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

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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: HuaQi Livestock Farms Methane Engineering Programme of Activities— CPA-[XXX]

Version: 02
Date: 11/10/2012
Revision History of the PDD:

Version Number	Date	Description and reason of revision
01	23/04/2012	Completed date for GSP version of generic CPA-DD
02	11/10/2012	Revised version based on DOE's Validation

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

>>

HuaQi Livestock Farms Methane Engineering Programme of Activities (hereinafter referred to as the PoA) aims at installing animal manure treatment systems with biogas recovery system to avoid methane emission and then utilizing the generated biogas as fuel to reduce the CO_2 emission by replacement of fossil fuel used for energy generation. The PoA is implemented through an unlimited number of small-scale CDM programme activities (hereinafter refer to the CPA), and each CPA include at least one livestock farm.

HuaQi Environmental Clean Technologies Co., Ltd. (hereinafter referred to as HECT), name of the coordinating/management entity (hereinafter referred to as the CME), is responsible for coordinating and managing the PoA and CPAs under the PoA. At Present, there is no mandatory law to enforce animal breeding entities to install animal manure treatment system with recovery of biogas and also no law to forbid fossil fuel-based energy in China. Therefore, the CME confirms that the proposed PoA is an absolutely voluntary action.

CPA-[XXX] (hereinafter referred to as the CPA) is one of the SSC-CPA under the PoA. [XXX] livestock farms, i.e. LF-[XXX]01, LF-[XXX]02, …, LF-[XXX] are included in the CPA. The project activity of CPA-[XXX] is aim to install animal treatment system with recovery of biogas for heat and/or electricity generation, which is consistent with the Scenario[XXX] described in Section A.2 of PoA-DD, i.e. [XXX]. The detailed information of CPA-[XXX] can be shown in Table A-1 as follows:

Table A-1 Detailed livestock farm information included in CPA-[XXX]

No. of livestock farm	Name of livestock farm	Farm owner	The annual average number of (heads) / The type of livestock	Expected biogas production (m^3/yr)	Biogas utilization pattern
LF-[XXX]01					
LF-[XXX]02					
...					
LF-[XXX]					

In the absence of the CPA, the animal manure removed from the livestock farm would be left to decay anaerobically in open anaerobic lagoons, the biogas generated was discharged into the atmosphere directly, equivalent thermal energy would be provided based on the fossil fuel, and/or the equivalent electricity generated by the biogas would be provided by the fossil fuel power plants connected to[XXX]) . This is also the same as 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 emitted 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.

The key technical indicators of the equipments used in the project activity are listed in Table A-2.

Table A-2 Key technical indicators of the anaerobic manure treatment systems

Livestock Farm No.	Livestock Farm Name	Technical information	Unit	Total Value
LF-[XXX]01				
LF-[XXX]02				
...				
LF-[XXX]				

[Technical introduction, equipment description and treatment flow will be insert herein and the following Figure A-1.]

[XXX]

Figure A-1 the treatment flow of the CPA

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

Social and Economic benefits:

- The CPA will create employment opportunities from the construction and operation of the CPA and for other related industries, such as manufacture industry of flow meters;
- Improving the air of livelihood will avoid respiratory diseases and cancer for women and children; also avoiding epidemic disease spread from animal to people because of innocuous treatment of dung.
- Promoting the development of animal raising industry, and furthermore increasing the tax revenues.

Environmental benefits:

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

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

>>

CME: HuaQi Environmental Clean Technologies Co., Ltd.

CPA-[XXX] implementer: [XXX]

The detailed information please refers to Annex 1 of specific CPA-DD.

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):

>>

The livestock farm(s) is (are) located in [XXX] Province, P.R. China. The table and map below is to identify the farm/farms involved in the corresponding CPA. The geographical references of the livestock farms under the CPA are listed in table A-3 and marked in the corresponding locations of the map.

Table A-3 Geographical reference of the farms involved in CPA-[XXX]

Livestock Farm No.	City/County	Town	Geographic reference	
			Latitude	Longitude
LF-[XXX]01				
LF-[XXX]02				
...				
LF-[XXX]				

The site of the CPA-[XXX] is shown in the Figure A-2.

[Insert the site Map of the CPA]

Figure A-2 Locations of the CPA-[XXX]

So CPA-[XXX] can be uniquely identified by the geographical reference of the livestock farm site(s).

A.4.2. Duration of the small-scale CPA

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

>>

According to thedefinition of Glossary of the CDM terms (Ver. 06.0.0),, "In the context of a CDM project activity, the earliest date at which either the implementation or construction or real action of a CDM project activity begins", which is not prior to the date of the PoA GSP (28/04/2012) either. Detailed information related to CDM project activities is listed in the following table:

Livestock farm No.	Starting Date	Evidence
LF-[XXX]01		
LF-[XXX]02		
…		
LF-[XXX]		

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

>>

Livestock farm No.	Operational lifetime(years)
LF-[XXX]01	
LF-[XXX]02	
…	
LF-[XXX]	

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

>>
Renewable crediting period

A.4.3.1. Starting date of the crediting period:

>>
[XXX] or the date of inclusion of the CPA into the PoA, whichever is later.

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

>>
7 years 0 months (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 first crediting period (7 years) is adopted and the estimation of the emission reduction in the first crediting period is presented in the table bellow:

Year	Annual estimated emission reductions in tonnes of CO_2e
[XXX]	[XXX]
[XXX]	[XXX]
[XXX]	[XXX]
[XXX]	[XXX]
[XXX]	[XXX]
[XXX]	[XXX]
[XXX]	[XXX]
Total estimated reductions (tonnes of CO_2e)	[XXX]
Total number of crediting years	**7**
Annual average of estimated reductions over the crediting period (tonnes of CO_2e)	[XXX]

A.4.5. Public funding of the CPA:

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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 debundled component

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The CME does not manage a large scale PoA in the same sectoral scope. In addition, there is no any activity[3] within the same sectoral scope, whose boundary is within 1km of the boundary of the proposed small-scale CPA. Besides this, confirmation letters from CPA implementer(s) and CME will be provided to confirm that each CPA is not a debundled component of a large scale activity. Therefore, it is considered that the CPA is not a debundled component of another CDM programme activity (CPA) or CDM project activity.

A.4.7. Confirmation that small-scale CPA is neither registered as an individual CDM project activity nor is part of another Registered PoA:

>>

Confirmation Letters from CPA implementer(s) and CME dated [XXX] will be provided to confirm that 1) The CPA has not been registered as an individual CDM project activity and 2) The CPA is not part of another registered POA. Therefore, the CPA is neither registered as an individual CDM project activity nor is part of another registered PoA.

Furthermore, by using the geographical coordinates of each CPA provided in section A.4.1.2 and comparing it with the database of under-validation, requesting for registration and registered CDM project activities and PoAs from UNFCCC website, IGES database and CDM pipeline[4], it has been confirmed that the CPA is either registered as an individual CDM project activity nor is part of another registered PoA.

[3] 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

[4] IGES database please refer to: http://www.iges.or.jp/en/cdm/report.html

CDM pipeline please refer to: http://cd4cdm.org/CDMJIpipeline.htm

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:

>>
HuaQi Livestock Farms Methane Engineering Programme of Activities
Version: 02
Date: 11/10/2012

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

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The 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
1	A CPA should be located in the boundary of the PoA, i.e. within Hunan, Henan or Guangxi Province.	The livestock farms included in the CPA are located in[XXX], [XXX] respectively, which are within [XXX] Province.
2	(i) Measures should be taken to avoid double counting of emission reductions for the CPAs, like unique identifications of each CPA and livestock farm; (ii) The potential individual CPA implementer includes in the proposed PoA should sign a contract with the CME to confirm that: • They are aware of and have agreed that their activity is being subscribed to the PoA. • They have neither already been registered as a CDM project, nor as a CPA of another PoA.	(i) Each CPA and livestock farm have a unique identification as CPA-[XXX] for CPA level and LF-[XXX] for project level and a unique geographical co-ordinates; (ii) Cooperation contract between CME and the CPA implementer and/or confirmation letters from CME and the CPA implementer has been provided to confirm that: • They are aware of and have agreed that their activity is being subscribed to the PoA. • The projects have neither already been registered as a CDM project, nor as a CPA of another PoA.
3	All activities under a CPA are to install anaerobic manure management systems in livestock farms to achieve methane recovery, and the recovered biogas will be utilized for thermal and/or electricity energy generation.	The activity under CPA-[XXX] is to install anaerobic animal manure management systems to achieve methane recovery and utilization by biogas boiler as thermal generation and/or by generator as electricity generation for captive use and/or household.
4	The start date of the CPA is "the earliest date at which either the implementation or construction or real action of a project activity begins", and it cannot be prior to the commencement of validation (GSP date 28/04/2012) of the programme of activities.	[XXX] (dated [XXX]), will be provided to prove the start date of CPA-[XXX], which is after the PoA GSP date (28/04/2012).
5	The CPA shall meet all the applicability of the	CPA-[XXX] complies with the

	methodology AMS-III.D (Ver.18.0), and the combined methodologies AMS-I.C (Ver.19.0) and/or AMS-I.F (Ver.2.0).	applicability and other requirements of applied methodologies, AMS-III.D (Ver.18.0), and AMS-I.C (Ver.19.0) and/or AMS-I.F (Ver.2.0), details please refer to No. 14 to 22 bellow.
6	The additionality for each CPA can be demonstrated by any one of the following approaches: **Approach 1:** Demonstrating additionality according to "Guidelines for Demonstrating Additonality of Microscale Project Activities" (Version 04.0). In case of Approach 1, the projects included in the CPA should meet relevant requirements in "Guidelines for demonstrating additionality of microscale project activities", including: ● The total installed capacity for type I (both electrical units and thermal units) of the CPA is no more than $15MW_{ther}$[5]; ● The emission reductions from type III components of the CPA are no more than 20 $ktCO_2e$ per year; ● The geographic location of the project activity is in a special underdeveloped zone (SUZ) of the host country. OR **Approach 2:** Demonstrating addtionality according to "Guidelines on the demonstration of additionality of small-scale CDM project activities"(Version 09.0). In case of Approach 2, the additionality for each CPA can be demonstrated by any one of the following options: **Option 1**: The CPA can meet the following criteria in the positive list of technologies and project activity types: • The CPA as a whole meets the threshold criteria of a small scale CDM project activity; and • The CPA is solely composed of isolated unites where the users of the technology/measure are households or communities or Small and Medium enterprises (SMEs); and • The installed capacity of each isolated unit from type I component is no more than 2,250 kW_{ther} and the emission reductions of each isolated unit from type III	The CPA-XXX applied the approach 1 or approach 2 Option [XXX]for additionality demonstrating. [XXX] The full analysis will be demonstrated in the section **B.3** in detail.

[5] According to paragraph 8(b) of the guidelines for demonstrating additionality of microscale project activities, the definitions provided for output capacity and guidelines to SSC CDM methodologies (Version 17 or its update) shall be used. In the referenced paragraph, a conversion factor of 3 is used. Therefore, this conversion factor is consequently also applied to convert electrical capacity to the thermal capacity.

	component of each isolated unit is no more than 3,000tCO_2e per year. OR **Option 2:** The financial/economic indicator (such as IRR, NPV) of the projects without CER revenues included in the CPA should be worse than the selected benchmark，which is indicated in investment decision document (such as FSR).	
7	Local stakeholder consultations and the environmental impact analysis would be done at the CPA level.	Local stakeholder consultations and environmental impact analysis have been done at CPA level, please refer to section D and section C respectively of this document.
8	CPA should not result into any funding from Annex I parties and the diversion of official development assistance.	There is not any funding from Annex I parties and no diversion of official development assistance in CPA-[XXX].
9	The recovered biogas will be combusted by biogas boilers to generate heat/steam and/or combusted by generator to generate electricity for livestock farms captive use, and/or supplied to households by gas pipelines.	The recovered biogas under CPA-[XXX] is combusted by biogas boilers to generate heat/steam and/or combusted by generator to generate electricity for livestock farms captive use, and/or supplied to households by gas pipelines.
10	No sampling method is involved in the PoA.	No sampling method is involved in CPA-[XXX].
11	The emission reductions from type III components of the CPA should be less than or equal to 60ktCO_2/yr and the total installed energy generation capacity of type I components of the CPA should be up to 15MW_{ele} (or 45 MW_{ther}).	In the CPA, the emission reductions from type III component is [XXX] tCO_2e/yr, which is not more than 60ktCO_2e/yr, and the total installed energy generation capacity of the CPA equipment is [XXX] $MW_{ele/ther}$, which is less than 15MW_{ele} (or 45MW_{ther}), it can meet the thresholds of the small-scale project.
12	The CME and CPA implementers confirm that the proposed small-scale CPA is not a de-bundled component of a large scale activity[6]. The proposed small-scale CPA shall be deemed to be a de-bundled component of a large scale activity if there is already an activity, which satisfies both conditions (a) and (b) below: (a)Has the same activity implementer as the proposed small scale CPA or has coordinating or managing entity, which also manages a large scale PoA of the same technology measure, and; (b)The boundary is within 1 km of the boundary of the	According to check the database described in section A.4.4.1 (iii) of SSC-PoA-DD and the list of project activities under-validation, requesting registration or registered at the UNFCCC, the CME and CPA implementer confirm that the CPA is not a de-bundled component of a large scale activity, because the CME and the CPA implementer don't manage a large scale PoA of the same technology measure, whose boundary is within 1 km of the boundary of CPA-[XXX] at the

[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.

	proposed small-scale CPA, at the closest point.	closest point.
13	The crediting period of the CPA shall not exceed the length of the PoA (28 years) regardless of the time of inclusion of CPA in the PoA.	The first crediting period of the CPA is [XXX] years with starting date on [XXX] and end time on [XXX], which does not exceed the length of the PoA with starting date on 28/04/2012 and end time on 27/04/2040.
The CPA shall meet the applicability criteria of the methodology AMS-III.D(Version 18.0) as elaborated below:		
14	The project activity shall satisfy the following conditions:	
14.1	The animal population in the farms included in each CPA under the PoA should be managed under confined conditions;	The livestock population in the farm included in the CPA-[XXX] is managed under confined conditions;
14.2	Manure or the streams obtained after treatment are not discharged into natural water resources;	Manure/streams obtained after treatment of the CPA under the PoA are not discharged into natural water resources;
14.3	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 facility located is [XXX]°C, which is higher than 5°C;
14.4	In the baseline scenario the retention time of manure waste in the anaerobic treatment system is greater than one month, and in case of anaerobic lagoons in the baseline, their depths are at least 1 m;	In the baseline scenario of the CPA, the retention time of manure waste in the anaerobic treatment system is about [XXX]days, which is greater than one month; and the depth of the anaerobic lagoons are[XXX] m, which is more than 1m;
14.5	No methane recovery and destruction by flaring, combustion or gainful use takes place in the baseline scenario.	No methane recovery and destruction by flaring, combustion or gainful use takes place in the baseline scenario of the CPA.
15	The project activity satisfies the following conditions:	
15.1	The residual waste from the animal manure management system shall be handled aerobically;	The residual waste from the animal manure management system will be handled aerobically;
15.2	Technical measures will be used to ensure that all biogas produced by the digester is used or flared;	According to the FSR (or the equivalent document), all the biogas produced by the digester will be used for energy generation through biogas boilers/generator and/or stoves, or flared (if necessary), and the gas tank will temporarily store the biogas in case there is an emergency. So no biogas will be emitted in the CPA;
15.3	The storage time of the manure after removal from the animal barns, including transportation, should not exceed 45 days before being fed into the anaerobic digester. Or if the project proponent can demonstrate that the dry matter content of the manure when removed from the animal barns is larger than 20%, this time constraint will not apply.	The storage time of the manure after removal from the animal barns, including transportation, is [XXX] day, which does not exceed 45 days before being fed into the anaerobic digester.

