combination of XXXXX will be applied in the CPA. As per the Methodologies applied in the CPA, the boundary of the CPA includes the physical, geographical site(s) of the livestock, animal manure management systems, facilities which recover and flare/combust or use methane.

[7] **Scenario II** can be further divided into two scenarios based on methodology application, which are electricity generation for captive use (Hereafter referred to as **Scenario IIa**) and grid connected electricity generation (Hereafter referred to as **Scenario IIb**).

Scenario III can also be further divided into two scenarios based on methodology application, which are electricity generation for captive use (Hereafter referred to as **Scenario IIIa**) and grid connected electricity generation (Hereafter referred to as **Scenario IIIb**).

Furthermore, as the CPA needs to purchase or replace electricity from Central China Power Grid (hereafter referred to as CCPG)/Northwest Power Grid (hereafter referred to as NWPG), the project boundary also includes power plants connected to CCPG/NWPG. Emissions sources included in or excluded from the project boundary are shown in the following Table.

	Source	Gas	Included ?	Justification/Explanation
Baseline	Direct emissions from the waste treatment processes	CH_4	Included	The major source of emissions in the baseline
		N_2O	Excluded	Excluded for simplification. This is conservative
		CO_2	Excluded	CO_2 emissions from the decomposition of organic waste are not accounted
	Emissions from electricity consumption /generation	CO_2	Included	This source of emissions will be included in the baseline only in the case of **Scenario II** or **III**
		CH_4	Excluded	Excluded for simplification. This is conservative
		N_2O	Excluded	Excluded for simplification. This is conservative
	Emissions from thermal energy generation	CO_2	Included	This source of emissions will be included in the baseline only in the case of **Scenario I** or **III**
		CH_4	Excluded	Excluded for simplification. This is conservative
		N_2O	Excluded	Excluded for simplification. This is conservative
Project activity	Emissions from physical leakage of biogas in the manure management systems	CH_4	Included	The major source of emissions
		CO_2	Excluded	CO_2 emissions from the decomposition of organic waste are not accounted
		N_2O	Excluded	Excluded for simplification.
	Emissions from flaring or combustion of the gas stream	CH_4	Included	The major source of emissions in case flaring is involved.
		CO_2	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification.
	Emissions from on-site electricity use	CO_2	Included	The major source of emissions
		CH_4	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification.
	Emissions from on-site fossil fuel fired	CO_2	Excluded	Fossil fuel is not involved in the PoA other than for transportation.
		CH_4	Excluded	Fossil fuel is not involved in the PoA other than for transportation.
		N_2O	Excluded	Fossil fuel is not involved in the PoA other than for transportation.
	Emissions from incremental transportation distances	CO_2	Included	This source of emissions shall be accounted for if transportation distance increases after implementation of the CPA
		CH_4	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification.
	Emissions from	CH_4	Included	This source of emissions shall be accounted for if both

	the storage of manure before being fed into the anaerobic digester			condition (a) and condition (b) below are satisfied: (a) The storage time of the manure after removal from the animal barns, including transportation, exceeds 24 hours before being fed into the anaerobic digester; and (b) The dry matter content of the manure when removed from the animal barns is less than 20%.
		CO_2	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification.

The following figure shows the project boundary:

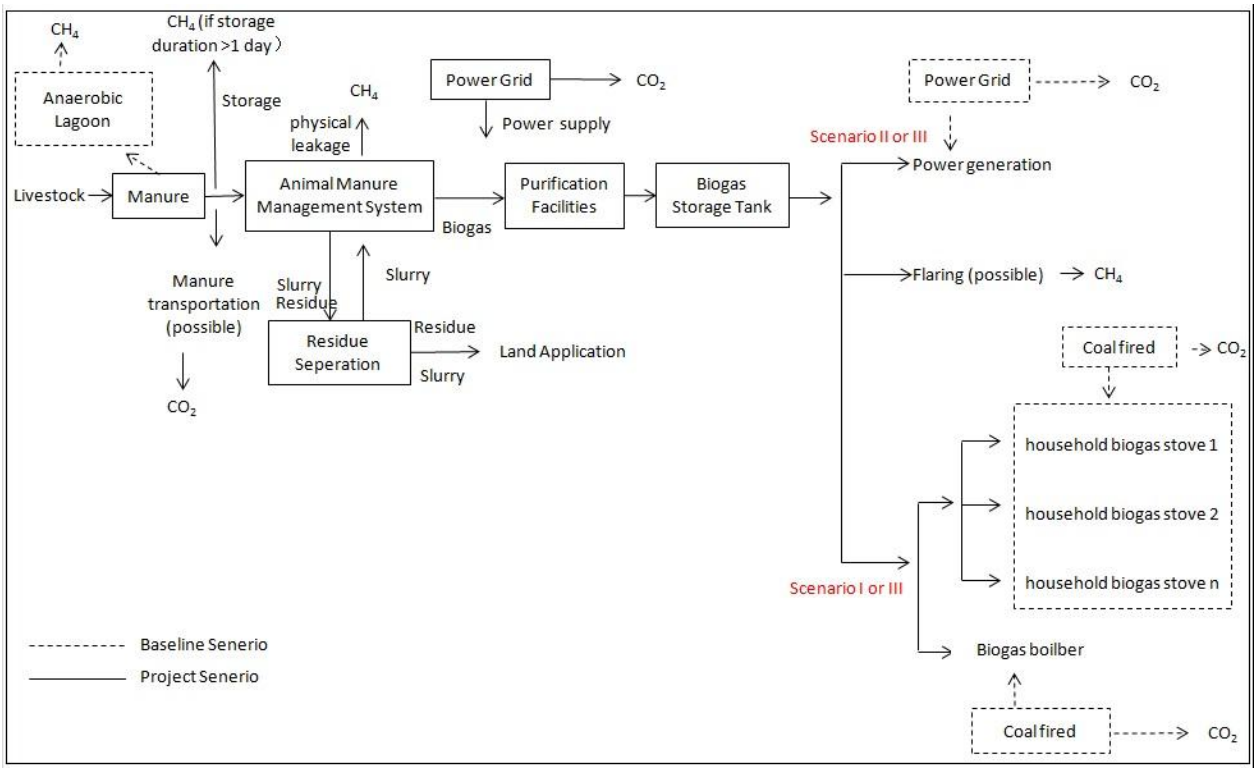


Figure 3. The boundary of the CPA

The project activity/ies included in the CPA are located in XXXXX, XXXXX, Henan/Shaanxi Province, which is within the geographical boundary of the PoA.

B.5. Emission reductions:

B.5.1. Data and parameters that are available at validation:

>>

Data / Parameter:	GWP_{CH4}
Data unit:	tCH_4/tCO_2e
Description:	Global Warming Potential (GWP) of CH_4
Source of data used:	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*
Value applied:	21
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default value
Any comment:	21 for the first period, and Shall be updated according to any future COP/MOP decisions.

Data / Parameter:	D_{CH4}
Data unit:	t/m^3
Description:	CH_4 density
Source of data used:	AMS III.D.
Value applied:	0.00067
Justification of the choice of data or description of measurement methods and procedures actually applied :	Recommended by the methodology.
Any comment:	at room temperature (20 ºC) and 1atm pressure

Data / Parameter:	MCF_j
Data unit:	%
Description:	Annual methane conversion factor (MCF) for the baseline animal waste management system “j”
Source of data used:	IPCC 2006 table10.17
Value applied:	Please see B.5.2 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to the Methodology AMS III.D., when national special value is unavailable, IPCC default value is used.
Any comment:	-

Data / Parameter:	UF_b
Data unit:	-
Description:	Model correction factor to account for model uncertainties
Source of data used:	AMS-III.D.
Value applied:	0.94
Justification of the choice of data or description of measurement methods and procedures actually applied :	AMS-III. D is credible data source.
Any comment:	-

Data / Parameter:	$B_{O,LT}$
Data unit:	m^3/CH_4/kg dm
Description:	Maximum methane producing potential of the volatile solid generated for animal type "LT"
Source of data used:	IPCC 2006 table10A-7 and 10A-8
Value applied:	Please see B.5.2 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to the Methodology AMS III.D., when national special value is unavailable, IPCC default value is used.
Any comment:	-

Data / Parameter:	$MS\%_{Bl,j}$
Data unit:	%
Description:	Fraction of manure handled in baseline animal manure management system "j"
Source of data used:	The CPA Owner
Value applied:	Please see B.5.2 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	All manure handled in baseline animal manure management.
Any comment:	-

Data / Parameter:	$W_{default}$
Data unit:	kg
Description:	Default average animal weight of a defined population

Source of data used:	Table10A-7 and 10A-8 in IPCC 2006
Value applied:	Please see B.5.2 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default value is credible data source.
Any comment:	-

Data / Parameter:	$VS_{default}$
Data unit:	kg dm/animal/day
Description:	Default value for the volatile solid excretion rate per day on a dry-matter basis for a defined livestock population
Source of data used:	Table10A-7 and 10A-8 in IPCC 2006
Value applied:	Please see B.5.2 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default value is credible data source.
Any comment:	-

Data / Parameter:	$EF_{grid,CM,y}$
Data unit:	tCO_2e/MWh
Description:	the combined margin emissions factor of CCPG/NWPG
Source of data used:	*Notification on Determining Baseline Emission Factor of China's Grid (20th Oct. 2011)* published by Chinese DNA , details please see PoA-DD.
Value applied:	0.72440/0.79260
Justification of the choice of data or description of measurement methods and procedures actually applied :	-
Any comment:	-