16	Projects that recover methane from landfills shall use AMS-III.G "Landfill methane recovery" and projects for wastewater treatment shall use AMS-III.H. Project for composting of animal manure shall use AMS-III.F "Avoidance of methane emissions through composting". Project activities involving co-digestion of animal manure and other organic matters shall use the methodology AMS-III.AO "Methane recovery through controlled anaerobic digestion".	The CPA will introduce anaerobic manure treatments with biogas recovery to treat only animal manure, no landfills, composting and co-digestion are involved in the CPA. Therefore, it can be met to use AMS-III.D (Ver.18.0).
17	The recovered biogas from each CPA would be utilized by the animal farms as thermal and/or electrical energy generation, which can meet the option (a) as detailed in paragraph 3 of AMS-III.H.	The recovered biogas will be utilized for thermal and/or electrical energy generation directly, which can meet the option (a) of paragraph 3 in AMS-III.H.
18	New facilities (Greenfield Projects) and project activities involving capacity additions compared to the baseline scenario are only eligible if they comply with the related and relevant requirements in the "General Guidelines to SSC CDM methodologies".	The CPA does not involve a new facility, but replacing an existing open lagoon. Or If the CPA involve a new facilities or capacity additions compared to the baseline scenario, it can meet the relevant requirements in the "General Guidelines to SSC CDM methodologies".
19	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 equipment replacement involved in the CPA, it will be met the requirements described in the "General Guidelines to SSC CDM methodologies";
For the CPA, it will be also satisfying one of the followed three scenarios:		
20	Scenario I: The biogas produced by the project is used for supplying users with thermal energy that displaces fossil fuel use.	The project activity under the CPA belongs to scenario I will be also satisfying the applicability of Methodology AMS-I.C (Ver.19.0).
20.1	The CPA will utilize renewable biogas displacing fossil fuel to provide thermal energy;	The CPA will utilize biogas displacing fossil fuel to provide thermal and/or energy;
20.2	New facilities (Greenfield Projects) and project activities involving capacity additions compared to the baseline scenario are only eligible if they comply with the related and relevant requirements in the "General Guidelines to SSC CDM methodologies";	The CPA is to install a new biogas boiler to replace an existing coal fired boiler and the project is not a Greenfield project. Or If the CPA involve a new facilities or capacity additions compared to the baseline scenario, it can meet the relevant requirements in the "General Guidelines to SSC CDM methodologies".
20.3	If electricity and/or steam/heat produced by the CPA is delivered to a third party, i.e. another facility or facilities within the project boundary, a contract between the supplier and consumer(s) of the energy will have to be entered that ensures there is no double-counting of emission reductions.	If electricity and/or steam/heat produced by the CPA is delivered to a third part, a contract between the supplier and consumer(s) of the energy will be entered to ensure that there is no double-counting

		of emission reductions.
21	Scenario II: The biogas produced by the project is used for generating electricity for captive use that displaces electricity from national or a regional grid.	The CPA under scenario II will be also satisfying the applicability of Methodology AMS-I.F (Ver.2.0).
21.1	The project activity involved in the CPA is to use the renewable biogas for captive electricity use to displace electricity from regional grid CCPG or CSPG.	The project activity involved in the CPA is to use the renewable biogas for captive electricity use to displace electricity from regional grid [XXX].
21.2	Project activities or project activity components supplying electricity to a grid shall apply AMS-I.D. Project activities for standalone off-the-grid power systems supplying electricity to households/users included in the boundary are eligible under AMS-I.A;	Electricity generated from the CPA is for captive use, but not supplied to the grid. And the CPA is in the national grid of [XXX] but not a standalone off-the grid power system;
21.3	The project activity involved in the CPA will install new sets of electricity generation units at a site where there was no renewable energy power plant operating prior to the implementation of the project activity.	The CPA will install new sets of electricity generation units at a site where there was no renewable energy power plant operating prior to the implementation of the project activity.
22	Scenario III: The biogas produced by the project is used for supplying users with thermal energy that displaces fossil fuel use and for generating electricity for captive use that displaces electricity from national or a regional grid.	The CPA under scenario III will be satisfied the applicability of Methodology AMS-I.C (Ver.19.0)and AMS-I.F (Ver.2.0). As defined in the criteria from No. 20 to 21 of this eligibility criteria description.

Table B-1 Summary of the information required for inclusion criteria judgment

Livestock farm No.	Depth of anaerobic lagoons (m)	Retention time of manure waste in the baseline (days)	Estimated ER from type III component (tCO_2e/yr)	Storage time of the manure after removal from the animal barns (days)
LF-[XXX]01				
LF-[XXX]02				
...				
LF-[XXX]				

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 specific SSC-CPA argues additionality based on "Guidelines for demonstrating additionality of microscale project activities"(Version 04.0) or the guidance provided by "Guidelines on the demonstration of additionality of small-scale project activities"(Version 09.0). The additionality of each CPA will be assessed according to the following steps:

Considering CDM before the construction of the CPA

As per the requirement of the PoA, each CPA starting date must be later than the GSP date of the PoA. The timeline of the project is shown as follows:

Livestock farm No.	Date	Milestone
LF-[XXX]01		
LF-[XXX]02		
…		
LF-[XXX]		

Additionality demonstration of the CPA

The CPA will proceed to demonstrate its additionality as per "Approach 1" or "Option1 or 2 of Approach 2" of section E.5.1 of the PoA DD.

Approach 1: Demonstrating addtionality according to "Guidelines for Demonstrating Additonality of Microscale Project Activities" (Version 04.0).

The additionality criteria of "Microscale Project Activity" related to the CPA could be summarized as follow:

No.	Criteria in the guideline	Real situation of the CPA	Applicable? (Y/N)
1	The total installed capacity from type I component (both electrical units and thermal units) of the CPA is no more than $15MW_{ther}$[7];	The total installed capacity from type I component of the CPA is[XXX]MW;	
2	The emission reductions from type III component of the project is no more than 20 $ktCO_2e$ per year;	The emission reductions from type III component of the CPA is [XXX] tCO_2e per year;	
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 (SUZ) of the host country ;	The project activity/ies in the CPA is/are located in [XXX] County, [XXX] City of [XXX]Province, which is/is n' t a special underdeveloped zone of the P.R. China[8].	

If the CPA under the PoA can satisfy all the above applicable criteria, it could be deemed as automatically additional.

Approach 2: Demonstrating addtionality according to "Guidelines on the demonstration of additionality of small-scale project activities"(Version 09.0).

[7] According to paragraph 8(b) of the guidelines for demonstrating additionality of microscale project activities, the definitions provided for output capacity and guidelines to SSC CDM methodologies (version 17 or its update) shall be used. In the referenced paragraph, a conversion factor of 3 is used. Therefore, this conversion factor is consequently also applied to convert electrical capacity to the thermal capacity.

[8] http://www.cpad.gov.cn/publicfiles/business/htmlfiles/FPB/fpyw/201203/175445.html

The CPA is additional only if proved to be additional according to either paragraph 2 (c) or paragraph 1 (a) of "Guidelines on the demonstration of additionality of small-scale project activities", which is respectively demonstrated as Option 1 and Option 2 followed.

Option 1 Positive list

According to Guidelines on the demonstration of additionality of small-scale project activities paragraph 2 (c), the small scale project activities are defined as automatically additional if the project activities solely composed of isolated unites 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 thresholds. It can be summarized as follow in accordance with the CPA situation:

(i) The CPA as a whole meets the threshold criteria of a small scale CDM project activity;

(ii) The CPA is solely composed of isolated units where the users of the technology/measure are households or communities or Small and Medium enterprises (SMEs);

(iii) The installed capacity of each isolated unit from type I component is no more than 2,250 kW_{ther} and the emission reductions of each isolated unit from type III component of each isolated unit is no more than 3,000tCO_2e per year.

In conclusion, the CPA under the PoA can be deemed to be automatically additional if the three conditions of the above criteria can be met.

Option 2 Investment Barrier

According to the Guidelines on the demonstration of additionality of small-scale project activities paragraph 1 (a) , investment barrier analysis can be applied for each CPA under the PoA. The steps in the "Tool for the demonstration and assessment of additionality" (Ver.6.0.0) will be applied as follow:

Sub-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 CPAs under the PoA will earn revenues not only from the CERs sales, the simple cost analysis method is not appropriate.

Investment comparison analysis method is only applicable to projects whose alternatives are similar investment projects. The continuation of the current situation is not an investment project; the investment comparison analy sis is not preferable.

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

Sub-step 2 Option III. Apply benchmark analysis

The decision-making financial indicator (mainly IRR, NPV) will be used for investment analysis. Accordingly ,the decision-making benchmark which is indicated in investment decision document (such as FSR) will be selected as the financial benchmark for the CPA.

The selected benchmark(or discount rate when NPV used as financial indictor) will be demonstrated to be compliance with the relevant rules indicted in the "Tool for the Demonstration and assessment of additionality"(Ver.06.0.0).

On the basis of the above selected benchmark, calculation and comparison of financial indicators are carried out in substep3.

Sub-step 3 Calculation and comparison of financial indicators

As mentioned above, different indicators may be used in different cases. However , IRR will be use as a example indicator for demonstration in the following part.

The expected input parameters for IRR calculation is as following, which might be adjusted for the specific case:

Table B-2 Financial Parameters of the CPA-[XXX]

Livestock farm No.	Parameter	Value	Units	Source
LF-[XXX]01	Static total investment		10,000RMB	
	Self-raised capital		10,000RMB	
	Total biogas generation		10,000m^3/year	
	Annual total revenue		10,000RMB/year	
	Project lifetime (include construction period)		years	
	Annual O&M cost		10,000 RMB	
	Rate of VAT		%	
	Rate of income tax		%	
	Rate of city maintenance and construction tax		%	
	Rate of education fee addition		%	
	CERs price		RMB/tCO_2e	
LF-[XXX]02	Static total investment		10,000RMB	
	Self-raised capital		10,000RMB	
	Total biogas generation		10,000m^3/year	

	Annual total revenue		10,000RMB/year	
	Project lifetime (include construction period)		years	
	Annual O&M cost		10,000 RMB	
	Rate of VAT		%	
	Rate of income tax		%	
	Rate of city maintenance and construction tax		%	
	Rate of education fee addition		%	
	CERs price		RMB/tCO_2e	
…	Static total investment		10,000RMB	
	Self-raised capital		10,000RMB	
	Total biogas generation		10,000m^3/year	
	Annual total revenue		10,000RMB/year	
	Project lifetime (include construction period)		years	
	Annual O&M cost		10,000 RMB	
	Rate of VAT		%	
	Rate of income tax		%	
	Rate of city maintenance and construction tax		%	
	Rate of education fee addition		%	
	CERs price		RMB/tCO_2e	
	Static total investment		10,000RMB	
	Self-raised capital		10,000RMB	
	Total biogas generation		10,000m^3/year	
	Annual total revenue		10,000RMB/year	

LF-[XXX]	Project lifetime (include construction period)		years	
	Annual O&M cost		10,000 RMB	
	Rate of VAT		%	
	Rate of income tax		%	
	Rate of city maintenance and construction tax		%	
	Rate of education fee addition		%	
	CERs price		RMB/tCO_2e	

Generally values that were applied at the moment of the investment decision shall be used for the analysis above. Mostly, the Feasibility Study Report(FSR) or Preliminary Design Report *(PDR)will be the widely used for investment decision in China.*

The calculation results of the IRR/NPV with and without CDM compared to benchmark are presented as:

Livestock farm No.	**IRR/NPV without CER revenue**	**IRR/NPV with CER revenue**
LF-[XXX]01		
LF-[XXX]02		
….		
LF-[XXX]		

According to para 34 (b) of "Tool for the demonstration and assessment of additionality" (version 06.0.0), *If the CDM project activity has a less favourable indicator than the benchmark, then the CDM project activity cannot be considered as financially attractive.*

Therefore, this CPA is not considered financially attractive without CER revenue .

Substep 4 Sensitivity analysis

According to "Guidelines 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 each CPA, the following financial parameters are taken as uncertain factors for sensitivity analysis of financial attractiveness:

- Static total investment
- Annual total revenue
- Annual O&M cost

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%.

Table B-3 Sensitivity analysis

LF-[XXX]01						
Parameter	**-10%**	**-5%**	**0%**	**5%**	**10%**	**IRR/NPV=bench mark**
Static total investment						
Annual total revenue						
Annual O&M cost						
LF-[XXX]02						
Parameter	**-10%**	**-5%**	**0%**	**5%**	**10%**	**IRR/NPV=bench mark**
Static total investment						
Annual total revenue						
Annual O&M cost						
...						
Parameter	**-10%**	**-5%**	**0%**	**5%**	**10%**	**IRR/NPV=bench mark**
Static total investment						
Annual total revenue						
Annual O&M cost						
LF-[XXX]						
Parameter	**-10%**	**-5%**	**0%**	**5%**	**10%**	**IRR/NPV=bench mark**
Static total investment						
Annual total revenue						
Annual O&M cost						

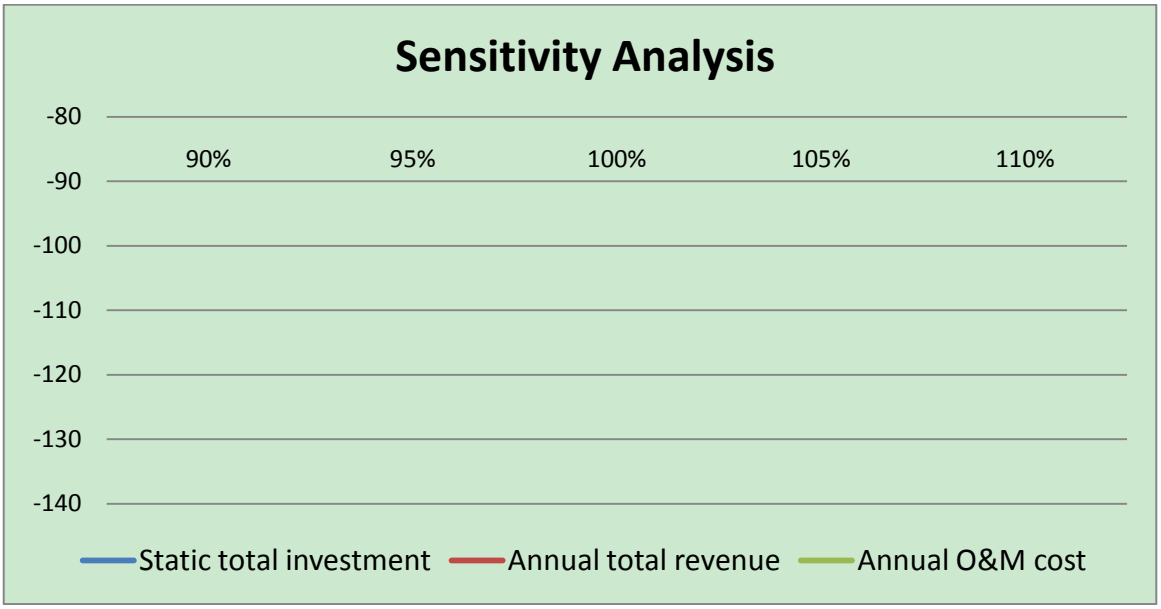

Figure B-1 (01) Sensitivity Analysis for LF-[XXX]01

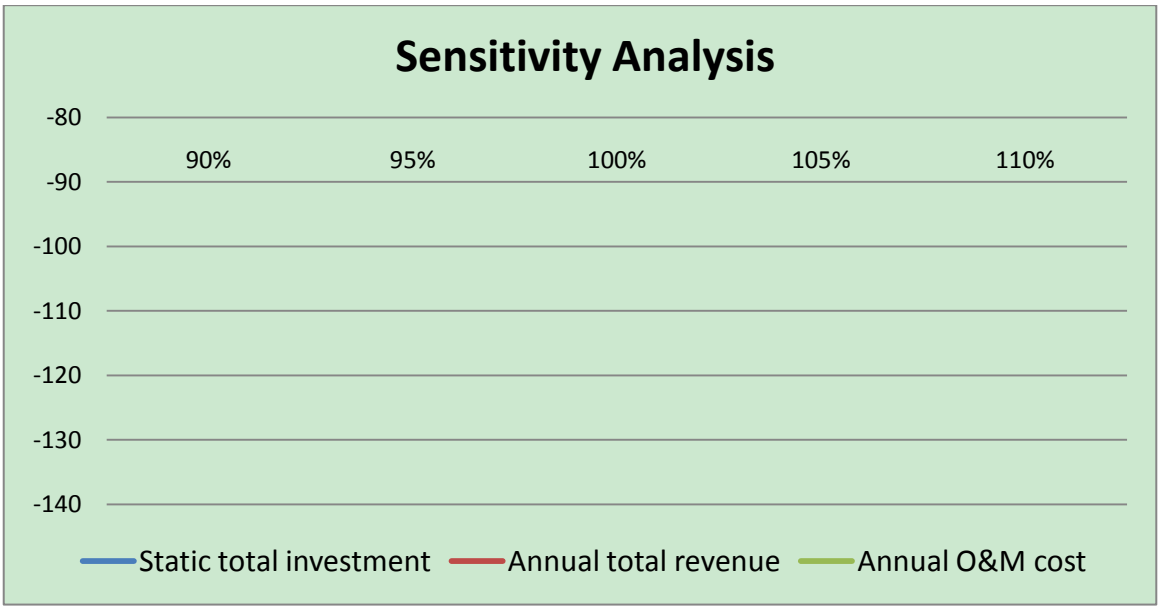

Figure B-1(02) Sensitivity Analysis for LF-[XXX]02

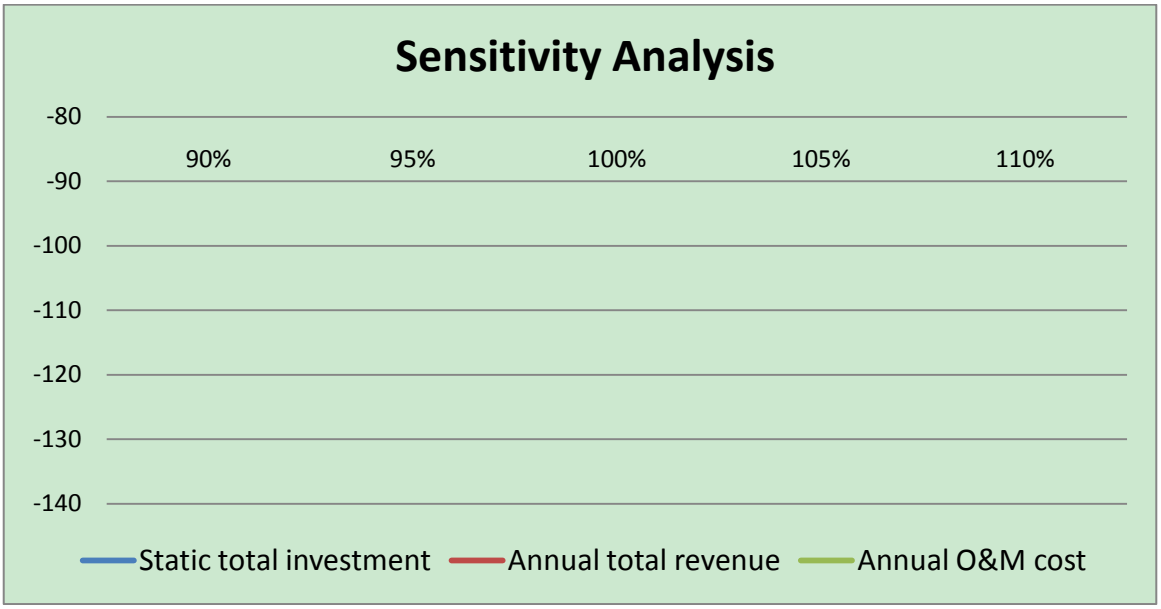

Figure B-1(…) Sensitivity Analysis for …

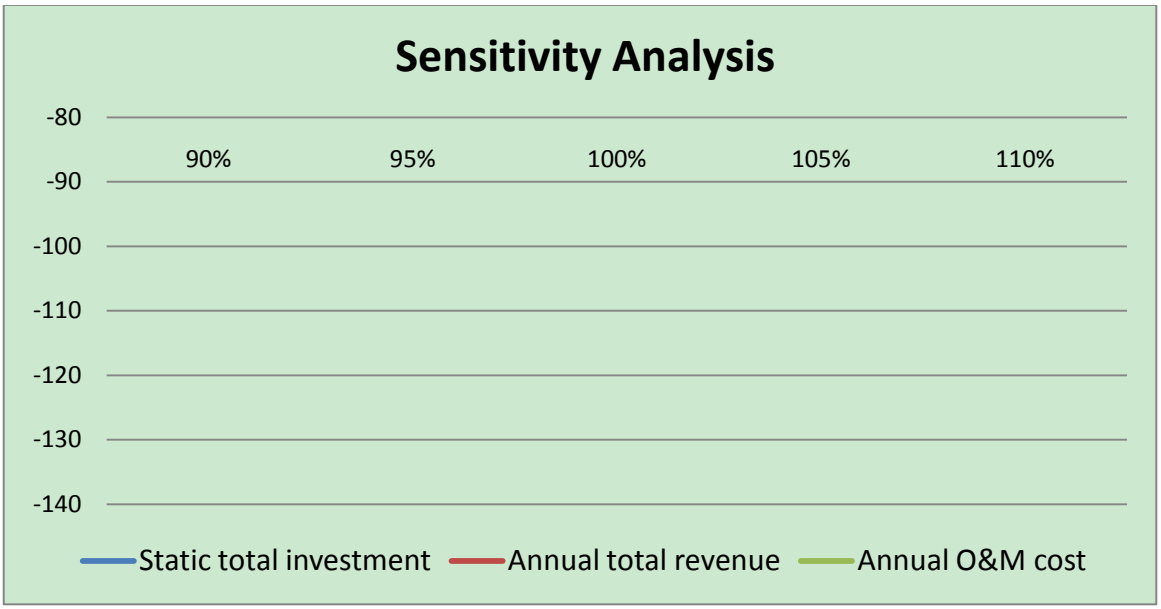

Figure B-1([XXX]) Sensitivity Analysis for LF-[XXX]

If the IRR of the CPA could not reach the benchmark even if the variation range of the factor reaches 10%, then the CPA is additional. If the IRR exceeds the benchmark in one or more of the above scenarios considered for the sensitivity analysis, the evidences shall be provided to demonstrate this is unlikely to happen.

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.

>>As per applied methodologies, 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 (AMS-III.D); industrial, commercial or residential facility, or facilities, consuming energy generated by the system and the processes or equipment affected by the project activity (AMS-I.C); and all power plants connected physically to the electricity system that the CDM project power plant is connected to (AMS-I.F). 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	Excluded for simplification. This is conservative
	Emissions from thermal energy generation	CO_2	Included	The major source of emissions (This is suitable for a CPA under Scenario I and III described in eligibility criteria of clause 20 and 22 in section A4.2.2 of PoA-DD)
		CH_4	Excluded	Excluded for simplification. This is conservative
		N_2O	Excluded	Excluded for simplification. This is conservative
	Emissions from electricity energy generation	CO_2	Included	The major source of emissions (This is suitable for a CPA under Scenario II and III described in eligibility criteria of clause 21 and 22 in section A4.2.2 of PoA-DD)
		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	Excluded for simplification. This is conservative
		N_2O	Excluded	Excluded for simplification.
	Emissions from flaring or combustion of the biogas	CO_2	Excluded	Excluded for simplification.
		CH_4	In/Excluded	It may be a major source of emissions for some CPAs.
		N_2O	Excluded	Excluded for simplification.
	Emissions from on-site electricity use and/or fossil fuel consumption	CO_2	Included	The major source of emissions
		CH_4	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification.
	Emissions from the storage of manure before being fed into the anaerobic digester	CO_2	Excluded	Excluded for simplification.
		CH_4	In/Excluded	It may be a major source of emissions for some CPAs.
		N_2O	Excluded	Excluded for simplification.
	Emissions from incremental transportation	CO_2	In/Excluded	It may be a major source of emissions for some CPAs.
		CH_4	Excluded	Excluded for simplification

		N_2O	Excluded	Excluded for simplification

The following figure shows the project boundary:

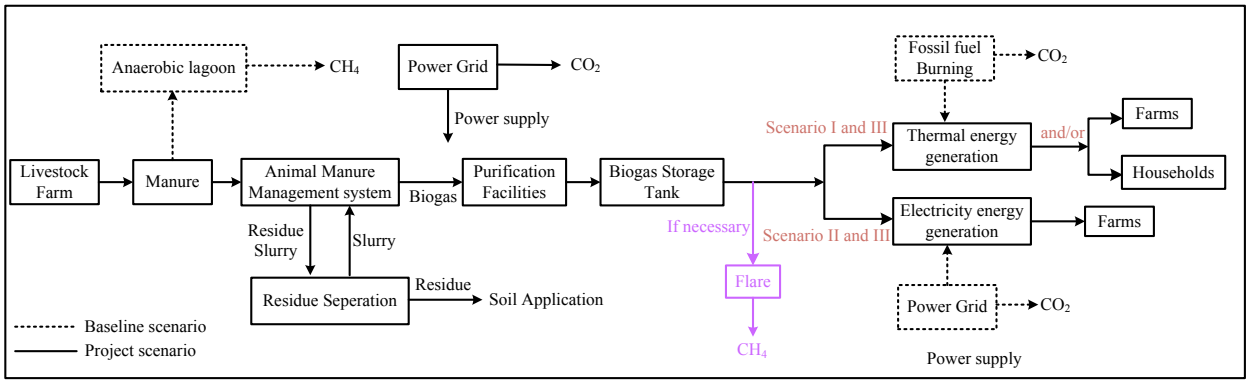

Figure B-2 Project boundary of CPA-[XXX]

All activities included in the CPA are located in[XXX], which is within [XXX] Province as 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:	tCO_2e/tCH_4
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 commitment 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 (Ver.18.0). (room temperature (20ºC) and 1atm pressure)
Value applied:	0.00067
Justification of the choice of data or description of	Recommended by the methodology of AMS-III.D(Ver.18.0)..

measurement methods and procedures actually applied :	
Any comment:	According to "Tool to determine project emissions from flaring gases containing methane",under the condition of 1atm and 0ºC, the CH_4 density is 0.000716 t/m^3

Data / Parameter:	MCF_j
Data unit:	%
Description:	Annual methane conversion factor (MCF) for the baseline animal manure management system "j"
Source of data used:	IPCC 2006 table10.17
Value applied:	[XXX]
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to the Methodology AMS-III.D(Ver.18.0)., 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(Ver.18.0).
Value applied:	0.94
Justification of the choice of data or description of measurement methods and procedures actually applied :	Recommended by the methodology of AMS-III.D(Ver.18.0)..
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-4 to 10A-9
Value applied:	[XXX]
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to the Methodology AMS-III.D (Ver.18.0), 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:	CPA implementer
Value applied:	[XXX]
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:	MCF_l
Data unit:	%
Description:	Annual methane conversion factor (MCF) for the project manure storage device l
Source of data used:	IPCC 2006 table10.17
Value applied:	[XXX]
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to the Methodology AMS-III.D (Ver.18.0), when national special value is unavailable, IPCC default value is used.
Any comment:	Used to calculate $PE_{storage,y}$

Data / Parameter:	$W_{default}$
Data unit:	kg
Description:	Default average animal weight of a defined population
Source of data used:	IPCC 2006 table10A-4 to 10A-9
Value applied:	[XXX]
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default value.
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:	IPCC 2006 table10A-4 to 10A-9
Value applied:	[XXX]

Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default value.
Any comment:	-

Data / Parameter:	NCV_{biogas}
Data unit:	MJ/m^3
Description:	Net calorific value (energy content) per volume unit of biogas
Source of data used:	China Energy Statistical Yearbook, 2010
Value applied:	20.908
Justification of the choice of data or description of measurement methods and procedures actually applied :	-
Any comment:	-

Data / Parameter:	$EF_{FF,CO2}$
Data unit:	tCO_2e/TJ
Description:	CO_2 emission factor of fossil fuel that would have been used in the baseline
Source of data used:	Obtained from reliable local or national data if available, alternatively, IPCC default emission factors can be used.
Value applied:	[XXX]
Justification of the choice of data or description of measurement methods and procedures actually applied :	-
Any comment:	-

Data / Parameter:	EF_{CO2}
Data unit:	$kgCO_2e/km$
Description:	CO_2 emission factor from fuel use due to transportation
Source of data used:	Obtained from reliable local or national data if available, alternatively, IPCC default emission factors can be used.
Value applied:	[XXX]
Justification of the choice of data or description of measurement methods and procedures actually	-

applied :	
Any comment:	Used to calculate $PE_{transp,y}$

Data / Parameter:	$w_{CH4,y}$
Data unit:	-
Description:	Methane fraction of biogas
Source of data used:	AMS-III.D(Ver.18.0)
Value applied:	60%
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to AMS-III.D(Ver.18.0), a default value of 60% methane content can be used.
Any comment:	-