Data / Parameter:	$w_{CH4,y}$
Data unit:	-
Description:	Methane fraction of biogas
Source of data used:	AMS-III.D.
Value applied:	60%
Justification of the	According to AMS-III.D., a default value of 60% methane content can be used.

choice of data or description of measurement methods and procedures actually applied :	
Any comment:	Reasonable

Data / Parameter:	MCF_l
Data unit:	-
Description:	Annual methane conversion factor for the project manure storage device *l*
Source of data used:	Table 10.17, Chapter 10, Volume 4, 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	Please see B.5.2 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to the Methodology AMS III.D., IPCC default value should be used.
Any comment:	-

Data / Parameter:	$\eta_{BL,thermal}$
Data unit:	-
Description:	Efficiency of the baseline equipment being replaced by biogas boiler
Source of data used:	AMS-I.C.
Value applied:	100%
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per AMS-I.C., Efficiency of the baseline units (excluding cogeneration plants) shall be determined by adopting one of the following criteria (in preferential order): (a) Highest measured operational efficiency over the full range of operating conditions of a unit with similar specifications, using baseline fuel. The efficiency tests shall be conducted following the guidance provided in relevant national/international standards; (b) Highest of the efficiency values provided by two or more manufacturers for units with similar specifications, using the baseline fuel; (c) Default efficiency of 100%. As the data described in option (a) or (b) is not available, option (c) default efficiency of 100% is adopted in the PoA.
Any comment:	The most conservative way.

Data / Parameter:	η_{BL}
Data unit:	-
Description:	Efficiency of the baseline equipment being replaced by biogas stove
Source of data used:	AMS-I.C.

Value applied:	100%
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to AMS-I.C., for household or commercial applications/systems, whose maximum output capacity is less than 45 kW thermal and where it can be demonstrated that the metering of thermal energy output is not plausible, as in the case of cooking stoves, gasifiers, driers, water heaters etc., efficiency of the baseline units shall be determined by adopting one of the following criteria: (a) Highest measured operational efficiency over the full range of operating conditions of a representative sample of units with similar specifications, using baseline fuel. The efficiency tests shall be conducted following the guidance provided in relevant national/international standards; (b) Highest of the efficiency values provided by two or more manufacturers for units with similar specifications using the baseline fuel; (c) Highest efficiency from referenced literature values or default efficiency of 100%. As no data on this value is available, option (c) default efficiency of 100% is adopted in the PoA.
Any comment:	The most conservative way.

Data / Parameter:	η_{PJ}
Data unit:	-
Description:	Efficiency of the biogas-fired stove.
Source of data used:	National Standards of China
Value applied:	55%
Justification of the choice of data or description of measurement methods and procedures actually applied :	The efficiency of the biogas-fired stoves η_{PJ} is taken to be 55 %. This corresponds to the efficiency requirements of biogas stoves and cookers according to the National Standards of China (GB/T 3606-2001). The biogas-fired products with lower efficiency are not eligible to enter in the market. Products compliance with the National Standards is inspected during manufacturing by the certified authority. This is conservative.
Any comment:	conservative

Data / Parameter:	$\eta_{flare,h}$
Data unit:	-
Description:	Flare efficiency of biogas flaring in the year y.
Source of data used:	-
Value applied:	0%
Justification of the choice of data or description of measurement methods and procedures actually applied :	This is conservative.
Any comment:	-

Data / Parameter:	EF_{CO2}
Data unit:	tCO_2/km
Description:	CO_2 emission factor from fuel use due to transportation
Source of data used:	Since there is no such parameter in IPCC 2006 Guidelines, thus the value in IPCC 1996 is applied
Value applied:	0.001011
Justification of the choice of data or description of measurement methods and procedures actually applied :	Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual, Moderate Control index for US Heavy Duty Diesel Vehicles in Table 1-32, page 1.75
Any comment:	Only applied for the CPAs in which the material transportation is involved

Data / Parameter:	*FE*
Data unit:	-
Description:	Combustion efficiency of biogas utilized for energy generation in the year y.
Source of data used:	AMS-III.D.
Value applied:	100%
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to AMS-III.D., when the amount of methane that is combusted for energy and that is flared is separately monitored, a destruction efficiency of 100% can be used for the amount that is combusted for energy.
Any comment:	-

Data / Parameter:	*k*
Data unit:	-
Description:	Degradation rate constant
Source of data used:	AMS III.D.
Value applied:	0.069
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to the Methodology AMS III.D., IPCC default value should be used.
Any comment:	-

B.5.2. Ex-ante calculation of emission reductions:

>>

Ⅰ. Calculate baseline emissions

Baseline emissions of the project include baseline emissions from methane and CO_2 emissions from energy generation in the absence of the CPA. As the CPA belongs to Scenario I/II/III, the baseline emission is calculated as follows:

$$\begin{cases} BE_y = BE_{CH4,y} + BE_{Thermal,y} & \text{Only applicable under Scenario I} \\ BE_y = BE_{CH4,y} + BE_{\mathrm{Ele},y} & \text{Only applicable under Scenario II} \\ BE_y = BE_{CH4,y} + BE_{Thermal,y} + BE_{\mathrm{Ele},y} & \text{Only applicable under Scenario III} \end{cases} \quad (1)$$

Where:

BE_y	Baseline emissions in year *y* (tCO_2e)
$BE_{CH4,y}$	Baseline emissions due to methane recovery in year *y* (tCO_2e)
$BE_{Thermal,y}$	Baseline emissions from thermal generation in year y (tCO_2e)
$BE_{\mathrm{Ele},y}$	Baseline emissions from electricity generation in year y (tCO_2e)

1. Calculation of $BE_{CH4,y}$

According to AMS-III.D, $BE_{CH4,y}$ is calculated by using one of the following two options:

(a) 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). For this calculation, information about the characteristics of the manure and of the management systems in the baseline is required. Manure characteristics include the amount of volatile solids (*VS*) produced by the livestock and the maximum amount of methane that can be potentially produced from that manure (B_o);

(b) Using the amount of manure that would decay anaerobically in the absence of the project activity based on direct measurement of the quantity of manure treated together with its specific volatile solids (*SVS*) content.

Option (a) is adopted in the CPA.

Determination of $N_{LT,y}$

According to AMS-III.D, the annual average number of animals ($N_{LT,y}$) is determined as follows:

$$N_{LT,y} = N_{da,y} * \left(\frac{N_{p,y}}{365} \right) \quad (2)$$

Where:

$N_{da,y}$ Number of days animal is alive in the farm in the year *y* (numbers)

$N_{p,y}$ Number of animals produced annually of type *LT* for the year *y* (numbers)

$N_{LT,y}$ is calculated as the following table:

	$N_{da,y}$						$N_{p,y}$						$N_{LT,y}$					
Farm No	**Market swine**	**Breeding swine**	**Cattle**	**Dairy Cattle**	**chicken**	**Other animal**	**Market swine**	**Breeding swine**	**Cattle**	**Dairy Cattle**	**chicken**	**Other breeding animal**	**Market swine**	**Breeding swine**	**Cattle**	**Dairy Cattle**	**chicken**	**Other animal**
Farm 1	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Farm 2	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…
Farm N	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX

Determination of MCF_j

Methane Conversion Factors (*MCF*) values are determined for a specific manure management system and represent the degree to which B_o is achieved. Where available country-specific *MCF* values that reflect the specific management systems used in particular countries or regions shall be used. Alternatively, the IPCC default values provided in table 10.17 of 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 Chapter 10 can be used.

Country-specific *MCF* is unavailable, the IPCC default values will therefore be adopted in a CPA.

Farm No	**Annual average temperature**	**MCF_j**
	℃	-
Farm 1	XXXX	XXXX
Farm 2	XXXX	XXXX
…	…	…
Farm N	XXXX	XXXX

Determination of $VS_{LT,y}$

Volatile solids (*VS*) are the organic material in livestock manure and consist of both biodegradable and non-biodegradable fractions. For the calculations the total *VS* excreted by each animal species is required. The preferred method to obtain *VS* is to use data from nationally published sources. These values shall be compared with IPCC default values and any significant differences shall be explained. If data from nationally published sources are not available, country-specific *VS* excretion rates can be estimated from feed intake levels, via the enhanced characterisation method (tier 2) described in section 10.2 in 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 chapter 10. If country specific VS values are not available IPCC default values from 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 chapter 10 table 10 A-4 to 10 A-9 can be used provided that the project participants assess the suitability of those data to the specific situation of the treatment site particularly with reference to feed intake levels;

In case default IPCC values for *VS* are adjusted for a site-specific average animal weight, it shall be well explained and documented. The following equation shall be used:

$$VS_{LT,y} = \left(\frac{W_{site}}{W_{default}} \right) * VS_{default} * nd_y \qquad (3)$$

Where:

W_{site} Average animal weight of a defined livestock population at the project site (kg)

$W_{default}$ Default average animal weight of a defined population, this data is sourced from IPCC 2006 (kg)

$VS_{default}$ Default value for the volatile solid excretion rate per day on a dry-matter basis for a defined livestock population (kg dm/animal/day)

nd_y Number of days in year y where the animal manure management system is operational

	W_{site}					
Farm No	**Market swine**	**Breeding swine**	**Cattle**	**Dairy Cattle**	**chicken**	**Other animal**
Farm 1	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Farm 2	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
…	…	…	…	…	…	…
Farm N	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
	$W_{default}$					
Farm No	**Market swine**	**Breeding swine**	**Cattle**	**Dairy Cattle**	**chicken**	**Other animal**
Farm 1	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Farm 2	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
…	…	…	…	…	…	…
Farm N	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
	$VS_{default}$					
Farm No	**Market swine**	**Breeding swine**	**Cattle**	**Dairy Cattle**	**chicken**	**Other animal**
Farm 1	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Farm 2	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
…	…	…	…	…	…	…
Farm N	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX

	$VS_{LT,y}$						nd_y
Farm No	**Market swine**	**Breeding swine**	**Cattle**	**Dairy Cattle**	**chicken**	**Other animal**	**-**
Farm 1	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Farm 2	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
…	…	…	…	…	…	…	…
Farm N	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX

Determination of $B_{0,LT}$

According to AMS-III.D, the maximum methane-producing capacity of the manure (B_o) varies by species and diet. Since country specific B_o values are not available, default values from tables 10 A-4 to 10 A-9 of 2006 IPCC Guidelines for National Greenhouse Gas Inventories volume 4 Chapter 10 can be used.