Data / Parameter:	$\eta_{BL,1}$
Data unit:	-
Description:	The efficiency of the plant using fossil fuel that would have been used in the absence of the CPA
Source of data used:	Determined as per paragraph 30 of AMS-I.C(Ver.19.0)
Value applied:	[XXX]%
Justification of the choice of data or description of measurement methods and procedures actually applied :	Methodology AMS-I.C(Ver.19.0).
Any comment:	-

Data / Parameter:	$\eta_{BL,2}$
Data unit:	-
Description:	Efficiency of the baseline equipment being replaced.
Source of data used:	Determined as per paragraph 31 of AMS-I.C(Ver.19.0)
Value applied:	[XXX] %
Justification of the choice of data or description of measurement methods and procedures actually applied :	Methodology AMS-I.C(Ver.19.0).
Any comment:	-

Data / Parameter:	η_{PJ}
Data unit:	-

Description:	Efficiency of the project activity equipment
Source of data used:	Determined by equipment specification and/or document value
Value applied:	[XXX] %
Justification of the choice of data or description of measurement methods and procedures actually applied :	-
Any comment:	-

Data / Parameter:	**$EF_{grid,OM,y}$**
Data unit:	tCO_2/MWh
Description:	OM emission factor, ex-ante calculation and determination
Source of data used:	China DNA: [XXX] Baseline Emission Factors for Regional Power Grids in China at http://cdm.ccchina.gov.cn
Value applied:	[XXX]
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official and authoritative statistics
Any comment:	

Data / Parameter:	**$EF_{grid,BM,y}$**
Data unit:	tCO_2/MWh
Description:	BM emission factor, ex-ante calculation and determination
Source of data used:	China DNA: [XXX] Baseline Emission Factors for Regional Power Grids in China at http://cdm.ccchina.gov.cn
Value applied:	[XXX]
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official and authoritative statistics
Any comment:	

Data / Parameter:	**$NCV_{i,y}$**
Data unit:	GJ/mass or volume unit
Description:	Net calorific value (energy content) of fossil fuel i in year y
Source of data used:	China Energy Statistical Yearbook
Value applied:	-
Justification of the choice of data or description of	*China Energy Statistical Yearbook* is an authoritative publication.

measurement methods and procedures actually applied :	
Any comment:	Used to calculate the emission factors

Data / Parameter:	$FC_{i,y}$
Data unit:	Mass or volume unit
Description:	Amount of fossil fuel type i consumed by power plants connected to the grid in year y
Source of data used:	China Energy Statistical Yearbook
Value applied:	-
Justification of the choice of data or description of measurement methods and procedures actually applied :	*China Energy Statistical Yearbook* is an authoritative publication.
Any comment:	Used to calculate the emission factors

Data / Parameter:	$EF_{CO2,i,y}$
Data unit:	tCO_2/TJ
Description:	CO_2 emission factor per unit of energy of fuel i in year y
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories (Volume 2, Energy, Chapter 1, Table 1.4)
Value applied:	-
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC Default Value
Any comment:	Used to calculate the emission factors

Data / Parameter:	$EG_{m,y}$
Data unit:	MWh
Description:	Net electricity generated by power plant/unit m in year y
Source of data used:	China Electric Power Yearbook
Value applied:	-
Justification of the choice of data or description of measurement methods and procedures actually applied :	*China Electric Power Yearbook* is an authoritative publication.
Any comment:	Used to calculate the emission factors

Data / Parameter:	$GENE_{best,coal}$

Data unit:	%
Description:	Best power supply efficiency by the most advanced technology commercially used in coal-fired plants in China
Source of data used:	China DNA: [XXX] Baseline Emission Factors for Regional Power Grids in China at http://cdm.ccchina.gov.cn
Value applied:	[XXX]
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official data from Chinese DNA
Any comment:	Used to calculate the emission factors

Data / Parameter:	$GENE_{best,oil,gas}$
Data unit:	%
Description:	Best power supply efficiency by the most advanced technology commercially used in oil- and gas-fired plants in China
Source of data used:	China DNA: [XXX] Baseline Emission Factors for Regional Power Grids in China at http://cdm.ccchina.gov.cn
Value applied:	[XXX]
Justification of the choice of data or description of measurement methods and procedures actually applied :	-
Any comment:	Used to calculate the emission factors

Data / Parameter:	CAP_y
Data unit:	MW
Description:	Installed generation capacity on different power sources connected to the grid
Source of data used:	China Electric Power Yearbook
Value applied:	-
Justification of the choice of data or description of measurement methods and procedures actually applied :	*China Electric Power Yearbook* is an authoritative publication.
Any comment:	Used to calculate the emission factors

Data / Parameter:	$\eta_{flare,h}$
Data unit:	%
Description:	Flare efficiency in the hour *h*
Source of data used:	Determined according to "Tool to calculate project emissions from flaring gases containing methane"

Value applied:	[XXX]
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to "Tool to calculate project emissions from flaring gases containing methane", in case of **enclosed flares and use of the default value** for the flare efficiency, the flare efficiency in the hour h ($\eta_{flare,h}$) is: • 0%, if the temperature in the exhaust gas of the flare (T_{flare}) is below 500°C for more than 20 minutes during the hour h. • 50%, if the temperature in the exhaust gas of the flare (T_{flare}) is above 500°C for more than 40 minutes during the hour h, but the manufacturer's specifications on proper operation of the flare are not met at any point in time during the hour h. • 90%, if the temperature in the exhaust gas of the flare (Tflare) is above 500° for more than 40 minutes during the hour h and the manufacturers specifications on proper operation of the flare are met continuously during the hour h. In case of **open flares,** the flare efficiency in the hour h ($\eta_{flare,h}$) is • 0% if the flame is not detected for more than 20 minutes during the hour h. • 50%, if the flare is detected for more than 20 minutes during the hour h. The value will be determined through online monitoring the exhaust gas temperature of the flare in operation.
Any comment:	Used to calculate $PE_{flare,y}$

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

>>

According to methodologies mentioned above, the emission reductions calculation includes:

- Baseline emissions
- Project emissions
- Leakage emissions
- Emission reductions

I. Calculate baseline emissions

Baseline emissions of the project include baseline emissions from methane recovery $BE_{CH_4,Y}$ according to AMS-III.D (Ver.18.0) and/or CO_2 emissions from thermal energy generation $BE_{Thermal,y}$ according to AMS-I.C(Ver.19.0) and/or CO_2 emissions from power generation $BE_{El,y}$ according to AMS-I.F(Ver.2.0) in the absence of the CPA.

The baseline emission is calculated as follow:

$$\begin{cases} BE_y = BE_{CH_4,y} + BE_{Thermal,y} & \text{Only applicable to CPAs under Scenario I} \quad (1) \\ BE_y = BE_{CH_4,y} + BE_{El,y} & \text{Only applicable to CPAs under Scenario II} \quad (2) \\ BE_y = BE_{CH_4,y} + BE_{Thermal,y} + BE_{El,y} & \text{Only applicable to CPAs under Scenario III} \quad (3) \end{cases}$$

Where:

BE_y Baseline emissions in year y (tCO_2e)

$BE_{CH_{4,y}}$	Baseline emissions due to methane recovery in year *y* (tCO_2e)
$BE_{Thermal,y}$	Baseline emissions from thermal energy generation in year y (tCO_2e)
$BE_{El,y}$	Baseline emissions from power generation in year y (tCO_2e)

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

According to AMS-III.D (Ver.18.0), $BE_{CH_{4,y}}$ are 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 a CPA, which is as below:

$$BE_{CH_4,y} = GWP_{CH_4} * D_{CH_4} * UF_b * \sum_{j,LT} MCF_j * B_{0,LT} * N_{LT,y} * VS_{LT,y} * MS\%_{Bl,j} \quad (4)$$

Where:

$BE_{CH_4,y}$	Baseline emissions duet to biogas recovery in year *y* (tCO_2e)
GWP_{CH_4}	Global Warming Potential (GWP) of CH_4 (21)
D_{CH_4}	CH_4 density (0.00067 t/m^3 at room temperature (20ºC) 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)[9]

Determination of $B_{0,LT}$

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

According to AMS-III.D (Ver.18.0), the maximum methane-producing capacity of the manure (B_o) varies by species and diet. The preferred method to obtain (B_o) measurement values is to use data from country-specific published sources. 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.

In the CPA, default values applicable to [XXX] countries are used:

	$B_{0,LT}$ (m^3CH_4/kg VS)			
Livestock Farm No.	Animal Type 1	Animal Type 2	……	Animal Type X
LF-[XXX]01				
LF-[XXX]02				
……				
LF-[XXX]				

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. Because the 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:

$$VS_{LT,y} = \left(\frac{W_{site}}{W_{default}}\right) * VS_{default} * nd_y \quad (5)$$

Where:

$VS_{LT,y}$	Volatile solids for livestock *LT* entering the animal manure management system in year *y* (on a dry matter weight basis, kg dm/animal/year)
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

In the CPA, default values applicable to [XX] countries are used. Therefore, $VS_{LT,y}$ can be calculated as following table:

Livestock Farm No.	Type	*Parameter/Value*

		W_{site} (kg)	$W_{default}$ (kg)	$VS_{default}$ (kg dm/animal/day)
LF-[XXX]01	Animal Type 1			
	Animal Type 2			
	……			
	Animal Type X			
LF-[XXX]02	Animal Type 1			
	Animal Type 2			
	……			
	Animal Type X			
……	……			
	……			
	……			
	……			
LF-[XXX]	Animal Type 1			
	Animal Type 2			
	……			
	Animal Type X			

	$VS_{LT,y}$ (kg dm/animal/year)				nd_y
Livestock Farm No.	Animal Type 1	Animal Type 2	……	Animal Type X	-
LF-[XXX]01					
LF-[XXX]02					
……					
LF-[XXX]					

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. The site annual average temperature is taken from official data at the nearest meteorological station, or from data available from historical on site observations.

In the CPA, because the country-specific *MCF* is unavailable, the IPCC default values will therefore be adopted.

Livestock Farm No.	Location	Annual average temperature(℃)	MCF_j
LF-[XXX]01			
LF-[XXX]02			
……			
LF-[XXX]			

Determination of $N_{LT,y}$

According to AMS-III.D (Ver.18.0), the annual average number of animals ($N_{LT,y}$) are determined as follows:

$$N_{LT,y} = N_{da,y} * \left(\frac{N_{p,y}}{365} \right) \quad (6)$$

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)

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

Livestock Farm No.	Type	*Parameter/Value*		
		$N_{da,y}$ (numbers)	$N_{p,y}$ (numbers)	$N_{LT,y}$ (numbers)
LF-[XXX]01	Animal Type 1			
	Animal Type 2			
	……			
	Animal Type X			
LF-[XXX]02	Animal Type 1			
	Animal Type 2			
	……			
	Animal Type X			
……	……			
	……			
	……			
	……			
LF-[XXX]	Animal Type 1			
	Animal Type 2			
	……			
	Animal Type X			

Determination of $BE_{CH4,y}$

Therefore, $BE_{CH_4,y}$ can be calculated as following table:

LF-[XXX]01		Animal Type 1	Animal Type 2	……	Animal Type X
MCF_j					
$B_{0,LT}$	m^3 CH_4/kg dm				
$N_{LT,y}$	numbers				
$VS_{LT,y}$	kg dm/animal/year				

$MS\%_{Bl,j}$					
GWP_{CH_4}	tCO_2e/tCH_4	21	21	……	21
D_{CH_4}	t/m^3	0.00067	0.00067	……	0.00067
UF_b		0.94	0.94	……	0.94
$BE_{CH_4,y}$	tCO_2e				
Sum	tCO_2e				
LF-[XXX]02		Animal Type 1	Animal Type 2	……	Animal Type X
MCF_j					
$B_{0,LT}$	m^3 CH_4/kg dm				
$N_{LT,y}$	numbers				
$VS_{LT,y}$	kg dm/animal/year				
$MS\%_{Bl,j}$					
GWP_{CH_4}	tCO_2e/tCH_4	21	21	……	21
D_{CH_4}	t/m^3	0.00067	0.00067	……	0.00067
UF_b		0.94	0.94	……	0.94
$BE_{CH_4,y}$	tCO_2e				
Sum	tCO_2e				
……		Animal Type 1	Animal Type 2	……	Animal Type X
MCF_j					
$B_{0,LT}$	m^3 CH_4/kg dm				
$N_{LT,y}$	numbers				
$VS_{LT,y}$	kg dm/animal/year				
$MS\%_{Bl,j}$					
GWP_{CH_4}	tCO_2e/tCH_4				
D_{CH_4}	t/m^3				
UF_b					
$BE_{CH_4,y}$	tCO_2e				
Sum	tCO_2e				
LF-[XXX]		Animal Type 1	Animal Type 2	……	Animal Type X
MCF_j					
$B_{0,LT}$	m^3 CH_4/kg dm				

$N_{LT,y}$	numbers				
$VS_{LT,y}$	kg dm/animal/year				
$MS\%_{Bl,j}$					
GWP_{CH_4}	tCO_2e/tCH_4	21	21		21
D_{CH_4}	t/m^3	0.00067	0.00067		0.00067
UF_b		0.94	0.94		0.94
$BE_{CH_4,y}$	tCO_2e				
Sum	tCO_2e				

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

According to AMS-I.C(Ver.19.0), baseline emissions from thermal energy generation in the CPA includes $BE_{thermal,y,1}$ from fossil fuel used in the boiler to generate steam/heat and/or $BE_{thermal,y,2}$ from fossil fuel used in the equipments whose maximum output capacity are less than 45 kW thermal, e.g. biogas stoves, to generate heat. In each CPA, the project replace fossil fuel with biogas ($BG_{biogas-1,PJ,y}$) as fuel of boiler system for thermal energy generation and/or biogas ($BG_{biogas-2,PJ,y}$) as fuel of equipments whose maximum output capacity are less than 45 kW thermal for thermal energy generation respectively, therefore, $BE_{Thermal,y}$ can be calculated as follows:

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

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_2e)
$BE_{thermal,y,2}$	The baseline emissions from thermal energy displaced by the CPA using biogas during the year *y* (tCO_2e)

a. Determination of $BE_{thermal,y,1}$

According to AMS-I.C(Ver.19.0), for steam/heat produced using fossil fuels, the baseline emissions are calculated as follows:

$$BE_{thermal,y,1} = [EG_{thermal,y} / \eta_{BL,1}] * EF_{FF,CO_2} \quad (8)$$

Where:

$BE_{thermal,y,1}$	The baseline emissions from steam/heat displaced by the CPA during the year y (tCO_2e)
$EG_{thermal,y}$	The net quantity of steam/heat supplied by the project activity during the year *y* (TJ)
$\eta_{BL,1}$	The efficiency of the plant using fossil fuel that would have been used in the absence of the CPA
EF_{FF,CO_2}	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_2/TJ)

$BE_{thermal,y,1}$ can be calculated as following table:

Livestock Farm No.	$EG_{thermal,y}$ (TJ)	$\eta_{BL,1}$	EF_{FF,CO_2} (tCO_2e/TJ)	$BE_{thermal,y,1}$ (tCO_2e)
LF-[XXX]01				
LF-[XXX]02				
……				
LF-[XXX]				
Sum				

b. Determination of $BE_{thermal,y,2}$

For households and/or farms applications, 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 biogas stoves, gasifiers, driers, water heaters etc, the project output energy shall be estimated based on consumption of the biogas (in terms of energy quantity) times the efficiency of the project equipment. The equation below shall be used:

$$BE_{thermal,y,2} = [HG_{PJ,y} / \eta_{BL,2}] * EF_{FF,CO_2}$$
$$= \{[B_{biogas,PJ,y} * NCV_{biogas} * \eta_{PJ}] / \eta_{BL,2}\} * EF_{FF,CO_2} \quad (9)$$

Where:

$BE_{thermal,y,2}$	The baseline emissions from thermal energy displaced by the project activity using renewable biogas during the year y (tCO_2e/yr)
$HG_{PJ,y}$	The net quantity of thermal energy supplied by the project activity using biogas during the year *y* (TJ)
$\eta_{BL,2}$	Efficiency of the baseline equipment being replaced (determined as per paragraph 31)
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,CO_2}	The CO_2 emission factor of coal that would have been used in the baseline (tCO_2e/TJ)
$B_{biogas,PJ,y}$	The net volume of the biogas consumed in year *y,* i.e. $BG_{biogas-2,PJ,y}$ (m^3)
NCV_{biogas}	The net calorific value of the biogas (TJ/m^3)

$BE_{thermal,y,2}$ can be calculated as following table:

Livestock Farm No.	$BG_{biogas-2,PJ,y}$ (m^3)	NCV_{biogas} (MJ/m^3)	η_{PJ}	$\eta_{BL,2}$	EF_{FF,CO_2} (tCO_2e/TJ)	$BE_{thermal,y,2}$ (tCO_2e/yr)
LF-[XXX]01		20.908				
LF-[XXX]02		20.908				
……		……				
LF-[XXX]		20.908				
Sum						

c. Determination of $BE_{thermal,y}$

According to the calculation above, $BE_{thermal,y}$ can be determined as following table:

Livestock Farm No.	$BE_{thermal,y,1}$ (tCO_2e/yr)	$BE_{thermal,y,2}$ (tCO_2e/yr)	$BE_{thermal,y}$ (tCO_2e/yr)
LF-[XXX]01			
LF-[XXX]02			
……			
LF-[XXX]			
Sum			

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

According to AMS-I.F(Ver.2.0), the baseline emissions $BE_{El,y}$ from power generation are the product of amount electricity displaced with the electricity produced by the project using the biogas ($BG_{biogas-3,PJ,y}$) and an emission factor.

$BE_{El,y}$ should be calculated as below:

$$BE_{El,y} = EG_{BL,y} * EF_{grid,CM,y} \quad (10)$$

$BE_{El,y}$	Baseline emissions from power generation in year y (tCO_2)
$EG_{BL,y}$	Quantity of the grid electricity displaced as a result of the implementation of the CDM project activity in year *y* (MWh)
$EF_{grid,CM,y}$	CO_2 emission factor of the grid in year *y* (t CO_2/MWh) calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (Ver. 02.2.1)

Calculation of $EF_{grid,CM,y}$

According to ASM-I.F, emission factor of a grid shall be calculated as per the procedures provided in AMS-I.D.

The emission factor can be calculated in a transparent and conservative manner as follows:

(a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the "Tool to calculate the Emission Factor for an electricity system";

OR

(b) The weighted average emissions (in tCO_2/MWh) of the current generation mix. The data of the year in which project generation occurs must be used.

A combined margin (CM) is adopted to calculate the emission reductions. The calculating process will be in accordance with steps of Tool to calculate the emission factor for an electricity system (version 02.2.1) and [XXX] *Baseline Emission Factors for Regional Power Grids in China,* published by Chinese DNA at the time of CPA validation. The detailed calculating processes are as follows:

Step 1: Identify the relevant electricity systems.
Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)
Step 3: Select a method to determine the operating margin (OM).
Step 4: Calculate the operating margin emission factor according to the selected method.
Step 5: Calculate the build margin (BM) emission factor.
Step 6: Calculate the combined margin (CM) emission factor.

The detailed calculating processes are:

Step 1 Identify the relevant electricity systems

Identify the electricity system and its covered areas that the CPA connects to, according to the "Tool to calculate the emission factor for an electricity system" and delineation of electricity system given by Chinese DNA.

The CPA connects through transmission and distribution lines to the [XXX] covering [XXX]. Correspondingly, the relevant electricity system of the CPA is identified as [XXX].

Step 2 Choose whether to include off-grid power plants in the project electricity system (optional)

According to the tool, project participants may choose between the following two options to calculate the operating margin and build margin emission factor:
Option I: Only grid power plants are included in the calculation.
Option II: Both grid power plants and off-grid power plants are included in the calculation.

Option I is chosen to calculate the operating margin and build margin emission factor..

Step 3 Select a method to determine the operating margin (OM)

The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods:
(a) Simple OM, or
(b) Simple adjusted OM, or
(c) Dispatch data analysis OM, or
(d) Average OM.

In the five most recent years where data are available, the low-cost/must run resources [10]constituted less than 50% [11]of total power generation of the grid. As a result, the simple OM method can be used to calculate the operating margin emission factor ($EF_{grid,OM,y}$) of the CPA.

[10] Low-cost/must-run resources are defined as power plants with low marginal generation costs or power plants that are dispatched independently of the daily or seasonal load of the grid. They typically include hydro, geothermal, wind, low-

To calculate the simple OM emission factor of the grid, the ex-ante option is adopted by using 3-year generation-weighted average based on the most recent data at the time of the CDM-PDD submission to the DOE for validation.

Step 4 Calculate the operating margin emission factor according to the selected method

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units. It may be calculated:

Option A: Based on the net electricity generation and a CO_2 emission factor of each power unit;[12] or

Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

According to the tool, Option B can only be used if:
(a) The necessary data for Option A is not available; and
(b) Only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and
(c) Off-grid power plants are not included in the calculation (i.e., if Option I has been chosen in Step 2).

The fuel consumption data in China is not available for each power plant/unit, thus Option A is not applicable. According to the latest version of Baseline Emission Factors for Regional Power Grids in China, only the nuclear and renewable power generation is considered as low-cost/must run power sources in China and the quantity of electricity supplied to the grid by these sources is known. Further, the off-grid power plants are not included in the calculation as mentioned in the above. So Option B is adopted to calculate the simple OM emission factor.

Under this Option, the simple OM emission factor is calculated based on the net electricity supplied to the grid by all power plants serving the system, not including low-cost/must run power plants/units, and based on the fuel type(s) and total fuel consumption of the project electricity system, as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum_i (FC_{i,y} * NCV_{i,y} * EF_{co2,i,y})}{EG_y} \quad (11)$$

Where:
$EF_{grid,OMsimple,y}$ = Simple operating margin CO_2 emission factor in year y($t\ CO_2/MWh$)
$FC_{i,y}$ = Amount of fossil fuel type *i* consumed by power plant/unit *m* in year (y) (mass or volume unit)
$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ/mass or volume unit)

cost biomass, nuclear and solar generation. If coal is obviously used as must-run, it should also be included in this list, i.e. excluded from the set of plants.

[11] The concrete demonstration will be filled in the specific CPA-DD.

[12] Power units should be considered if some of the power units at the site of the power plant are low-cost/must-run units and some are not. Power plants can be considered if all power units at the site of the power plant belong to the group of low-cost/must-run units or if all power units at the site of the power plant do not belong to the group of low-cost/must-run units.

$EF_{co2,i,y}$ = CO_2 emission factor of fossil fuel type *i* in year *y* (t CO_2/GJ)
EG_y = Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must-run power plants/units, in year *y* (MWh)
i = All fossil fuel types combusted in power sources in the project electricity system in year *y*
y = The relevant year as per the data vintage chosen in Step 3.

Based on *[XX] Baseline Emission Factors for Regional Power Grids in China* published by China DNA, the Operating Margin Emission Factor ($EF_{grid,OM,y}$) of the [XXX] is determined to be: [XXX] tCO_2e/MWh.

Step 5 Calculate the build margin (BM) emission factor

In terms of vintage of data, project participants can choose between one of the following two options:

Option 1: For the first crediting period, calculate the build margin emission factor *ex ante* based on the most recent information available on units already built for sample group *m* at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Option 2: For the first crediting period, the build margin emission factor shall be updated annually, *ex post*, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated *ex ante*, as described in Option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

For the CPA, option 1 is chosen to calculate Build Margin emission factor ($EF_{grid, BM, y}$).

The sample group of power units *m* used to calculate the build margin should be determined as per the following procedure, consistent with the data vintage selected above:

(a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently ($SET_{5\text{-units}}$) and determine their annual electricity generation ($AEG_{SET\text{-}5\text{-units}}$, in MWh);

(b) Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEG_{total}, in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEG_{total} (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) ($SET_{\geq 20\%}$) and determine their annual electricity generation ($AEG_{SET\text{-}\geq 20\%}$, in MWh);

(c) From $SET_{5\text{-units}}$ and $SET_{\geq 20\%}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample});

Otherwise:

(d) Exclude from SET_{sample} the power units which started to supply electricity to the grid more than 10 years ago. Include in that set the power units registered as CDM project activityies, starting with power units that started to supply electricity to the grid most recently, until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) to the extent is possible. Determine for the resulting set ($SET_{sample-CDM}$) the annual electricity generation ($AEG_{SET-sample-CDM}$, in MWh);

If the annual electricity generation of that set is comprises at least 20% of the annual electricity generation of the project electricity system (i.e. $AEG_{SET-sample-CDM} \geqslant 0.2 \times AEG_{total}$), then use the sample group $SET_{sample-CDM}$ to calculate the build margin. Ignore steps (e) and (f).

Otherwise:

(e) Include in the sample group $SET_{sample-CDM}$ the power units that started to supply electricity to the grid more than 10 years ago until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation);

(f) The sample group of power units m used to calculate the build margin is the resulting set ($SET_{sample-CDM->10yrs}$).

The Build Margin Emission Factor ($EF_{grid,BM,y}$) is calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} * EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

(12) Where:

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year *y* (t CO_2/MWh)
$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid *y* power unit *m* in year *y* (MWh)
$FE_{EL,m,y}$ = CO_2 emission factor of power unit *m* in year *y* (t CO_2/MWh)
m = power units included in the build margin
y = most recent historical year for which power generation data is available.

Due to data's unavailability, the BM calculation follows the guidance provided by CDM EB in the deviation. First, calculate the newly installed capacity and its power generation technology mix, then the weights of different power technologies in the newly installed capacity, finally the BM emission factor base on the emission factors of different types of most advanced commercial generation technologies.

Because the generating capacity of the coal-fired, oil-fired and gas-fired power plants can not be separated from the existing statistical data, the BM calculation adopts the following method: First, use the available data in the energy balance tables on the most recent year to calculate the proportion of CO_2 emissions from solid, liquid and gaseous fuels corresponding to the total emissions of CO_2 emissions. Second, calculate the emission factor of the fossil fuel fired power generation in each grid using the above proportions as the weights and the emission factors of the most advanced commercial generation technologies as the reference. Finally, the BM

emission factor is multiplied by the proportion of fossil fuel fired power generation and the proportion of fossil fuel fired power plants in the newly added 20% capacity. Concrete steps and the formula for BM are as follows:

Sub-step 5a. Calculating the share of CO_2 emission of different fuel-fired power plants in the total CO_2 emissions

$$\lambda_{coal,y} = \frac{\sum_{ieCOAL,j} F_{i,j,y} * NCV_{i,y} * EF_{co2i,j,y}}{\sum_{i,j} F_{i,j,y} * NCV_{i,y} * EF_{co2i,j,y}}$$

(13)

$$\lambda_{oil,y} = \frac{\sum_{ieOIL,j} F_{i,j,y} * NCV_{i,y} * EF_{co2i,j,y}}{\sum_{i,j} F_{i,j,y} * NCV_{i,y} * EF_{co2i,j,y}}$$

(14)

$$\lambda_{gas,y} = \frac{\sum_{ieGAS,j} F_{i,j,y} * NCV_{i,y} * EF_{co2i,j,y}}{\sum_{i,j} F_{i,j,y} * NCV_{i,y} * EF_{co2i,j,y}}$$

(15)

Where:

$F_{i,j,y}$ = the amount of fuel *i* (in a mass or volume unit) consumed by project *j* in year *y*;

$NCV_{i,j}$ = Net calorific value (energy content) of fossil fuel type *i* consumed by province *j* (GJ/mass or volume unit)

$EF_{co2,i,j,y}$ = CO_2 emission coefficient of fossil fuel type *i* (t CO_2/mass or volume unit of the fuel), taking into account the carbon content of the fuels used by relevant provincial sub-grids *j* and the percent oxidation of fuel in year *y*;

Coal, Oil and Gas is the footnote for solid fuels, liquid fuels and gas fuels.

Sub-step 5b. Calculation the emission factor of fuel-fired power technology.

$$EF_{Thermal,y} = \lambda_{Coal,y} * EF_{Coal,Adv,y} + \lambda_{Oil,y} * EF_{Oil,Adv,y} + \lambda_{Gas,y} * EF_{Gas,Adv,y} \quad (16)$$

Where:

$EF_{Coal,Adv,y}$, $EF_{Oil,Adv,y}$ *and* $EF_{Gas,Adv,y}$ represent the emission factors of the commercially available most advanced coal, oil and gas fired power technology.

Sub-step5c. Calculating the $EF_{grid,BM,y}$

$$EF_{grid,BM,y} = \frac{CAP_{Thermal,y}}{CAP_{Total,y}} * EF_{Thermal,y} \quad (17)$$

Where:

$CAP_{Total,y}$ is the newly increment of total installed capacity;

$CAP_{Thermal,y}$ is the newly increment of fuel-fired installed capacity.

Based on *[XXX] Baseline Emission Factors for Regional Power Grids in China* published by China DNA, the Build Margin Emission Factor ($EF_{grid,BM,y}$) of the [XXX] could be obtained determined to be: [XXX]tCO_2e/MWh.

The $EF_{grid,OM,y}$ and $EF_{grid,BM,y}$ of the first crediting period of the CPA is calculated ex-ante and will not change during the first crediting period. For the second crediting period of the CPA, the $EF_{grid,OM,y}$ and $EF_{grid,BM,y}$ should be updated based on the latest version of *Baseline Emission Factors for Regional Power Grids in China* at the time of submission of the request for renewal of the crediting period of the CPA to the DOE. For the third crediting period of the CPA, the $EF_{grid,OM,y}$ and $EF_{grid,BM,y}$ used for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Step 6. Calculate the combined margin (CM) emission factor

The calculation of the combined margin (CM) emission factor ($EF_{grid,CM,y}$) is based on one of the following methods:
(a) weighted average CM; or
(b) simplified CM
The weighted average CM method should be used as the preferred option.