	$B_{0,LT}$					
Farm No	**Market swine**	**Breeding swine**	**Cattle**	**Dairy Cattle**	**chicken**	**Other animal**
Farm 1	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Farm 2	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
…	…	…	…	…	…	…
Farm N	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX

Determination of $BE_{CH4,y}$

$$BE_{CH4,y} = GWP_{CH4} * D_{CH4} * UF_b * \sum_{j,LT} MCF_j * B_{0,LT} * N_{LT,y} * VS_{LT,y} * MS\%_{Bl,j} \quad (4)$$

Where:

$BE_{CH4,y}$	Baseline emissions duet to biogas recovery in year y (tCO_2e)
GWP_{CH4}	Global Warming Potential (GWP) of CH_4 (21)
D_{CH4}	CH_4 density (0.00067 t/m^3 at room temperature (20 ºC) and 1 atm pressure)
LT	Index for all types of livestock
j	Index for animal manure management system

MCF_j Annual methane conversion factor (MCF) for the baseline animal manure management system *j*

$B_{0,LT}$ Maximum methane producing potential of the volatile solid generated for animal type *LT* (m^3 CH_4/kg dm)

$N_{LT,y}$ Annual average number of animals of type *LT* in year *y* (numbers)

$VS_{LT,y}$ 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*

UF_b Model correction factor to account for model uncertainties (0.94)[8]

	$MS\%_{Bl,j}$					
Farm No	**Market swine**	**Breeding swine**	**Cattle**	**Dairy Cattle**	**chicken**	**Other animal**
Farm 1	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Farm 2	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
…	…	…	…	…	…	…
Farm N	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX

Farm 1		**Market swine**	**Breeding swine**	**Cattle**	**Dairy Cattle**	**chicken**	**Other animal**
Sum		**XXXX**					
MCF_j	-	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$B_{0,LT}$	m^3 CH_4/kg dm	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$N_{LT,y}$	-	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$VS_{LT,y}$	kg dm/animal/year	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$MS\%_{Bl,j}$	-	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$BE_{CH4,y}$	tCO_2e	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Sum	**tCO_2e**	**XXXX**					
Farm 2		**Market swine**	**Breeding swine**	**Cattle**	**Dairy Cattle**	**chicken**	**Other animal**
MCF_j	-	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$B_{0,LT}$	m^3 CH_4/kg dm	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX

[8] Reference: FCCC/SBSTA/2003/10/Add.2, page 25.

$N_{LT,y}$	-	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$VS_{LT,y}$	kg dm/animal/year	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$MS\%_{Bl,j}$	-	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$BE_{CH4,y}$	tCO_2e	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Sum	**tCO_2e**	**XXXX**					
…		**Market swine**	**Breeding swine**	**Cattle**	**Dairy Cattle**	**chicken**	**Other animal**
MCF_j	-	…	…	…	…	…	…
$B_{0,LT}$	m^3 CH_4/kg dm	…	…	…	…	…	…
$N_{LT,y}$	-	…	…	…	…	…	…
$VS_{LT,y}$	kg dm/animal/year	…	…	…	…	…	…
$MS\%_{Bl,j}$	-	…	…	…	…	…	…
$BE_{CH4,y}$	tCO_2e	…	…	…	…	…	…
Sum	**tCO_2e**	**…**					
Farm N		**Market swine**	**Breeding swine**	**Cattle**	**Dairy Cattle**	**chicken**	**Other animal**
MCF_j	-	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$B_{0,LT}$	m^3 CH_4/kg dm	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$N_{LT,y}$	-	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$VS_{LT,y}$	kg dm/animal/year	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$MS\%_{Bl,j}$	-	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$BE_{CH4,y}$	tCO_2e	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Sum	**tCO_2e**	**XXXX**					

2. Calculation of $BE_{Thermal,y}$

Thermal energy generation in the PoA includes, supplying biogas to households as life fuel for thermal energy generation and utilizing biogas as fuel of boiler for thermal energy generation.

The requirements concerning demonstration of the remaining lifetime of the replaced equipment shall be met as described in the "General Guidelines to SSC CDM methodologies". If the remaining lifetime of the affected systems increases due to the project activity, the crediting period shall be limited to the estimated remaining lifetime, i.e. the time when the affected systems would have been replaced in the absence of the project activity.

According to "General Guidelines to SSC CDM methodologies", in case of replacement of existing equipment, project participants shall estimate the point in time where the existing equipment would be replaced in the absence of the project activity in accordance with the latest version of "Tool to determine the remaining lifetime of equipment" (Ver.01). For household devices/ appliances, the remaining lifetime may be disregarded.

Therefore, in case replacement of existing coal-fired boiler by biogas-fired boiler is involved in the CPA, the remaining life time of the existing coal-fired boiler should be determined.

According to "Tool to determine the remaining lifetime of equipment" (Ver.01), Project participants may use one of the following options to determine the remaining lifetime of the equipment:

(a) Use manufacturer's information on the technical lifetime of equipment and compare to the date of first commissioning;

(b) Obtain an expert evaluation;

(c) Use default values;

According to AMS-I.C, for steam/heat produced using fossil fuels the baseline emissions are calculated as follows:

$$BE_{thermal,y,1} = [EG_{PJ,y} / \eta_{BL,thermal}] * EF_{FF,CO2} \quad (5)$$

Where:

$BE_{thermal,y,1}$	The baseline emissions from steam/heat displaced by the CPA during the year *y* (tCO_2e)
$EG_{PJ,y}$	The net quantity of steam/heat supplied by the project activity during the year *y* (TJ)
$\eta_{BL,thermal}$	Efficiency of the baseline equipment being replaced by biogas boiler; 100% will be used for this parameter based on PoA-DD. This is conservative.
$EF_{FF,CO2}$	The CO_2 emission factor of the fossil fuel that would have been used in the baseline plant obtained from reliable local or national data if available, alternatively, IPCC default emission factors can be used (tCO_2e/TJ)

Farm No	$EG_{PJ,y}$	$\eta_{BL,thermal,y}$	$EF_{FF,CO2,1}$	$BE_{thermal,y,1}$
	GJ	-	tCO_2e/GJ	tCO_2e

Sum				
Farm 1	XXXX	XXXX	XXXX	XXXX
Farm 2	XXXX	XXXX	XXXX	XXXX
…	…	…	…	…
Farm N	XXXX	XXXX	XXXX	XXXX

For household or commercial applications/systems, whose maximum output capacity is less than 45 kW thermal and where it can be demonstrated that the metering of thermal energy output is not plausible, as in the case of biomass stoves, gasifiers, driers, water heaters etc, the project output energy shall be estimated based on consumption of the biomass (in terms of energy quantity) times the efficiency of the project equipment. The equation below shall be used:

$$\begin{aligned} BE_{thermal,y,2} &= [HG_{PJ,y} / \eta_{BL}] * EF_{FF,CO2} \\ &= \{[B_{biomass,PJ,y} * NCV_{biomass} * \eta_{PJ}] / \eta_{BL}\} * EF_{FF,CO2} \end{aligned} \quad (6)$$

Where:

$BE_{thermal,y,2}$	The baseline emissions from thermal energy displaced by the project activity using renewable biogas during the year *y* (tCO_2)
$HG_{PJ,y}$	The net quantity of thermal energy supplied by the project activity using biogas during the year *y* (TJ)
η_{BL}	Efficiency of the baseline equipment being replaced by biogas stove; 100% will be used for this parameter based on PoA-DD. This is conservative.
η_{PJ}	Efficiency of the project equipment measured using representative sampling methods or based on referenced literature values. The efficiency tests shall be conducted following the guidance provided in the relevant national/international standards
$EF_{FF,CO2}$	The CO_2 emission factor of the fossil fuel that would have been used in the baseline (tCO_2/TJ)
$B_{biomass,PJ,y}$	The net quantity of the biogas consumed by households in year *y* (tons)
$NCV_{biomass}$	The net calorific value of the biogas (TJ/tons)

Farm No	$B_{biomass,PJ,y}$	$NCV_{biomass}$	η_{PJ}	η_{BL}	$EF_{FF,CO2,2}$	$BE_{thermal,y,2}$
	m^3/a	GJ/m^3	-	-	tCO_2e/GJ	tCO_2e