Method (a) is adopted for calculating the combined margin emission factor of the CPA:

$$EF_{grid,CM,y} = w_{OM} * EF_{grid,OM,y} + w_{BM} * EF_{grid,BM,y} \quad (18)$$

Where:
$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (tCO_2/MWh)
w_{OM} = Weighting of operating margin emission factor (%)
w_{BM} = Weighting of build margin emission factor (%)

The weight w_{OM} and w_{BM} are taken both by 0.5 for the first crediting period; and w_{OM}=0.25 and w_{BM}=0.75 for the second and third period.

Therefore the combined baseline emission factor:

$$EF_{grid,CM,y} = 0.5*[XXX]\ t\ CO_2/MWh + 0.5*[XXX]\ t\ CO_2/MWh = [XXX]\ t\ CO_2/MWh \quad (19)$$

$BE_{El,y}$ can be calculated as following table:

Livestock Farm No.	$EG_{BL,y}$ (MWh)	$EF_{grid,CM,y}$ (t CO_2/MWh)	$BE_{El,y}$ (tCO_2e/yr)
LF-[XXX]01			
LF-[XXX]02			
……			
LF-[XXX]			
Sum			

Ⅱ. Calculate project emissions

The project emission PE_y of the CPA is sum of the AMS-III.D (Ver.18.0) ($PE_{y,D}$) and/or AMS-I.C(Ver.19.0) ($PE_{y,C}$) and/or AMS-I.F(Ver.2.0) ($PE_{y,F}$) component, which can be calculated as follows:.

$$\begin{cases} PE_y = PE_{y,D} + PE_{y,C} & \text{Only applicable to CPAs under Scenario I} \quad (20) \\ PE_y = PE_{y,D} + PE_{y,F} & \text{Only applicable to CPAs under Scenario II} \quad (21) \\ PE_y = PE_{y,D} + PE_{y,C} + PE_{y,F} & \text{Only applicable to CPAs under Scenario III} \quad (22) \end{cases}$$

Where:

PE_y	Project emission in year y (tCO_2e)
$PE_{y,D}$	Project emission of AMS-III.D(Ver.18.0) component in year y (tCO_2e)
$PE_{y,C}$	Project emission of AMS-I.C(Ver.19.0) component in year y (tCO_2e)
$PE_{y,F}$	Project emission of AMS-I.F(Ver.2.0) component in year y (tCO_2e)

(I) According to AMS-III.D(Ver.18.0), 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($PE_{transp,y}$);

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

$$PE_{y,D} = PE_{PL,y} + PE_{flare,y} + PE_{power,y} + PE_{transp,y} + PE_{storage,y} \quad (23)$$

Where:

$PE_{y,D}$	Project emission of AMS-III.D(Ver.18.0) component 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)

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

According to AMS-III.D(Ver.18.0), in case option in paragraph 9(a) is chosen, it is determined that $PE_{PL,y}$ can be calculated as follows:

$$PE_{PL,y} = 0.10 * GWP_{CH_4} * D_{CH_4} * \sum_{i,LT} B_{0,LT} * N_{LT,y} * VS_{LT,y} * MS\%_{i,y} \quad (24)$$

Where:

$PE_{PL,y}$ Emissions due to physical leakage of biogas in year *y* (tCO_2e)

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

LF-[XXX]01		Animal Type 1	Animal Type 2	……	Animal Type X
		0.10	0.10	……	0.10
$B_{0,LT}$	m^3 CH_4/kg dm				
$N_{LT,y}$	numbers				
$VS_{LT,y}$	kg dm/animal/year				
$MS\%_{i,y}$					
GWP_{CH_4}	tCO_2e/tCH_4	21	21	……	21
D_{CH_4}	t/m^3	0.00067	0.00067	……	0.00067
$PE_{PL,y}$	tCO_2e				
Sum	tCO_2e				
LF-[XXX]02		Animal Type 1	Animal Type 2	……	Animal Type X
		0.10	0.10	……	0.10
$B_{0,LT}$	m^3 CH_4/kg dm				
$N_{LT,y}$	numbers				
$VS_{LT,y}$	kg dm/animal/year				
$MS\%_{i,y}$					
GWP_{CH_4}	tCO_2e/tCH_4	21	21	……	21
D_{CH_4}	t/m^3	0.00067	0.00067	……	0.00067
$PE_{PL,y}$	tCO_2e				
Sum	tCO_2e				
……		Animal Type 1	Animal Type 2	……	Animal Type X
$B_{0,LT}$	m^3 CH_4/kg dm				
$N_{LT,y}$	numbers				

$VS_{LT,y}$	kg dm/animal/year				
$MS\%_{i,y}$					
GWP_{CH_4}	tCO_2e/tCH_4				
D_{CH_4}	t/m^3				
$PE_{PL,y}$	tCO_2e				
Sum	tCO_2e				
LF-[XXX]		Animal Type 1	Animal Type 2	……	Animal Type X
		0.10	0.10	……	0.10
$B_{0,LT}$	m^3 CH_4/kg dm				
$N_{LT,y}$	numbers				
$VS_{LT,y}$	kg dm/animal/year				
$MS\%_{i,y}$					
GWP_{CH_4}	tCO_2e/tCH_4	21	21	……	21
D_{CH_4}	t/m^3	0.00067	0.00067	……	0.00067
$PE_{PL,y}$	tCO_2e				
Sum	tCO_2e				

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

In case of flaring/combustion of biogas, project emissions are estimated using the procedures described in the "Tool to determine project emissions from flaring gases containing methane".

According to the tool above, $PE_{flare,y}$ is calculated as per the formulae below:

$$PE_{flare,y} = \sum_{h=1}^{8760} TM_{RG,h} * (1 - \eta_{flare,h}) * \frac{GWP_{CH4}}{1000} \quad (25)$$

Where:

$PE_{flare,y}$	Project emissions from flaring of the residual gas stream in year y (tCO_2e)
$TM_{RG,h}$	Mass flow rate of methane in the residual gas in the hour h (kg/h)
$\eta_{flare,h}$	Flare efficiency in hour h
GWP_{CH4}	Global Warming Potential of methane valid for the commitment period (tCO_2e/tCH_4)

$$TM_{RG,h} = FV_{RG,h} * fv_{CH4,RG,h} * \rho_{CH4,n} \quad (26)$$

Where:

$TM_{RG,h}$	Mass flow rate of methane in the residual gas in the hour (kg/h)
$FV_{RG,h}$	Volumetric flow rate of the residual gas in dry basis at normal conditions in hour h(m^3/h), i.e. $BG_{biogas-4,PJ,y}$
$fv_{CH4,RG,h}$	Volumetric fraction of methane in the residual gas on dry basis in hour h (NB: this corresponds to $fv_{i,RG,h}$ where i refers to methane) ,i.e. $w_{CH4,y}$
$\rho_{CH4,n}$	Density of methane at normal conditions (0.716)(kg/m^3)

In case of **enclosed flares and use of the default value** for the flare efficiency, the flare efficiency in the hour h ($\eta_{flare,h}$) is:

- 0%, if the temperature in the exhaust gas of the flare (T_{flare}) is below 500 °C for more than 20 minutes during the hour h.
- 50%, if the temperature in the exhaust gas of the flare (T_{flare}) is above 500 °C for more than 40 minutes during the hour h, but the manufacturer's specifications on proper operation of the flare are not met at any point in time during the hour h.
- 90%, if the temperature in the exhaust gas of the flare (T_{flare}) is above 500 °C for more than 40 minutes during the hour h and the manufacturer's specifications on proper operation of the flare are met continuously during the hour h.

In case of **open flares**, the flare efficiency in the hour h ($\eta_{flare,h}$) is

- 0%, if the flame is not detected for more than 20 minutes during the hour h.
- 50%, if the flare is detected for more than 20 minutes during the hour h.

If all biogas generated by the CPA is used for energy generation, i.e., no biogas is flared, there will be no need to consider $PE_{flare,y}$ and no need to monitor the relative parameters to calculate the $PE_{flare,y}$

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

As fossil fuel is not involved in the CPA, $PE_{power,y}$ is equivalent to project emissions from electricity consumption. According to AMS-III.D(Ver.18.0), 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:

$$PE_{power,y} = EG_{PJ,ele,y} * EF_{grid,CM,y} \quad (27)$$

Where:

$PE_{power,y}$	CO_2 emissions from use of fossil fuels or electricity for the operation of all the installed facilities(tCO_2e)
$EG_{PJ,ele,y}$	Quantity of electricity consumed by the Project facilities in year *y* (MWh/yr)
$EF_{grid,CM,y}$	Combined margin CO_2 emission factor for grid connected power generation in year y

(tCO_2e/MWh) calculated using the latest version of the "*Tool to calculate the emission factor for an electricity system*"(Ver.02.2.1).

The electricity consumed in the CPA is imported from [XXX], so $EF_{grid,CM,y}$ is equal to the value adopted above.

Therefore, $PE_{power,y}$ can be calculated as followed:

Livestock Farm No.	$EG_{PJ,ele,y}$ (MWh/yr)	$EF_{grid,CM,y}$ (tCO_2e/MWh)	$PE_{power,y}$ (tCO_2e)
LF-[XXX]01			
LF-[XXX]02			
……			
LF-[XXX]			
Sum			

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

According to AMS-III.D, the relevant procedures in AMS-III.F "Avoidance of methane emissions through composting" will be applied to determine the project emissions due to incremental transport distances ($PE_{transp,y}$) are calculated based on the incremental distances between:

(i) The collection points of biomass and/or manure and the compost treatment site as compared to the baseline solid waste disposal site or manure treatment site;

(ii) When applicable, the collection points of wastewater and treatment site as compared to baseline wastewater treatment site;

(iii) Treatment sites and the sites for soil application, landfilling and further treatment of the produced compost.

$$PE_{transp,y} = (Q_y / CT_y) * DAF_w * EF_{CO_2} + (Q_{y,treatment} / CT_{y,treatment}) * DAF_{treatment} * EF_{CO_2} \quad (28)$$

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)

If compared to the baseline scenario, no incremental transport distance exists in the CPA, there will be no need to consider $PE_{transp,y}$ and no need to monitor the relative parameters to calculate the $PE_{transp,y}$.

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:

$$PE_{storage,y} = GWP_{CH_4} * D_{CH_4} * \sum_{LT,l}[\frac{365}{AI_l}\sum_{d=1}^{AI}(N_{LT,y} * VS_{LT,d} * MS\%_l * (1-e^{-k(AI_l-d)}) * MCF_l * Bo_{LT}] \quad (29)$$

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/hd/day)
$MS\%_l$	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

If all manure of the CPA is fed into manure treatment system in 24 hours, there will be no need to consider $PE_{storage,y}$ and no need to monitor the relative parameters to calculate $PE_{storage,y}$

6. Calculation of $PE_{y,D}$

$PE_{y,D}$ can be calculated as following table:

Livestock farm No.	$PE_{PL,y}$ (tCO_2e/yr)	$PE_{flare,y}$ (tCO_2e/yr)	$PE_{power,y}$ (tCO_2e/yr)	$PE_{transp,y}$ (tCO_2e/yr)	$PE_{storage,y}$ (tCO_2e/yr)	$PE_{y,D}$ (tCO_2e/yr)
LF-[XXX]01						
LF-[XXX]02						
……						
LF-[XXX]						
Sum						

(II) According to AMS-I.C(Ver.19.0), project activity emissions of AMS-I.C(Ver.19.0) component $PE_{y,C}$ consist of:

(a) CO_2 emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the latest version of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion";
(b) CO_2 emissions from electricity consumption by the project activity using the latest version of the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption";
(c) Any other significant emissions associated with project activity within the project boundary.

The project emissions from on-site consumption of fossil fuels and electricity due to the project activity are demonstrated as $PE_{power,y}$ above. And there are no other significant emissions associated with project activity within the project boundary. Therefore, the $PE_{y,C}$=0 tCO_2e.

(III) According to AMS-I.F(Ver.2.0), for energy generation projects using biogas, the $PE_{y,F}$=0 tCO_2e. In addition, the CO_2 emissions from on-site consumption of fossil fuels due to the project activity has been demonstrated as $PE_{power,y}$ above.

III. Calculate Leakage emissions

No energy generating equipment is transferred from outside the boundary to each CPA under the PoA. In addition, the collection/processing/transportation of animal manure is inside the project boundary. As per AMS-I.C(Ver.19.0), AMS-I.F(Ver.2.0) and AMS-III.D(Ver.18.0), leakage can be neglected. Therefore, leakage emissions of AMS-III.D component $LE_{y,D}$=0 tCO2e, leakage emissions of AMS-I.C component $LE_{y,C}$=0 tCO2e, and leakage emissions of AMS-I.F component $LE_{y,F}$=0 tCO2e.

IV. Calculate Emission Reductions

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

$$ER_y = ER_{y,D} + ER_{y,C} = BE_{CH_4,y} - PE_{y,D} - LE_{y,D} + BE_{Thermal,y} - PE_{y,C} - LE_{y,C}$$

Only applicable to CPAs under Scenario I (30)

$$ER_y = ER_{y,D} + ER_{y,F} = BE_{CH_4,y} - PE_{y,D} - LE_{y,D} + BE_{El,y} - PE_{y,F} - LE_{y,F}$$

Only applicable to CPAs under Scenario II (31)

$$ER_y = ER_{y,D} + ER_{y,C} + ER_{y,F}$$
$$= BE_{CH_4,y} - PE_{y,D} - LE_{y,D} + BE_{Thermal,y} - PE_{y,C} - LE_{y,C} + BE_{El,y} - PE_{y,F} - LE_{y,F}$$

Only applicable to CPAs under Scenario III (32)

Where:

ER_y	Emission reductions in year *y*(tCO_2e/yr)
$ER_{y,D}$	Emission reductions of AMS-III.D (Ver.18.0)component in year y (tCO_2e)
$ER_{y,C}$	Emission reductions of AMS-I.C (Ver.19.0)component in year y (tCO_2e)
$ER_{y,F}$	Emission reductions of AMS-I.F (Ver.2.0)component in year y (tCO_2e)

ER_y can be calculated as following table:

For the CPAs under scenario I,

Livestock Farm No.	LF-[XXX]01	LF-[XXX]02	……	LF-[XXX]	Sum
$BE_{CH_4\,y}$					

$PE_{y,D}$					
$LE_{y,D}$					
$BE_{Thermal,y}$					
$PE_{y,C}$					
$LE_{y,C}$					
ER_y					

For the CPAs under scenario II,

Livestock Farm No.	LF-[XXX]01	LF-[XXX]02	……	LF-[XXX]	Sum
$BE_{CH_4\,y}$					
$PE_{y,D}$					
$LE_{y,D}$					
$BE_{El\,y}$					
$PE_{y,F}$					
$LE_{y,F}$					
ER_y					

For the CPAs under scenario III,

Livestock Farm No.	LF-[XXX]01	LF-[XXX]02	……	LF-[XXX]	Sum
$BE_{CH_4\,y}$					
$PE_{y,D}$					
$LE_{y,D}$					

$BE_{Thermal,y}$					
$PE_{y,C}$					
$LE_{y,C}$					
$BE_{El\,y}$					
$PE_{y,F}$					
$LE_{y,F}$					
ER_y					

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

>>

For LF-[XXX]01:

Year	Estimation of project activity emissions(tCO_2e)	Estimation of baseline emissions(tCO_2e)	Estimation of leakage(tCO_2e)	Estimation of overall emission reductions(tCO_2e)
[XXX]				
[XXX]				
[XXX]				
[XXX]				
[XXX]				
[XXX]				
[XXX]				
Total(tCO_2e)				

For LF-[XXX]02:

Year	Estimation of project activity emissions(tCO_2e)	Estimation of baseline emissions(tCO_2e)	Estimation of leakage(tCO_2e)	Estimation of overall emission reductions(tCO_2e)
[XXX]				
[XXX]				
[XXX]				
[XXX]				
[XXX]				
[XXX]				
[XXX]				
Total(tCO_2e)				

……

For LF-[XXX]:

Year	Estimation of project activity emissions(tCO_2e)	Estimation of baseline emissions(tCO_2e)	Estimation of leakage(tCO_2e)	Estimation of overall emission reductions(tCO_2e)
[XXX]				
[XXX]				
[XXX]				
[XXX]				
[XXX]				
[XXX]				
[XXX]				
Total(tCO_2e)				

For the CPA:

Year	Estimation of project activity emissions(tCO_2e)	Estimation of baseline emissions(tCO_2e)	Estimation of leakage(tCO_2e)	Estimation of overall emission reductions(tCO_2e)
[XXX]				
[XXX]				
[XXX]				
[XXX]				
[XXX]				
[XXX]				
[XXX]				
Total(tCO_2e)				

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

B.6.1. Description of the monitoring plan:

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The objective of the monitoring plan is to assure the complete, consistent, clear, and accurate monitoring and calculation of the project emission reductions during the whole crediting period. The CPA implementer is responsible for the implementation of the monitoring plan, and the consumers cooperate with the CPA implementer. And on-site inspections will be conducted for each individual livestock farm during the verification of the CPA.

As per AMS-III.D (Ver.18.0), 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:

$$ER_{y,D,ex\,post} = \min[(BE_{y,D,ex\,post} - PE_{y,D,ex\,post}),(MD_y - PE_{power,y,ex\,post})] \quad (33)$$

Where:

$ER_{y,D,ex\,post}$	Emission reductions of AMS-III.D (Ver.18.0) component achieved by the project activity based on monitored values for year y (tCO_2e)
$BE_{y,D,ex\,post}$	Baseline emissions calculated using equation 1 of AMS-III.D(Ver.18.0) (for projects using option in paragraph 9 (a)) using ex post monitored values of $N_{LT,y}$ and if applicable $VS_{LT,y}$
$PE_{y,D,ex\,post}$	Project emissions calculated using equation 5 of AMS-III.D(Ver.18.0) and relevant equation of AMS-III.F and AMS-I.D using *ex post* monitored values of $N_{LT,y}$, $MS\%_{i,y}$, $MS\%_l$, AI_l, and if applicable $VS_{LT,y}$
MD_y	Methane captured and destroyed or used gainfully by the project activity in year *y* (tCO_2e)
$PE_{power,y,ex\,post}$	Emissions from the use of fossil fuel and/or electricity for the operation of the installed facilities based on monitored values in the year *y* (tCO_2e).

In case of flaring/combustion MD_y will be measured using the conditions of the flaring process:

$$MD_y = BG_{burnt,y} * w_{CH_4,y} * D_{CH_4} * FE * GWP_{CH_4} \quad (34)$$

Where:

$BG_{burnt,y}$	Biogas flared or combusted in year y (m^3) According to AMS-III.D (Ver.18.0), the amount of biogas recovered $BG_{biogas,PJ,y}$ and fuelled, flared or used gainfully shall be monitored ex post, using flow meters. When the biogas combusted by the boiler system for thermal energy, the monitored parameter is $BG_{biogas-1,PJ,y}$. When the biogas combusted by the equipments whose maximum output capacity are less than 45 kW thermal, e.g. biogas stoves, for thermal energy, the monitored parameter is $BG_{biogas-2,PJ,y}$. When the biogas combusted by the power generation system for electricity, the monitored parameter is $BG_{biogas-3,PJ,y}$. When the biogas flared, the monitored parameter is $BG_{biogas-4,PJ,y}$. If the biogas flared ($BG_{biogas-4,PJ,y}$) and fuelled ($BG_{biogas-1,PJ,y}$, $BG_{biogas-2,PJ,y}$, $BG_{biogas-3,PJ,y}$) is continuously monitored separately, the two fractions can be added to determine the biogas recovered ($BG_{biogas,PJ,y}$). In that case, recovered biogas ($BG_{biogas,PJ,y}$) need not be monitored separately. And the $BG_{burnt,y}$ is determined as the monitored parameters $BG_{biogas,PJ,y}$, $BG_{biogas-1,PJ,y}$, $BG_{biogas-2,PJ,y}$, $BG_{biogas-3,PJ,y}$ and/or $BG_{biogas-4,PJ,y}$ accordingly.
$w_{CH4,y}$	Methane content in biogas in the year y (volume fraction) .
FE	Flare efficiency in the year y (fraction). 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. When the methane is flared, the FE is equal to the $\eta_{flare,h}$ to determine the $PE_{flare,y}$

So the emission reductions achieved by the typical CPA will be determined *ex post* according to the following formula:

$$ER_y = ER_{y,D,ex\,post} + ER_{y,C} = ER_{y,D,ex\,post} + BE_{Thermal,y} - PE_{y,C} - LE_{y,C}$$

Only applicable to CPAs under Scenario I (35)

$$ER_y = ER_{y,D,ex\,post} + ER_{y,F} = ER_{y,D,ex\,post} + BE_{El,y} - PE_{y,F} - LE_{y,F}$$

Only applicable to CPAs under Scenario II (36)

$$ER_y = ER_{y,D,ex\,post} + ER_{y,C} + ER_{y,F} = ER_{y,D,ex\,post} + BE_{Thermal,y} - PE_{y,C} - LE_{y,C} + BE_{El,y} - PE_{y,F} - LE_{y,F}$$

Only applicable to CPAs under Scenario III (37)

1. Data and parameters monitored:

Data / Parameter:	W_{site}
Data unit:	kg
Description:	Average animal weight of a defined livestock population at the project site
Source of data to be used:	CPA implementer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[XXX]
Description of measurement methods and procedures to be applied:	Annually recording
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:	nd_y
Data unit:	day
Description:	Number of days that the animal manure management system was operational in year y.
Source of data to be used:	Assumed 365 days in the typical CPA, actual data is from the monitoring
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[XXX]
Description of measurement methods and procedures to be applied:	Annually, based on daily records and monthly aggregation. And if any farm has no operations on a given day it needs to be documented (e.g. logbook) and taken into account for the calculation of $BE_{ex\text{-}post}$.
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	$N_{da,y}$
Data unit:	Number
Description:	Number of days animal is alive in the farm in the year *y*
Source of data to be used:	CPA implementer
Value of data applied	[XXX]

for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Annually, based on monthly records. The rolled-in date and rolled-out date of every animal will be recorded and rolled-in date will be also marked on the correspondent animal during its lifetime by the farm owners. So the average number of days animal is alive can be calculated.
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:	Number
Description:	Number of animals produced annually of type LT for the year *y*
Source of data to be used:	CPA implementer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[XXX]
Description of measurement methods and procedures to be applied:	Annually, based on monthly records. The farm owners will keep records of sales for every animal transaction, so the number of animals produced annually can be calculated.
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:	$MS\%_{i,y}$
Data unit:	%
Description:	Fraction of manure handled in system "i" in project activity in year y
Source of data to be used:	CPA implementer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	100
Description of measurement methods and procedures to be applied:	Annually, based on daily measurement and monthly aggregation. In case animal manure is treated in different treatment systems manure weight delivered to each system shall be directly measured or alternatively manure volume can be measured together with the density determined from representative sample (90/10 precision). The quantity of animal manure from different farms and different animal types will be recorded separately for cross-check. Recording of the baseline animal manure management system where the animal manure would have been treated anaerobically is also required.

	Archive electronically and all data records will be kept until 2 years after the end of the crediting period.
QA/QC procedures to be applied:	
Any comment:	-

Data / Parameter:	$MS\%_l$
Data unit:	%
Description:	Fraction of volatile solids (%) handled by storage device *l*
Source of data to be used:	CPA implementer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[XXX]
Description of measurement methods and procedures to be applied:	Monthly. It is to be used to calculate possible project emissions due the storage of animal manure, as per paragraph 16 of AMS-III.D.
QA/QC procedures to be applied:	
Any comment:	Used to calculate $PE_{storage,y}$

Data / Parameter:	Q_y
Data unit:	tons
Description:	Quantity of raw waste/manure treated and/or wastewater co-treated in the year y
Source of data to be used:	CPA implementer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[XXX]
Description of measurement methods and procedures to be applied:	On-site data sheets recorded monthly using weigh bridge. Weighbridge will be subject to periodic calibration (in accordance with stipulation of the weighbridge supplier).
QA/QC procedures to be applied:	
Any comment:	Used to calculate $PE_{transp,y}$

Data / Parameter:	CT_y
Data unit:	tons/truck
Description:	Average truck capacity for transportation
Source of data to be used:	CPA implementer

Value of data applied for the purpose of calculating expected emission reductions in section B.5	[XXX]
Description of measurement methods and procedures to be applied:	On site measurement
QA/QC procedures to be applied:	
Any comment:	Used to calculate $PE_{transp,y}$

Data / Parameter:	DAF_w
Data unit:	km/truck
Description:	Average incremental distance for raw solid waste/manure and/or wastewater transportation
Source of data to be used:	CPA implementer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[XXX]
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:	Used to calculate $PE_{transp,y}$

Data / Parameter:	$Q_{y,treatment}$
Data unit:	tons
Description:	Quantity of compost produced in year *y*
Source of data to be used:	CPA implementer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[XXX]
Description of measurement methods and procedures to be applied:	On-site data sheets recorded monthly using weigh bridge. Weighbridge will be subject to periodic calibration (in accordance with stipulation of the weighbridge supplier).
QA/QC procedures to be applied:	

Any comment:	Used to calculate $PE_{transp,y}$

Data / Parameter:	$CT_{y,treatment}$
Data unit:	tons/truck
Description:	Average truck capacity for compost transportation
Source of data to be used:	CPA implementer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[XXX]
Description of measurement methods and procedures to be applied:	On site measurement
QA/QC procedures to be applied:	
Any comment:	Used to calculate $PE_{transp,y}$

Data / Parameter:	$DAF_{treatment}$
Data unit:	km/truck
Description:	Average distance for compost transportation
Source of data to be used:	CPA implementer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[XXX]
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:	Used to calculate $PE_{transp,y}$

Data / Parameter:	AI_l
Data unit:	days
Description:	Annual average interval between manure collection and delivery for treatment at a given storage device l (days)
Source of data to be used:	CPA implementer
Value of data applied for the purpose of calculating expected	[XXX]

emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Annually, based on monthly records. It is to be used to calculate possible project emissions due the storage of animal manure, as per paragraph 16 of AMS-III.D.
QA/QC procedures to be applied:	
Any comment:	Used to calculate $PE_{storage,y}$

Data / Parameter:	**T_{flare}**
Data unit:	°C
Description:	Temperature in the exhaust gas of the flare
Source of data to be used:	CPA implementer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[XXX]
Description of measurement methods and procedures to be applied:	Measure the temperature of the exhaust gas stream in the flare by a Type N thermocouple. A temperature above 500°C indicates that a significant amount of gases are still being burnt and that the flare is operating.
QA/QC procedures to be applied:	Thermocouples should be replaced or calibrated every year.
Any comment:	An excessively high temperature at the sampling point (above 700°C) may be an indication that the flare is not being adequately operated or that its capacity is not adequate to the actual flow. Used to determine the $\eta_{flare,h}$ and calculate $PE_{flare,y}$.

Data / Parameter:	**Other flare operation parameters**
Data unit:	-
Description:	This should include all data and parameters that are required to monitor whether the flare operates within the range of operating conditions according to the manufacturer's specifications including a flame detector in case of open flares. Such as flare operation hours.
Source of data to be used:	CPA implementer
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:	Measured continuously

QA/QC procedures to be applied:	Timing only during the flaring status.
Any comment:	The operation parameters will be monitored in accordance with the manufacturer's specification. Used to determine the $\eta_{flare,h}$ and calculate $PE_{flare,y}$.

Data / Parameter:	**FE**
Data unit:	%
Description:	The flare efficiency
Source of data to be used:	Determined according to "Tool to calculate project emissions from flaring gases containing methane" and paragraph 22 of AMS-III.D.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[XXX]
Description of measurement methods and procedures to be applied:	As per the "Tool to determine project emissions from flaring gases containing Methane". Regular maintenance shall be carried out to ensure optimal operation of flares. If there is no flare in the CPA, a destruction efficiency of 100% can be used for the amount that is combusted for energy.
QA/QC procedures to be applied:	
Any comment:	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. When the methane is flared, the FE is equal to the $\eta_{flare,h}$ (default value) to determine the $PE_{flare,y}$.

Data / Parameter:	$BG_{biogas,PJ,y}$
Data unit:	m^3
Description:	The total volume of the biogas generated in year y.
Source of data to be used:	The data used come from the third party document (eg.FSR), the actual data should be measured with meter(s).
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[XXX]
Description of measurement methods and procedures to be applied:	Annually, based on continuous flow measurement with daily accumulated volume reading. Flow meters will be installed at the outlet of gas tank. Archive electronically and all data records will be kept until 2 years after the end of the crediting period. This parameter is used as cross-check.
QA/QC procedures to be applied:	Flow meters will undergo maintenance/calibration subject to appropriate industry standards.
Any comment:	Reasonable. If the biogas flow meter(s) employed measures flow, pressure and temperature and displays/outputs normalised flow of biogas, there is no need for separate monitoring of pressure and temperature of the biogas. Otherwise, the temperature and the pressure of the biogas shall be measured at the same time when the flow of the biogas is measured.

Data / Parameter:	$BG_{biogas-1,PJ,y}$
Data unit:	m^3
Description:	The volume of the biogas supplied to boilers in year y.
Source of data to be used:	The data used come from the third party document (eg.FSR), the actual data should be measured with meter(s).
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[XXX]
Description of measurement methods and procedures to be applied:	Annually, based on continuous flow measurement with daily accumulated volume reading. Flow meter(s) will be installed at the inlet of boiler(s). Archive electronically and all data records will be kept until 2 years after the end of the crediting period.
QA/QC procedures to be applied:	Flow meters will undergo maintenance/calibration subject to appropriate industry standards.
Any comment:	Reasonable. If the biogas flow meter(s) employed measures flow, pressure and temperature and displays/outputs normalised flow of biogas, there is no need for separate monitoring of pressure and temperature of the biogas. Otherwise, the temperature and the pressure of the biogas shall be measured at the same time when the flow of the biogas is measured.