Sum						0
Farm 1	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Farm 2	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
…	…	…	…	…	…	…
Farm N	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX

$$BE_{thermal,y,} = BE_{thermal,y,1} + BE_{thermal,y,2} \quad (7)$$

Where:

$BE_{thermal,y}$ Baseline emissions from thermal generation in year y (tCO_2e)

$BE_{thermal,y,1}$ The baseline emissions from steam/heat displaced by the CPA during the year *y* (tCO_2)

$BE_{thermal,y,2}$ The baseline emissions from thermal energy displaced by the project activity using renewable biogas during the year *y* (tCO_2)

Farm No	$BE_{thermal,y,1}$	$BE_{thermal,y,2}$	$BE_{thermal,y}$
	tCO_2e	tCO_2e	tCO_2e
Sum			
Farm 1	XXXX	XXXX	XXXX
Farm 2	XXXX	XXXX	XXXX
…	…	…	…
Farm N	XXXX	XXXX	XXXX

3. Calculation of $BE_{Ele,y}$

Baseline emissions from electricity generation should be considered as below:

$$BE_{Ele,y} = EG_{BL,y} \times EF_{grid,CM,y} \quad (8)$$

Where:

$BE_{Ele,y}$ Baseline emissions from electricity generation in year y (tCO_2e)

$EG_{BL,y}$ Quantity of electricity supplied to and/or displaced from the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)

$EF_{grid,CM,y}$ Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "*Tool to calculate the emission factor for an electricity system*" (Ver. 02.2.1);

The electricity generated in the CPA will be supplied to/displace equivalent electricity from CCPG/NWPG, so

$$EF_{grid,CM,y}=0.72440/0.79260tCO_2e/MWh.$$

Farm No	$EG_{BL,y}$	$EF_{grid,CM,y}$	$BE_{Ele,y}$
	MWh	tCO_2e/MWh	tCO_2e
Sum			XXXX
Farm 1	XXXX	XXXX	XXXX
Farm 2	XXXX	XXXX	XXXX
…	…	XXXX	…
Farm N	XXXX	XXXX	XXXX

4. Calculation of BE_y

According to formulae (1), the baseline emission is calculated as follows:

$$\begin{cases} BE_y = BE_{CH4,y} + BE_{Thermal,y} \text{.....Only applicable under Scenario I} \\ BE_y = BE_{CH4,y} + BE_{Ele,y} \text{.....Only applicable under Scenario II} \\ BE_y = BE_{CH4,y} + BE_{Thermal,y} + BE_{Ele,y} \text{.....Only applicable under Scenario III} \end{cases}$$

Farm No	$BE_{CH4,y}$	$BE_{Thermal,y}$	$BE_{Ele,y}$	BE_y
	tCO_2e	tCO_2e	tCO_2e	tCO_2e
Sum				XXXX
Farm 1	XXXX	XXXX		XXXX
Farm 2	XXXX	XXXX		XXXX
…	…	…		…
Farm N	XXXX	XXXX		XXXX

Ⅱ. Calculate project emissions

According to AMS-III.D, Project activity emissions consist of:

(a) Physical leakage of biogas in the manure management systems which includes production, collection and transport of biogas to the point of flaring/combustion or gainful use ($PE_{PL,y}$);

(b) Emissions from flaring or combustion of the gas stream ($PE_{flare,y}$);

(c) CO_2 emissions from use of fossil fuels or electricity for the operation of all the installed facilities ($PE_{power,y}$);

(d) CO_2 emissions from incremental transportation distances;

(e) Emissions from the storage of manure before being fed into the anaerobic digester ($PE_{storage,y}$)

1. Determination of $PE_{PL,y}$

According to AMS-III.D, $PE_{PL,y}$ is calculated as follows:

$$PE_{PL,y} = 0.10 * GWP_{CH4} * D_{CH4} * \sum_{i,LT} B_{0,LT} * N_{LT,y} * VS_{LT,y} * MS\%_{i,y} \qquad (9)$$

Where:

$MS\%_{i,y}$ Fraction of manure handled in system *i* in year *y*

Farm 1		**Market swine**	**Breeding swine**	**Cattle**	**Dairy Cattle**	**chicken**	**Other animal**
Sum		**XXXX**					
$B_{0,LT}$	m^3 CH_4/kg dm	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$N_{LT,y}$	-	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$VS_{LT,y}$	kg dm/animal/year	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$MS\%_{Bl,j}$	-	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$PE_{PL,y}$	tCO_2e	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Sum	**tCO_2e**	**XXXX**					
Farm 2		**Market swine**	**Breeding swine**	**Cattle**	**Dairy Cattle**	**chicken**	**Other animal**
$B_{0,LT}$	m^3 CH_4/kg dm	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$N_{LT,y}$	-	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$VS_{LT,y}$	kg dm/animal/year	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX

$MS\%_{Bl,j}$	-	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$PE_{PL,y}$	tCO_2e	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Sum	**tCO_2e**	**XXXX**					
…		**Market swine**	**Breeding swine**	**Cattle**	**Dairy Cattle**	**chicken**	**Other animal**
$B_{0,LT}$	m^3 CH_4/kg dm	…	…	…	…	…	…
$N_{LT,y}$	-	…	…	…	…	…	…
$VS_{LT,y}$	kg dm/animal/year	…	…	…	…	…	…
$MS\%_{Bl,j}$	-	…	…	…	…	…	…
$PE_{PL,y}$	tCO_2e	…	…	…	…	…	…
Sum	**tCO_2e**	**…**					
Farm N		**Market swine**	**Breeding swine**	**Cattle**	**Dairy Cattle**	**chicken**	**Other animal**
$B_{0,LT}$	m^3 CH_4/kg dm	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$N_{LT,y}$	-	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$VS_{LT,y}$	kg dm/animal/year	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$MS\%_{Bl,j}$	-	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$PE_{PL,y}$	tCO_2e	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Sum	**tCO_2e**	**XXXX**					

2. **Determination of** $PE_{flare,y}$

In case flaring is involved in a CPA, the emission from flaring of biogas will be taken into account. According to AMS-III.D., this emission should be calculated as follows:

$$PE_{flare,y} = \sum_{h=1}^{8760} TM_{RG,h} \times \left(1 - \eta_{flare,h}\right) \times \frac{GWP_{CH4}}{1000} \qquad (10)$$

Where:

$PE_{flare,y}$ Project emissions from flaring of biogas in year y (tCO_2e)

$TM_{RG,h}$ Mass flow rate of methane in biogas in the hour h (kg/h)

$\eta_{flare,h}$ Flare efficiency in hour h; 0 is used for this parameter. This is conservative.

GWP_{CH4} Global Warming Potential of methane valid for the commitment period (tCO_2e/tCH_4)

For simplification and conservative, 0 is used for flare efficiency of flaring system. i.e.

$$\eta_{flare,h}=0$$

$$TM_{RG,h} = FV_{RG,h} \times fv_{CH4,RG,h} \times \rho_{CH4,n} \quad (11)$$

Where:

$TM_{RG,h}$	Mass flow rate of methane in biogas in the hour h; (kg/h)
$FV_{RG,h}$	Volumetric flow rate of biogas in dry basis at normal conditions in hour h;(m^3/h)
$fv_{CH4,RG,h}$	Volumetric fraction of methane in biogas on dry basis in hour h; according to AMS-III.D., The default value of 60% will be used.
$\rho_{CH4,n}$	Density of methane at normal conditions (0.716); (kg/m^3)

Farm No	$FV_{RG,h}$	$fv_{CH4,RG,h}$	$\rho_{CH4,n}$	$\eta_{flare,h}$	GWP_{CH4}	$PE_{flare,y}$
	m^3/h	-	kg/m^3	-	tCO_2e/tCH_4	tCO_2e
Sum						XXXX
Farm 1	XXXX	60%	0.716	0	21	XXXX
Farm 2	XXXX	60%	0.716	0	21	XXXX
…	…	60%	0.716	0	21	XXXX
Farm N	XXXX	60%	0.716	0	21	XXXX

3. Determination of $PE_{power,y}$

As fossil fuel is not involved in the CPA other than for transportation, $PE_{power,y}$ is equivalent to project emissions from electricity consumption. According to AMS-III.D, project emissions from electricity consumption are determined as per the procedures described in AMS-I.D "Grid connected renewable electricity generation", which is calculated as below:

$$PE_{power,y} = EC_{PJ,y} \times EF_{grid,CM,y} \quad (12)$$

Where:

$EC_{PJ,y}$ Quantity of net electricity consumed by the Project in year *y* (MWh/yr)

$EF_{grid,CM,y}$ Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "*Tool to calculate the emission factor for an electricity system*" (Ver. 02.2.1); please see PoA-DD

Farm No	$EC_{PJ,y}$	$EF_{grid,CM,y}$	$PE_{power,y}$
	MWh	tCO_2e/MWh	tCO_2e
Sum			XXXX
Farm 1	XXXX	XXXX	XXXX
Farm 2	XXXX	XXXX	XXXX
…	…	XXXX	…
Farm N	XXXX	XXXX	XXXX

4. Determination of $PE_{transp,y}$

According to AMS-III.F, the emissions from incremental transportation are calculated as below:

$$PE_{y,transp} = (Q_y / CT_y) * DAF_w * EF_{CO2} + (Q_{y,treatment} / CT_{y,treatment}) * DAF_{treatment} * EF_{CO2} \quad (13)$$

Where:

Q_y Quantity of raw waste/manure treated and/or wastewater co-treated in the year *y* (tonnes)

CT_y Average truck capacity for transportation (tonnes/truck)

DAF_w Average incremental distance for raw solid waste/manure and/or wastewater transportation (km/truck)

EF_{CO2} CO_2 emission factor from fuel use due to transportation ($kgCO_2$/km, IPCC default values or local values may be used)

$Q_{y,treatment}$ Quantity of compost produced in year *y* (tonnes)

$CT_{y,treatment}$ Average truck capacity for compost transportation (tonnes/truck)

$DAF_{treatment}$ Average distance for compost transportation (km/truck)

Farm No	Q_y	CT_y	DAF_w	EF_{CO2}	$Q_{y,treatment}$	$CT_{y,treatment}$	$DAF_{treatment}$	$PE_{y,transp}$
	t	t/truck	km/truck	$kgCO_2/km$	t	t/truck	km/truck	tCO_2e
Sum								XXXX
Farm 1	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Farm 2	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
…	…	…	…	…	…	…	…	…
Farm N	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX

5. Determination of $PE_{storage,y}$

Project emissions on account of storage of manure before being fed into the anaerobic digester shall be accounted for if both condition (a) and condition (b) below are satisfied:

(a) The storage time of the manure after removal from the animal barns, including transportation, exceeds 24 hours before being fed into the anaerobic digester; and

(b) The dry matter content of the manure when removed from the animal barns is less than 20%.

The following method shall be used to calculate project emissions from manure storage:

$$PE_{storage,y} = GWP_{CH_4} * D_{CH_4} * \sum_{LT,l} \left[\frac{365}{AI_l} \sum_{d=1}^{AI} (N_{LT,y} * VS_{LT,d} * MS\%_l * (1 - e^{-k\ (AI_l - d)}) * MCF_l * B_{0_{LT}}) \right] \quad (14)$$

Where:

$PE_{storage,y}$	Project emissions on account of manure storage in year *y* (tCO_2e)
AI_l	Annual average interval between manure collection and delivery for treatment at a given storage device *l* (days)
$VS_{LT,d}$	Amount of volatile solid production by type of animal *LT* in a day (kg VS/head/d)
$MS\%_l$	Fraction of volatile solids (%) handled by storage device *l*
k	Degradation rate constant (0.069)
d	Days for which cumulative methane emissions are calculated; d can vary from 1 to 45 and to be run from 1 up to AI_l
MCF_l	Annual methane conversion factor for the project manure storage device l from Table 10.17, Chapter 10, Volume 4

Farm 1		**Market swine**	**Breeding swine**	**Cattle**	**Dairy Cattle**	**chicken**	**Other breeding animal**
Sum		**XXXX**					
MCF_l	-	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$B_{0,LT}$	m^3 CH_4/kg dm	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX

AI_l	days	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$VS_{LT,y}$	kg dm/animal/year	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$MS\%_{Bl,j}$	-	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$PE_{storage,y}$	tCO_2e	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Sum	**tCO_2e**	**XXXX**					
Farm 2		**Market swine**	**Breeding swine**	**Cattle**	**Dairy Cattle**	**chicken**	**Other breeding animal**
MCF_j	-	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$B_{0,LT}$	m^3 CH_4/kg dm	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$N_{LT,y}$	days	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$VS_{LT,y}$	kg dm/animal/year	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$MS\%_{Bl,j}$	-	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$PE_{storage,y}$	tCO_2e	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Sum	**tCO_2e**	**XXXX**					
…		**Market swine**	**Breeding swine**	**Cattle**	**Dairy Cattle**	**chicken**	**Other breeding animal**
MCF_j	-	…	…	…	…	…	…
$B_{0,LT}$	m^3 CH_4/kg dm	…	…	…	…	…	…
$N_{LT,y}$	days	…	…	…	…	…	…
$VS_{LT,y}$	kg dm/animal/year	…	…	…	…	…	…
$MS\%_{Bl,j}$	-	…	…	…	…	…	…
$PE_{storage,y}$	tCO_2e	…	…	…	…	…	…
Sum	**tCO_2e**	**…**					
Farm N		**Market swine**	**Breeding swine**	**Cattle**	**Dairy Cattle**	**chicken**	**Other breeding animal**
MCF_j	-	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$B_{0,LT}$	m^3 CH_4/kg dm	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$N_{LT,y}$	days	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$VS_{LT,y}$	kg dm/animal/year	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
$MS\%_{Bl,j}$	-	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX

$PE_{storage,y}$	tCO_2e	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Sum	**tCO_2e**	**XXXX**					

Calculation of PE_y

$$PE_y = PE_{PL,y} + PE_{flare,y} + PE_{power,y} + PE_{transp,y} + PE_{storage,y} \qquad (15)$$

Where:

PE_y	Project emissions in year *y* (tCO_2e)
$PE_{PL,y}$	Emissions due to physical leakage of biogas in year *y* (tCO_2e)
$PE_{flare,y}$	Emissions from flaring or combustion of the biogas stream in the year *y* (tCO_2e)
$PE_{power,y}$	Emissions from the use of fossil fuel or electricity for the operation of the installed facilities in the year *y* (tCO_2e)
$PE_{transp,y}$	Emissions from incremental transportation in the year *y* (tCO_2e), as per relevant paragraph in AMS-III.F
$PE_{storage,y}$	Emissions from the storage of manure (tCO_2e)

Farm No	$PE_{PL,y}$	$PE_{flare,,y}$	$PE_{Power,y}$	$PE_{transp,y}$	$PE_{storage,y}$	PE_y
	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e
Sum	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Farm 1	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Farm 2	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
…	…	…	…	…	…	…
Farm N	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX

Ⅲ. Calculate Leakage emissions

No energy generating equipment is transferred from outside the boundary to the PoA. In addition, the collection/processing/transportation of animal manure is inside the project boundary. As per the methodologies applied in the CPA, leakage can be neglected.

Ⅳ. Calculate Emission Reductions

Emission reductions achieved by the CPA during a given year can be estimated ex-ante as below:

$$ER_y = BE_y - PE_y \qquad (16)$$

Where:

ER_y Emission reductions in year y (tCO_2e)

Farm No	BE_y	PE_y	ER_y
	tCO_2e	tCO_2e	tCO_2e
Sum	XXXX	XXXX	XXXX
Farm 1	XXXX	XXXX	XXXX
Farm 2	XXXX	XXXX	XXXX
…	…	…	…
Farm N	XXXX	XXXX	XXXX

According to AMS-III.D, the emission reductions achieved by avoiding methane emissions will be determined *ex post* through direct measurement of the amount of methane fuelled, flared or gainfully used. It is likely that the project activity involves manure treatment steps with higher methane conversion factors (*MCF*) than the *MCF* for the manure treatment systems used in the baseline situation, therefore the emission reductions achieved by the project activity is limited to the *ex post* calculated baseline emissions minus project emissions using the actual monitored data for the project activity ($N_{LT,y}$, $MS\%_{i,y}$, $MS\%_{l}$, AI_l, and in case adjusted values for animal weight are used as defined in paragraph 10 (c): $VS_{LT,y}$). The emission reductions achieved in any year are the lowest value of the following:

$$ER_{y,ex\,post} = \min[(BE_{y,ex\,post} - PE_{y,ex\,post}),(MD_y - PE_{power,y,ex\,post})] \qquad (17)$$

Where:

$ER_{y,ex\,post}$ Emission reductions achieved by the project activity based on monitored values for year y (tCO_2e)

$BE_{y,ex\,post}$ Baseline emissions calculated using equation 1 of AMS-III.D (for projects using option in paragraph 9 (a)) using *ex post* monitored values of $N_{LT,y}$ and if applicable $VS_{LT,y}$. For projects using option in paragraph 9 (b), the *ex post* monitored values for $Q_{manure,j,LT,y}$ and $SVS_{j,LT,y}$ are used

$PE_{y,ex\,post}$ Project emissions calculated using equation 5 of AMS-III.D using *ex post* monitored values of $N_{LT,y}$, $MS\%_{i,y}$, $MS\%_{l}$, AI_l, $Q_{res\,waste,y}$ and if applicable $VS_{LT,y}$

MD_y Methane captured and used gainfully by the project activity in year y (tCO_2e)

$PE_{power,y,ex\,post}$ Emissions from the use of fossil fuel or electricity for the operation of the installed facilities based on monitored values in the year y (tCO_2e)

MD_y will be determined as below:

$$MD_y = BG_{burnt,y} * w_{CH4,y} * D_{CH4} * FE * GWP_{CH4} \quad (18)$$

Where:

$BG_{burnt,y}$	The amount of biogas utilized in year *y* (m^3)
$w_{CH4,y}$	Methane content in biogas in the year *y* (volume fraction)
FE	Combustion efficiency of biogas utilized for energy generation in year (fraction)

At room temperature (20 ºC) and 1 atm pressure i.e. normal condition, CH_4 density is 0.00067 t/m^3. For ex-post calculation, if the measured volume of biogas is not in normalized cubic meters, this parameter will be corrected by using actual temperature and pressure of biogas based on state equation of ideal gas, as below:

$$D_{CH4} = 0.00067 \times \frac{293 \times P}{1 \times (273 + T)} \quad (19)$$

Where:

T	Temperature of the biogas at the flow measurement site; (ºC)
P	Pressure of the biogas at the flow measurement site; (atm)
0.00067	CH_4 density at room temperature and 1 atm pressure; (t/m^3)
293	Thermodynamic temperature corresponding to normal condition; (K)
273	The parameter for unit conversion from celsius temperature to thermodynamic temperature; (K)
1	Pressure corresponding to normal condition; (atm)