Data / Parameter:	$BG_{biogas-2,PJ,y}$
Data unit:	m^3
Description:	The volume of the biogas supplied to the equipments whose maximum output capacity are less than 45 kW thermal, e.g. biogas stoves,in year y.
Source of data to be used:	The data used come from the third party document (eg.FSR), the actual data should be measured with meter(s).
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[XXX]
Description of measurement methods and procedures to be applied:	Annually, based on continuous flow measurement with daily accumulated volume reading. Flow meter(s) will be installed to measure the biogas supplied to the equipments whose maximum output capacity are less than 45 kW thermal, e.g. biogas stoves. Archive electronically and all data records will be kept until 2 years after the end of the crediting period.
QA/QC procedures to be applied:	Flow meters will undergo maintenance/calibration subject to appropriate industry standards.
Any comment:	Reasonable. If the biogas flow meter(s) employed measures flow, pressure and temperature and displays/outputs normalised flow of biogas, there is no need for separate monitoring of pressure and temperature of the biogas. Otherwise, the temperature and the pressure of the biogas shall be measured at the same time when the flow of the biogas is measured.

Data / Parameter:	$BG_{biogas-3,PJ,y}$

Data unit:	m^3
Description:	The volume of the biogas supplied to power generator in year y
Source of data to be used:	The data used come from the third party document (eg.FSR), the actual data should be measured with meter(s).
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[XXX]
Description of measurement methods and procedures to be applied:	Annually, based on continuous flow measurement with daily accumulated volume reading. Flow meter(s) will be installed at the inlet of the generator. Archive electronically and all data records will be kept until 2 years after the end of the crediting period.
QA/QC procedures to be applied:	Flow meter(s) will undergo maintenance/calibration subject to appropriate industry standards.
Any comment:	Reasonable. If the biogas flow meter(s) employed measures flow, pressure and temperature and displays/outputs normalised flow of biogas, there is no need for separate monitoring of pressure and temperature of the biogas. Otherwise, the temperature and the pressure of the biogas shall be measured at the same time when the flow of the biogas is measured.

Data / Parameter:	$BG_{biogas-4,PJ,y}$
Data unit:	m^3
Description:	The volume of the biogas supplied to flare in year y
Source of data to be used:	0 for ex ante calculation, and it will be monitored during the crediting period.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[XXX]
Description of measurement methods and procedures to be applied:	Annually, based on continuous flow measurement with hourly accumulated volume reading. Flow meter(s) will be installed at the inlet of the flare. Archive electronically and all data records will be kept until 2 years after the end of the crediting period.
QA/QC procedures to be applied:	Flow meter(s) will undergo maintenance/calibration subject to appropriate industry standards.
Any comment:	Reasonable. If the biogas flow meter(s) employed measures flow, pressure and temperature and displays/outputs flow of biogas, there is no need for separate monitoring of pressure and temperature of the biogas. Otherwise, the temperature and the pressure of the biogas shall be measured at the same time when the flow of the biogas is measured.

Data / Parameter:	$EG_{thermal,y}$
Data unit:	TJ/yr
Description:	The net quantity of steam/heat supplied by the project activity during the year *y*

Source of data to be used:	The data used come from the third party document (eg.FSR), the actual data should be measured with meter(s).
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[XXX]
Description of measurement methods and procedures to be applied:	Continuous monitoring, monthly recording. Heat generation is determined as the difference of the enthalpy of the steam or hot fluid and/or gases generated by the heat generation equipment and the sum of the enthalpies of the feed-fluid and/or gases blow-down and if applicable any condensate returns. The respective enthalpies should be determined based on the mass (or volume) flows, the temperatures and, in case of superheated steam, the pressure. Steam tables or appropriate thermodynamic equations may be used to calculate the enthalpy as a function of temperature and pressure.
QA/QC procedures to be applied:	Meter(s) will undergo maintenance/calibration subject to appropriate industry standards. Uncertainty of the meter(s) to be obtained from the manufacturers.
Any comment:	-

Data / Parameter:	Continuous operation of the thermal equipment/system
Data unit:	-
Description:	Continuous operation of the thermal equipment/system
Source of data to be used:	CPA implementer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[XXX]
Description of measurement methods and procedures to be applied:	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.
QA/QC procedures to be applied:	
Any comment:	-

Data / Parameter:	$EG_{BL,y}$
Data unit:	MWh/yr
Description:	Quantity of the grid electricity displaced as a result of the implementation of the CDM project activity in year y
Source of data to be used:	The data used come from the third party document (eg.FSR), the actual data should be measured with electricity meter(s).
Value of data applied for the purpose of calculating expected emission reductions in	[XXX]

section B.5	
Description of measurement methods and procedures to be applied:	Continuous monitoring, monthly recording. Electricity meter(s) will be installed to measure the quantity of the electricity displaced from the grid as a result of the implementation of the CDM project activity in year y
QA/QC procedures to be applied:	Electricity meter(s) will undergo maintenance/calibration subject to appropriate industry standards. Uncertainty of the meter(s) to be obtained from the manufacturers.
Any comment:	-

Data / Parameter:	$EG_{PJ, ele,,y}$
Data unit:	MWh/yr
Description:	Quantity of electricity consumed by the Project facilities in year *y*
Source of data to be used:	The data used come from the third party document (eg.FSR), the actual data should be measured with electricity meter(s).
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[XXX]
Description of measurement methods and procedures to be applied:	Continuous monitoring, monthly recording. Electricity meter(s) will be installed to measure the quantity of the electricity consumed by the project activity in year y.
QA/QC procedures to be applied:	Electricity meter(s) will undergo maintenance/calibration subject to appropriate industry standards. Uncertainty of the meter(s) to be obtained from the manufacturers.
Any comment:	-

2. Monitoring organization

The CME will act as the overall supervisor of the PoA, preparing the operation and monitoring manual for CPAs, calculating emission reductions and preparing monitoring reports periodically to the DOE

The CPA implementers will undertake the monitoring of CPA operations including employee training, data collection and report to CME periodically.

This monitoring plan will be carried out by each monitoring team of each CPA implementer under the supervision of the CME, designated by the CPA implementer, which consists of a team leader, an assistant and at least two operators. This team leader has the overall responsibility for the monitoring and verification process, training and managing all team members, and keep in touch with the CME.

The assistant will help the team leader to supervise the operation of the project, including data monitoring, negotiations with the consumers, and to collect financial data.

The operators will be responsible for calibrating and maintaining the meters, measuring and recording relevant readings, collecting, checking, archiving and managing data, and making summary according to the CDM project's requirements at a regular basis.

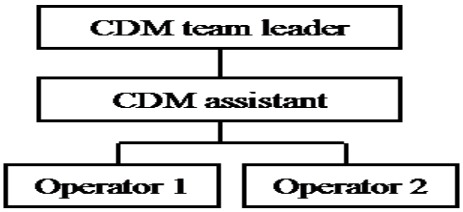


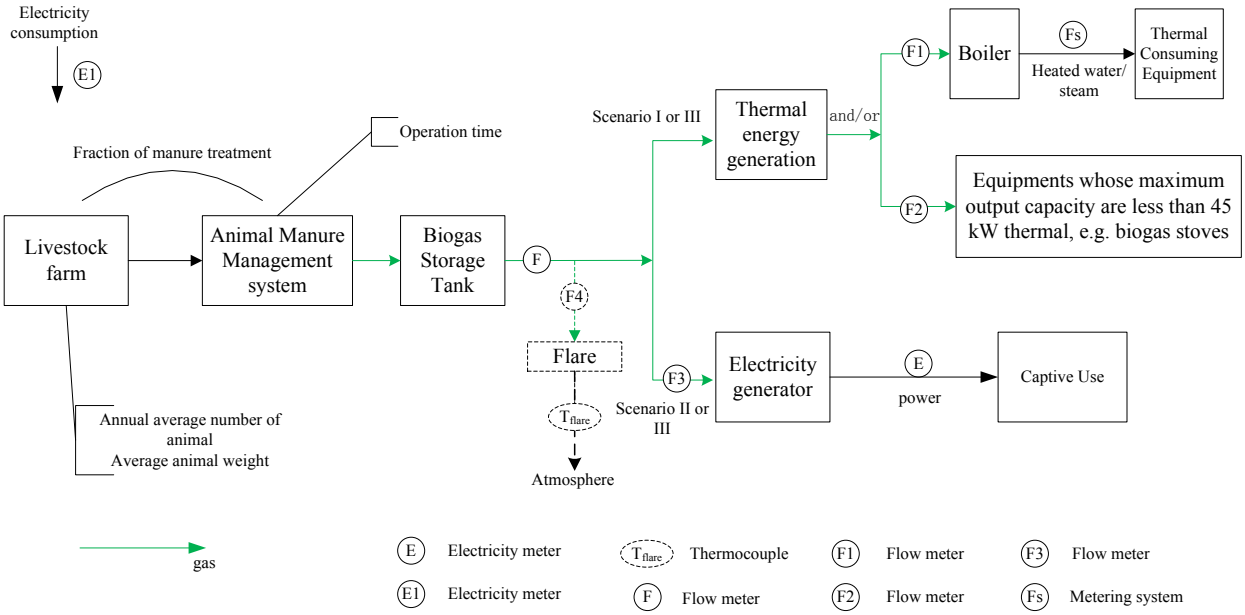
Figure B-3 Monitoring team organization

3. Installation of monitoring meters

Meter F[13] will be equipped at the end of gas tank for measurement of total generated biogas ($BG_{biogas,PJ,y}$), and/or meter F1 will be equipped at the entrance of boiler system to measure the biogas supplied to boiler system ($BG_{biogas-1,PJ,y}$), and/or meter F2 will be installed to measure the biogas supplied to the equipments whose maximum output capacity are less than 45 kW thermal, e.g. biogas stoves, ($BG_{biogas-2,PJ,y}$), and/or meter F3 will be equipped at the entrance of power generation system to measure the biogas supplied to the power generator ($BG_{biogas-3,PJ,y}$), and/or metering system Fs will be equipped to measure the thermal energy supplied $EG_{thermal,y}$ by the project activity , and/or E will be equipped to measure the electricity supplied ($EG_{BL,y}$) by the project activity, and E1 will be equipped to measure the electricity consumption ($EG_{PJ,\ elc,,y}$) by the project activity.

In case the biogas will be supplied to the flare, meter F4 will be equipped at the entrance of flare to measure the biogas supplied to flare ($BG_{biogas-4,PJ,y}$), and the thermocouple will be equipped to measure the temperature in the exhaust gas of the flare (T_{flare}).

Location of each meter is shown in the following figure:



[13] In case the biogas flared ($BG_{biogas-4,PJ,y}$) and fuelled ($BG_{biogas-1,PJ,y}$, $BG_{biogas-2,PJ,y}$, $BG_{biogas-3,PJ,y}$) is continuously monitored separately, the two fractions can be added to determine the biogas recovered ($BG_{biogas,PJ,y}$). In that case, recovered biogas ($BG_{biogas,PJ,y}$) need not be monitored separately, i.e., the Meter F need not be equipped.

Figure B-4 Monitoring system

4. Equipment management system
The accuracy of the equipments will be satisfied with the related national standards, and the equipment will undergo routing maintenance and calibration subject to the appropriate industry and/or national standards and requirements by the CDM operator and outsourced company with the help of the operators. The calibrations will be complied with the related national standards. All the records will be maintained.

5. Data management
Hard copy documentation such as paper maps, diagrams and environmental assessment will be collected in a central place, together with this monitoring plan. In order to facilitate auditor's reference, monitoring results will be indexed and sent to the monitoring computer managed by the CME at a regular basis. All the data after internal validation should be saved up to 2 years after the end of the crediting period.

6. Disposing process of abnormity
If the error of data is caused by accidents during the crediting period, CPA implementers and consumers will deal with it as contingency.CDM team should be informed about the accidents occurred at project site in time. The CDM team leader and assistant will analyze the rationality of data according to conservative rules of CDM projects. The data should be recorded and archived.

7. Verification of monitoring results
The responsibilities for verification of the projects are as follows:

- The CME and CPA implementers will make the arrangements for the verification and will prepare for the audit and verification process to the best of its abilities.
- The CME and CPA implementers will facilitate the verification through providing the DOE with all required necessary information, before, during and in the event of queries, after the verification.

The CME and CPA implementers will fully cooperate with the DOE and instruct CDM monitoring team and manage to be available for interviews and respond honestly to all questions from the DOE.

8. Training
Training will be done at a regular interval organized by the CME, and a local management team will be established to be responsible for giving operational and monitoring guidance and occasional trainings.

SECTION C. Environmental Analysis

>>

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:

>>

☐ Please tick if this information is provided at the PoA level. In this case sections C.2. and C.3. need not be completed in this form.

Environmental analysis of the PoA is done at CPA level, because the environmental impact of biogas project for each livestock depends entirely on the particular location, size and how the project is embedded in its environment.

Therefore, the environmental analysis should be done at SSC-CPA level, and the EIA and its approval will be provided for each project.

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

>>The analysis of the environmental impacts for CPA will be description based on the real situation of each specific CPA-DD.

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:

>>

The analysis of the environmental impacts for CPA will be description based on the real situation of each specific CPA-DD.

SECTION D. Stakeholders' comments

>>

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

>>

☐ Please tick if this information is provided at the PoA level. In this case sections D.2. to D.4. need not be completed in this form.

The stakeholder comments are invited at the CPA level. The impact on the surrounding communities of the biogas project for each livestock depends entirely on the particular location, size and how the project is embedded in its environment. Therefore, the CPA level is the adequate choice for inviting stakeholder comments.

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

>>

Brief description how comments local stakeholders have been invited and complied will be detailed described in each specific CPA-DD.

D.3. Summary of the comments received:

>>

The comments received for different CPA will be documented in each specific CPA-DD.

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

>>

Clarifications following comments received on the different CPA will be documented in each specific CPA-DD.

Annex 1

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

Organization:	HuaQi Environmental Clean Technologies Co., Ltd.
Street/P.O.Box:	No.126 Xiangjiang Middle Road
Building:	No.3 Huasheng New Bund Garden Building
City:	Changsha
State/Region:	Hunan Province
Postfix/ZIP:	410005
Country:	China
Telephone:	+86-731-89799581
FAX:	+86-731-82859978
E-Mail:	huaqi.zhanghu@gmail.com
URL:	
Represented by:	Zhang Hu
Title:	
Salutation:	Mr.
Last Name:	Zhang
Middle Name:	
First Name:	Hu
Department:	
Mobile:	
Direct FAX:	+86-731-82859978
Direct tel:	+86-731-89799581
Personal E-Mail:	huaqi.zhanghu@gmail.com

The contact information of CPA-[XXX] implementer(s) will list here followed by the CME information.

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding from Annex I Parties for this Project.

Annex 3

BASELINE INFORMATION

To be filled in the specific CPA-DD.

Annex 4

MONITORING INFORMATION

No additional information.