Therefore, emission reductions achieved by a SSC-CPA during a given year can be calculated ex-post as below:

$$ER_{y,ex\,post} = \min[(BE_{y,ex\,post} - PE_{y,ex\,post}),(MD_y + BE_{\text{Energy},y,ex\,post} - PE_{power,y,ex\,post})] \quad (20)$$

Where:

$ER_{y,ex\,post}$	Emission reductions achieved by the CPA based on monitored values for year *y* (tCO_2e)
$BE_{y,ex\,post}$	Baseline emissions calculated using *ex post* monitored values in year y (tCO_2e)
$PE_{y,ex\,post}$	Project emissions calculated using *ex-post* monitored values in year y (tCO_2e)
MD_y	Methane captured and used gainfully by the CPA in year *y* (tCO_2e)

$BE_{\text{Energy},y,ex\,post}$	Baseline emissions from energy generation using *ex post* monitored values in year y (tCO_2e)
$PE_{power,y,ex\,post}$	Emissions from the use of fossil fuel or electricity for the operation of the CPA based on monitored values in the year *y* (tCO_2e)

The parameter of $BE_{\text{Energy},y,ex\,post}$ will be calculated as below:

$$\begin{cases} BE_{Energy,y,ex\,post} = BE_{\text{Theraml},y,ex\,post} & \text{Only applicable under Scenario I} \\ BE_{Energy,y,ex\,post} = BE_{\text{Ele},y,ex\,post} & \text{Only applicable under Scenario II} \\ BE_{Energy,y,ex\,post} = BE_{\text{Theraml},y,ex\,post} + BE_{\text{Ele},y,ex\,post} & \text{Only applicable under Scenario III} \end{cases} \quad (21)$$

Where:

$BE_{\text{Theraml},y,ex\,post}$	Baseline emissions from thermal generation using the *ex post* monitored values in year y (tCO_2e)
$BE_{\text{Ele},y,ex\,post}$	Baseline emissions from electricity generation using the *ex post* monitored values in year y (tCO_2e)

B.5.3. Summary of the ex-ante estimation of emission reductions:

>>

Year	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of baseline emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of overall emission reductions (tonnes of CO_2e)
XX/XX/XXXX~XX/XX/XXXX	XXXX	XXXX	0	XXXX
XX/XX/XXXX~XX/XX/XXXX	XXXX	XXXX	0	XXXX
XX/XX/XXXX~XX/XX/XXXX	XXXX	XXXX	0	XXXX
XX/XX/XXXX~XX/XX/XXXX	XXXX	XXXX	0	XXXX
XX/XX/XXXX~XX/XX/XXXX	XXXX	XXXX	0	XXXX
XX/XX/XXXX~XX/XX/XXXX	XXXX	XXXX	0	XXXX
XX/XX/XXXX~XX/XX/XXXX	XXXX	XXXX	0	XXXX
Total (tonnes of CO_2 e)	**XXXX**	**XXXX**	**0**	**XXXX**

B.6. Application of the monitoring methodology and description of the monitoring plan:

B.6.1. Description of the monitoring plan:

>>

Monitoring Parameter

The monitoring parameters have been listed in the tables below.

Data / Parameter:	W_{site}
Data unit:	kg
Description:	Average animal weight of a defined livestock population at the CPA site
Source of data to be used:	Farm Owners
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Please see B.5.2 for details
Description of measurement methods and procedures to be applied:	Farm owners will measure weight of livestock alive with mass scale and calculate the average in a project year.
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	nd_y
Data unit:	day
Description:	Number of days in year “y” where the treatment plant was operational.
Source of data to be used:	Assumed 365 days in the CPA, actual data is from the measurement.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	365
Description of measurement methods and procedures to be applied:	The data is obtained from the operation records of the treatment plant.
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	$N_{da,y}$
Data unit:	-
Description:	Number of days animal is alive in the farm in the year *y*
Source of data to be used:	The data used in the CPA comes from the farm owners, the actual data should be monitored monthly.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Please see B.5.2 for details
Description of measurement methods and procedures to be applied:	Record feed days
QA/QC procedures to be applied:	The consistency between the value and indirect information (records of sales, records of food purchases) should be assessed.
Any comment:	-

Data / Parameter:	$N_{p,y}$
Data unit:	-
Description:	Number of animals produced annually of type *LT* for the year *y*
Source of data to be used:	The data used in the CPA comes from the farm owners, the actual data should be monitored monthly.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Please see B.5.2 for details
Description of measurement methods and procedures to be applied:	Annually, based on monthly records.
QA/QC procedures to be applied:	The consistency between the value and indirect information (records of sales, records of food purchases) should be assessed.
Any comment:	-

Data / Parameter:	$MS\%_{PJ,j}$
Data unit:	%
Description:	Fraction of manure handled in CPA animal manure management system “j”
Source of data to be used:	The farm owners, all manure handled in CPA animal manure management.
Value of data applied for the purpose of calculating expected	100

emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Monitored annually. Archive electronically during project plus 5 years.
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	$EG_{PJ,y}$
Data unit:	TJ/yr
Description:	The net quantity of thermal energy supplied by a CPA during the year y
Source of data to be used:	FSR
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Please see B.5.2 for details
Description of measurement methods and procedures to be applied:	The temperature, pressure and flow of steam provided by the CPA, will be measured by thermograph， flow-meter and manometer. Then the enthalpy of the steam will be determined. The net thermal energy generated by the Project will be available by the enthalpy of the steam deducting the known enthalpy of the inlet water.
QA/QC procedures to be applied:	The three meters will undergo maintenance/calibration subject to appropriate industry standards.
Any comment:	This parameter will be measured only in the case of **Scenario I** or **III**

Data / Parameter:	$B_{biomass-1,PJ,y}$
Data unit:	m^3
Description:	The net quantity of the biogas consumed by households in year *y*
Source of data to be used:	FSR
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Please see B.5.2 for details
Description of measurement methods and procedures to be applied:	Measured continuously by one flow meters installed at the outlet of gas line network. Meters installed in households will be used for cross-check. Reported cumulatively on weekly basis. Archive electronically during project plus 2 years.
QA/QC procedures to be applied:	Flow meters will undergo maintenance/calibration subject to appropriate industry standards.

Any comment:	This parameter will be measured only in the case of **Scenario I** or **III**

Data / Parameter:	$B_{biomass-2,PJ,y}$
Data unit:	m^3
Description:	The net quantity of the biogas supplied to boilers in year *y*
Source of data to be used:	FSR
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Please see B.5.2 for details
Description of measurement methods and procedures to be applied:	Measured continuously by one flow meters installed at the inlet of the boiler. Reported cumulatively on weekly basis. Archive electronically during project plus 2 years.
QA/QC procedures to be applied:	Flow meters will undergo maintenance/calibration subject to appropriate industry standards.
Any comment:	-

Data / Parameter:	$B_{biomass-3,PJ,y}$
Data unit:	m^3
Description:	The net quantity of the biogas supplied to power generator in year *y*
Source of data to be used:	FSR
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Please see B.5.2 for details
Description of measurement methods and procedures to be applied:	Measured continuously by one flow meters installed at the inlet of the generator. Reported cumulatively on weekly basis. Archive electronically during project plus 2 years.
QA/QC procedures to be applied:	Flow meters will undergo maintenance/calibration subject to appropriate industry standards.
Any comment:	-

Data / Parameter:	$FV_{RG,h}$
Data unit:	m^3/h
Description:	Volumetric flow rate of biogas in dry basis at normal conditions in hour h;(m^3/h)
Source of data to be used:	-
Value of data applied for the purpose of	NA

calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Measured continuously by one flow meter installed at the inlet of flaring system.
QA/QC procedures to be applied:	Flow meters will undergo maintenance/calibration subject to appropriate industry standards.
Any comment:	Only applied for the CPAs in which the flaring is involved

Data / Parameter:	Q_y
Data unit:	ton
Description:	Quantity of manure transported
Source of data to be used:	FSR
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Please see individual CPA-DD
Description of measurement methods and procedures to be applied:	On-site data sheets recorded monthly using weigh bridge.
QA/QC procedures to be applied:	Weighbridge will be subject to periodic calibration (in accordance with stipulation of the weighbridge supplier), also cross check with sales of compost
Any comment:	Applicable only if project emissions on account of transportation shall be accounted for.

Data / Parameter:	$Q_{y,treatment}$
Data unit:	ton
Description:	Quantity of product transported
Source of data to be used:	FSR
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Please see individual CPA-DD
Description of measurement methods and procedures to be applied:	On-site data sheets recorded monthly using weigh bridge.

QA/QC procedures to be applied:	Weighbridge will be subject to periodic calibration (in accordance with stipulation of the weighbridge supplier), also cross check with sales of compost
Any comment:	Applicable only if project emissions on account of transportation shall be accounted for.

Data / Parameter:	CT_y
Data unit:	ton/truck
Description:	Average truck capacity for manure transportation
Source of data to be used:	FSR and the information provided by the farm owner
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Please see individual CPA-DD
Description of measurement methods and procedures to be applied:	On site measurement
QA/QC procedures to be applied:	-
Any comment:	Applicable only if project emissions on account of transportation shall be accounted for.

Data / Parameter:	$CT_{y,treatment}$
Data unit:	ton/truck
Description:	Average truck capacity for product transportation
Source of data to be used:	FSR and the information provided by the farm owner
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Please see individual CPA-DD
Description of measurement methods and procedures to be applied:	On site measurement
QA/QC procedures to be applied:	-
Any comment:	Applicable only if project emissions on account of transportation shall be accounted for.

Data / Parameter:	DAF_w
Data unit:	km/truck

Description:	Average incremental distance for manure transportation
Source of data to be used:	FSR and the information provided by the farm owner
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Please see individual CPA-DD
Description of measurement methods and procedures to be applied:	Annually on site measurement, assumption to be approved by DOE
QA/QC procedures to be applied:	-
Any comment:	Applicable only if project emissions on account of transportation shall be accounted for.

Data / Parameter:	$DAF_{treatment}$
Data unit:	km/truck
Description:	Average incremental distance for product transportation
Source of data to be used:	FSR and the information provided by the farm owner
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Please see individual CPA-DD
Description of measurement methods and procedures to be applied:	Annually on site measurement, assumption to be approved by DOE
QA/QC procedures to be applied:	-
Any comment:	Applicable only if project emissions on account of transportation shall be accounted for.

Data / Parameter:	T
Data unit:	℃
Description:	Temperature of the biogas at the flow measurement site
Source of data to be used:	measured
Value of data applied for the purpose of calculating expected emission reductions in	NA

section B.5	
Description of measurement methods and procedures to be applied:	The temperature of the biogas will be recorded daily using thermometer and monthly averaged. Measured to determine the density of methane D_{CH4}.
QA/QC procedures to be applied:	Thermometer will undergo maintenance/calibration subject to appropriate industry standards.
Any comment:	No separate monitoring of temperature is necessary if using flow meters that automatically measure the temperature and pressure of biogas, and expressing biogas volumes in normalized cubic meters.

Data / Parameter:	***P***
Data unit:	Pa
Description:	Pressure of the biogas at the flow measurement site
Source of data to be used:	measured
Value of data applied for the purpose of calculating expected emission reductions in section B.5	NA
Description of measurement methods and procedures to be applied:	The pressure of the biogas will be recorded daily using manometer and monthly averaged. Measured to determine the density of methane D_{CH4}.
QA/QC procedures to be applied:	The manometer will undergo maintenance/calibration subject to appropriate industry standards.
Any comment:	No separate monitoring of pressure is necessary if using flow meters that automatically measure the temperature and pressure of biogas, and expressing biogas volumes in normalized cubic meters.

Data / Parameter:	$EG_{BL,y}$
Data unit:	MWh/yr
Description:	Quantity of electricity supplied to and/or displaced from the grid as a result of the implementation of the CDM project activity in year *y*
Source of data to be used:	The data comes from FSR, the actual data should be measured with electricity meter.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Please see individual CPA-DD
Description of measurement methods and procedures to be	Electricity meters should be installed to measure the quantity of the electricity consumed by a typical SSC-CPA in year y.

applied:	
QA/QC procedures to be applied:	Electricity meters will undergo maintenance/calibration subject to appropriate industry standards. Uncertainty of the meters to be obtained from the manufacturers.
Any comment:	-

Data / Parameter:	$EC_{PJ,y}$
Data unit:	MWh/yr
Description:	Quantity of net electricity consumed by a typical SSC-CPA in year *y*
Source of data to be used:	The data comes from FSR, the actual data should be measured with electricity meter.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Please see individual CPA-DD
Description of measurement methods and procedures to be applied:	Electricity meters should be installed to measure the quantity of the electricity consumed by a typical SSC-CPA in year y.
QA/QC procedures to be applied:	Electricity meters will undergo maintenance/calibration subject to appropriate industry standards. Uncertainty of the meters to be obtained from the manufacturers.
Any comment:	-

Data / Parameter:	$MS\%_{l}$
Data unit:	-
Description:	Fraction of volatile solids (%) handled by storage device *l*
Source of data to be used:	FSR
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Please see individual CPA-DD
Description of measurement methods and procedures to be applied:	Monitored annually. Archive electronically during project plus 2 years.
QA/QC procedures to be applied:	-
Any comment:	Applicable only if project emissions on account of storage of manure before being fed into the anaerobic digester shall be accounted for.

Data / Parameter:	T_i
Data unit:	℃
Description:	Annual Average ambient temperature at weather station nearby project site.
Source of data to be used:	weather station nearby project site
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Please see individual CPA-DD
Description of measurement methods and procedures to be applied:	Monitoring frequency will be monthly. Archive electronically during the crediting period plus 2 years.
QA/QC procedures to be applied:	-
Any comment:	Used to select the annual MCF from 2006 IPCC Guidelines

Data / Parameter:	AI_l
Data unit:	days
Description:	Annual average interval between manure collection and delivery for treatment at a given storage device *l*
Source of data to be used:	FSR
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Please see individual CPA-DD
Description of measurement methods and procedures to be applied:	Monitored by daily operation record.
QA/QC procedures to be applied:	-
Any comment:	Applicable only if project emissions on account of storage of manure before being fed into the anaerobic digester shall be accounted for.

Data / Parameter:	**On-site inspections**
Data unit:	**-**
Description:	On-site inspections for each individual farm included in the project boundary where the project activity is implemented for each verification period.
Source of data to be used:	Measured
Value of data applied	-

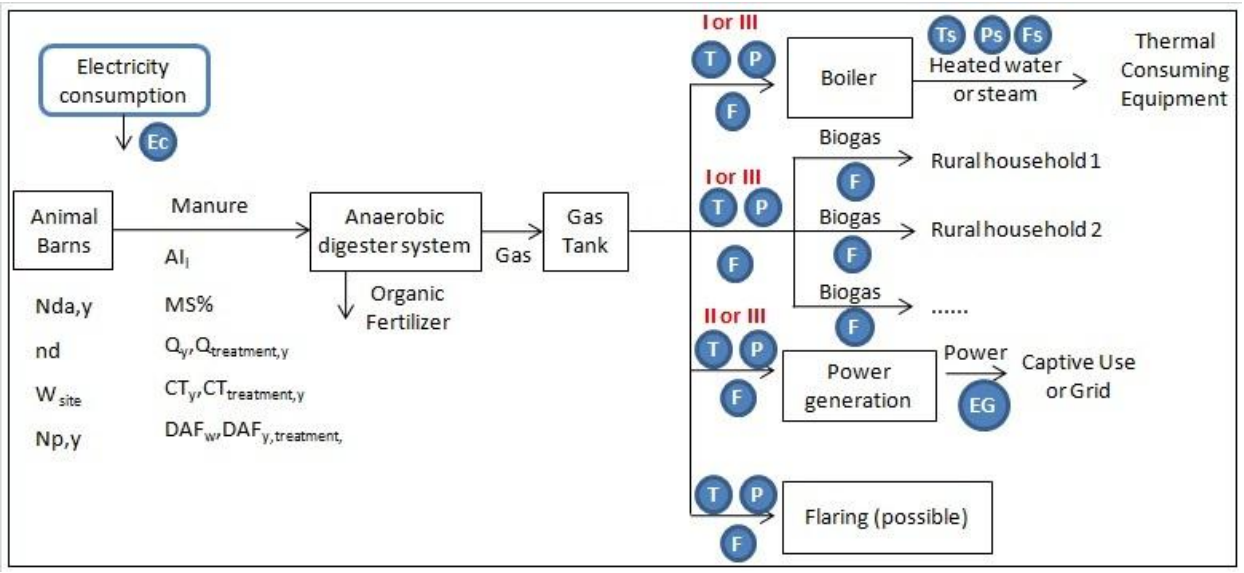
for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	On-site inspections for each individual farm included in the project boundary will be conducted by the person in charge of CPA.
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	**-**
Data unit:	Continuous operation of the household biogas stoves
Description:	FSR, and the actual information should be assessed
Source of data to be used:	Please see individual CPA-DD
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Annual check of all appliances or a representative sample thereof to ensure that they are still operating or are replaced by an equivalent in service appliance.
Description of measurement methods and procedures to be applied:	-
QA/QC procedures to be applied:	Continuous operation of the household biogas stoves
Any comment:	-

Data / Parameter:	**Soil application**
Data unit:	-
Description:	The proper soil application (not resulting in methane emissions) of the residual waste
Source of data to be used:	-
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	Monitor the soil application when the final sludge be used and clarify the soil application is proper.

QA/QC procedures to be applied:	-
Any comment:	Where applicable, the proper soil application (not resulting in methane emissions) of the residual waste shall be monitored.

Installation of Monitoring Meters



Note: "I or III" means this branch in the technology flow will only appear in the case of **Scenario I** or **III;**

"II or III" means this branch in the technology flow will only appear in the case of **Scenario II** or **III;**

Figure 4 Installation of monitoring meters

In order to implement the monitoring plan effectively, the specific person in charge of the Programme is designated by CME to make sure the implementation of monitoring plan and keep in touch with EB, DNA and other relevant parties. The monitoring structure is clearly shown in the following figure.

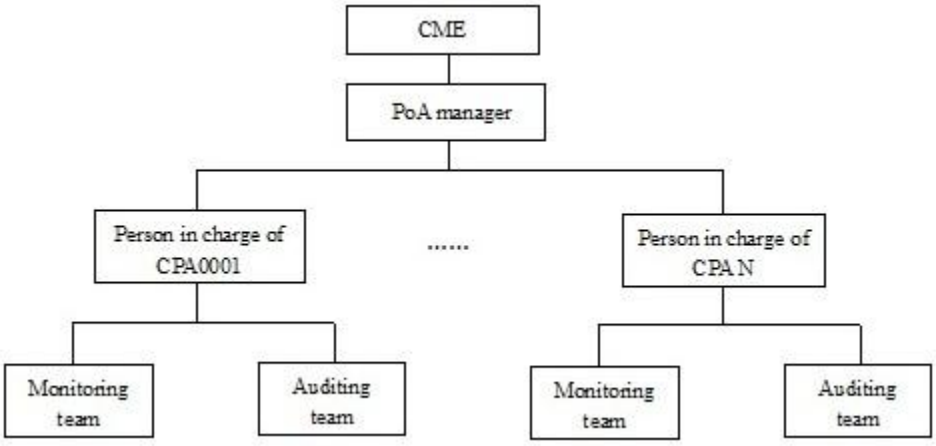


Figure 5 Monitoring Structure

Position	Responsibility description
PoA manager	PoA manager is designated by CME and is in full charge of monitoring and other issues related to PoA, in particular: (1) Track the development of PoA; keep communication with EB, DNA and related agencies; (2) Establish the monitoring plan and training plan. (3)Collect the data, and supervise implementation of the PoA.
Person in charge of CPA	Take in charge of all monitoring matters related to this CPA, including monitoring team and auditing team management, and training implementation for monitoring team and auditing team.
Monitoring team	Take in charge of monitoring implementation and the data collection according to the Monitoring Manual.
Auditing team	Audit the work regarding monitoring and conduct the QC/QA procedures as per the Monitoring Manual.

All data will be bottom-up collected and reported as shown in monitoring structure and finally reported to CME.

Data Collection and Management

Monitoring team will implement monitoring and collect the monitoring data according to the Monitoring Manual. All data will be bottom-up collected as per the monitoring structure and the regular summary should be made and reported to CME periodically. All data will be transmitted to the monitoring computer managed by CME. All the data after internal validation should be saved up to 2 years after the end of the crediting period.

Measuring instrument fault/emergency treatment procedures

Once a meter is in fault, it shall be replaced immediately with another calibrated meter by a professional engineer. During the period of erroneous measurement and replacement of the fault meter, a conservative method that can cause a lower CER value will be used.

QA/QC

In order to maintain high precision for meters, the calibration should be implemented according to state and/or sector standards and rules and certificated after calibration.

The meters should be calibrated periodically. Within 10 days on the date of:

(1) The error of duty meters occurs and checking meters oversteps the permissible range;

(2) Repairs due to meters failure.

Training

Before the formal operation of each activity, the person in charge of the CPA will organize the relevant personnel to participate the CDM training.

Verification

The verification of emission reduction is carried out based on CME's requirements. The CME should provide DOE documents and evidence related to monitoring.

C.1. Please indicate the level at which environmental analysis as per requirements of the CDM modalities and procedures is undertaken. Justify the choice of level at which the environmental analysis is undertaken:

EIA is conducted at CPA level.
Environmental Analysis is conducted based on each specific project. Thus, the Environmental Analysis is done at CPA level.

C.2. Documentation on the analysis of the environmental impacts, including transboundary impacts:

>>

Each activity included in the CPA has conducted environmental impact analysis. The information related to the EIA preparation and approval is listed in the following table.

Farm No	The date of completion of EIA	The date of approval of EIA	Documentation No. of approval of EIA	Agency for approval of EIA
Farm 1	XXXX	XXXX	XXXX	XXXX
Farm 2	XXXX	XXXX	XXXX	XXXX
…	…	…	…	…
Farm N	XXXX	XXXX	XXXX	XXXX

According to EIAs and its approval, the environment impacts possibly caused by the project potentially included in the CPAs, and the corresponding measures may be adopted by the project owner are analyzed as followings:

1) Air pollution

The main impact brought by the construction of the projects under the CPA to the surrounding atmosphere is the dust generated during materials transportation, loading and unloading as well as mixing. The project owner tales certain measures to reduce the dust, maybe including: sprinkling water on the road, construction pause, covering the materials with canvas in windy weather and so forth. Moreover, the total quantity of air pollutants is small, and the pollution is intermittent and transient, therefore no significant effluence will be brought to the air. During operation period, main air pollutants are malodorous gases, which come from manure and urine in the course of storage and anaerobic fermentation. It will not cause serious impact on environment either due to the small quantity.

2) Noise

During construction period, noise is mainly generated due to machine operations and transportation vehicles. To reduce its impact on surrounding environment, the measures adopted by the construction unit may include: Arranging construction time reasonably, employing equipment with low noise and so on. What is more, the negative impacts will disappear along with the end of the construction period. During operating period, noise that is mainly caused by pumps, exhaust fan, mixer and dryer, is able to meet II level standard of "*Industrial Enterprise Boundary Noise Standard*"(GB12348-93). So the impact on environment resulted from noise is also slender.

3) Waste water

Wastewater generated during the construction period of the project comes from production and living usage. Production wastewater is only a small quantity and will be used for watering the construction site; wastewater from living usage will be treated in anaerobic lagoon and used for surrounding grassland irrigation, getting ecological benefits. The sewage generated during the operation period will be sent into the effluent lagoon and used for greening around the farm, which hence does not influence the natural water system.

4) Solid waste

During construction period of the project, solid waste mainly consists of residential garbage of the workers and the disposed soil and stones from construction. Residential garbage will be used for agricultural fertilization after being properly treated. Solid waste will be collected and sent to the nearby waste disposal station. During operation period, solid waste is mainly composed of biogas residue, dinas and residential garbage of the workers. Biogas residual will be provided to the local farmers for free and be used as organic fertilizer for agricultural land, the residential garbage and dinas will be sent to waste disposal station. Therefore, there is little environmental impact caused by solid waste.

5) Ecological environment

The project is to manage animal manure treatment and biogas recovery system, which is environmental-friendly and favorable to ecological sustainable development in local area; at the same time, it can avoid direct emission of CH_4 into atmosphere by displacing the uncovered anaerobic lagoon. In addition, utilizing animal manure and the recovered biogas, the project can develop renewable energy with zero emission, alleviating the reliance on fossil fuel in traditional energy provision. It also reduces the emissions of air pollutants such as SO_2, and NO_x, improves air quality, and reduces GHG emissions of CO_2. The use of waste residue and effluent as organic fertilizers can improve soil quality and fertility, and thus sustainable development in agricultural sector will be achieved. The project will benefit local ecological environment.

In summary, the project will not bring significant impacts on the environment, and the negative aspects will be controlled to the lowest level after taking the protection measures mentioned above. On the other hand, the project can benefit local environment through effective manure treatment and utilization of biogas.

Therefore, there is no significant negative environment impact of the CPA.

C.3. Please state whether an environmental impact assessment is required for a typical CPA, included in the programme of activities (PoA), in accordance with the host Party laws/regulations:

>>

EIA of each activity included in the CPA is conducted as per national environmental law. Therefore, the CPA is in accordance with the national laws/regulations.

SECTION D. Stakeholders' comments

>>

D.1. Please indicate the level at which local stakeholder comments are invited. Justify the choice:

>>

The stakeholder consultation of the activities is conducted at the PoA level.
Considering the CPAs under the PoA are similar, the local stakeholder consultation is done at PoA level.

D.2. Brief description how comments by local stakeholders have been invited and compiled:

>>

Not applicable

D.3. Summary of the comments received:

>>

Not applicable

D.4. Report on how due account was taken of any comments received:

>>

Not applicable

Annex 1

CONTACT INFORMATION ON ENTITY/INDIVIDUAL RESPONSIBLE FOR THE SMALL-SCALE CPA

Organization:	Zhongruihe International New Energy Science and Technology (Beijing) Co. Ltd.
Street/P.O.Box:	1-153 Room, Shuanghuiyuanjia No.5, Chaoyang District, Beijing City, Beijing City
Building:	Building shuanghuiyuanjia No.5
City:	Beijing City
State/Region:	Beijing City
Postfix/ZIP:	100001
Country:	People's Republic of China
Telephone:	+86-10-65589992
FAX:	-
E-Mail:	zrhrqj966@126.com
URL:	-
Represented by:	Qijie RONG
Title:	Manager
Salutation:	Mr
Last Name:	RONG
Middle Name:	-
First Name:	Qijie
Department:	Department of Investment and Development
Mobile:	+86-13801120910
Direct FAX:	-
Direct tel:	+86-10-65589992
Personal E-Mail:	zrhrqj966@126.com

Organization:	A&T Carbon Asset Co., Limited
Street/P.O.Box:	Cedar House Breckland, Linford Wood, Milton Keynes, Buckinghamshire, United Kingdom, MK146EX
Building:	-
City:	Milton Keynes
State/Region:	Buckinghamshire
Postfix/ZIP:	MK146EX
Country:	United Kingdom of Great Britain and Northern Ireland
Telephone:	+44-1908-577-451
FAX:	+44-1908-577-451
E-Mail:	projects@atholdings.com
URL:	www.atholdings.com
Represented by:	Wang, Xia
Title:	Chinese business director
Salutation:	
Last Name:	Wang
Middle Name:	
First Name:	Xia
Department:	
Mobile:	+8613911538197
Direct FAX:	+86-010-65833191
Direct tel:	+86-010-65830366 (ext.818)
Personal E-Mail:	Xia.wang@atholdings.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No additional information

Annex 3

BASELINE INFORMATION

No additional information

Annex 4

MONITORING INFORMATION

No additional information