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

CONTENTS

Annexes

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.

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[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:

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Sichuan Animal Farms GHG Mitigation Programme, CPA Nb. SCAFBG-XXXX-XXX

Version: 1.6

Date: 03/12/2012

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

The CPA SCAFBG-2011-01, under the framework of Sichuan Animal Farms GHG Mitigation Programme, involves the installation and operation of a biogas system and a utilization system for electricity generation on FARM(s) located in LOCATION, Sichuan Province, China.

NUMBER OF PIGS AT FARMS

DESCRIPTION OF BASELINE SCENARIO

DESCRIPTION OF PROJECT SCENARIO

To simplify the development process, the proposed CPA will only claim emission reductions from the avoidance of methane emission due to the existing AWMS. No CERs will be claimed for substituting fossil fuel by biogas for heating or electricity generation.

The average annual emission reductions expected from this CPA are XXX tCO_2e.The total emission reductions are expected to be XXX tCO_2e throughout the whole crediting period of 10 years.

IMPLEMENTER(s) OF THE CPA

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

DESCRIPTION OF CONTRIBUTION TO LOCAL SUSTAINABLE DEVELOPMENT

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

The CPA implementers are as follows:

- IMPLEMENTER(s)

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

The technical process and measures employed by FARM(s) in the proposed CPA will comprise four stages as follows:

TECHNICAL DESCRIPTION

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

>>

A.4.1.1. Host Party:

>> 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):

FARM(s) can be clearly identified by the detailed information shown in Table 1 and Figure 1 and Figure 2.

Name of the farm	Address	Latitude	Longitude
XXX	XXX	XXX	XXX

Table 1: Location of the farm.

Figure 1: Administrative area of Sichuan province.

Figure 2: Location of the farm.

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

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

>>

XXX

The starting date of the CPA is no earlier than the date of commencement of PoA validation.

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

>>

XXX

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

Fixed crediting period

A.4.3.1. Starting date of the crediting period:

>>

XX/XX/XXXX, or the date of inclusion into the registered PoA, whichever occurs later

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

>>

10 years

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

>>

The estimated yearly emission reduction is calculated based on the equations listed in the PoA-DD of the Sichuan Animal Farms GHG Mitigation Programme.

The estimated average annual emission reductions are XXX tCO_2e. Over the chosen crediting period of 10 years, the total emission reductions are therefore expected to be XXX tCO_2e.

A breakdown of estimated yearly ERs is given in the table below:

Year	Estimation of annual emission reductions in tonnes of CO_2e
Year 1	XXX
Year 2	XXX
Year 3	XXX
Year 4	XXX
Year 5	XXX
Year 6	XXX
Year 7	XXX
Year 8	XXX
Year 9	XXX
Year 10	XXX
Total estimated reductions (tonnes of CO_2e)	XXX
Total number of crediting years	10
Annual average of the estimated reductions over the crediting period	XXX

A.4.5. Public funding of the CPA:

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

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

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According to the Guidelines on Assessment of Debundling for SSC Project Activities, *a proposed small-scale CPA of a PoA 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 a 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 proposed small-scale CPA, at the closest point.

Neither the C/ME of the PoA nor the implementers do manage a large scale PoA or a large CDM activity of the same sectoral scope as the proposed CPA. Furthermore, there is no other similar project activity with a boundary lies closer than 1km from the project location, at the closest point.

Therefore, as per the Guidelines on assessment of debundling for SSC project activities (version 03), the proposed CPA is not a de-bundled component of another CDM Programme Activity and is eligible to use the simplified modalities and procedures for small-scale project activities.

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

>>

In order to avoid double accounting and to ensure that those operating the CPA are aware of and have agreed that their activity is being subscribed to the PoA. The involved farm, FARM(s), in accordance with the eligibility criteria stipulated in section A.4.2.2, confirms in a written statement that:

1. The CPA and the biogas system to be newly installed in FARM(s) to be installed under the CPA have not been and will not be registered as a single CDM project activity or as a CPA under another PoA.
2. FARM(s) is aware and agrees that the CPA will be subscribed to the present PoA.

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

1. Internal cross-check procedure: the proposed CPA is the first CPA under the Sichuan Animal Farm GHG Mitigation Programme, no double counting takes place in the PoA.
2. External cross-check procedure: After checking the official CDM websites (UNFCCC website, NDRC CDM website, etc), the C/ME confirms that the proposed CPA does not have an overlapping location with any existing registered CDM project or PoA.

Both checks came to a negative result. Hence, it can be excluded that any kind of double counting will occur during the crediting period of this CPA.

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:

>>

Sichuan Animal Farms GHG Mitigation Programme

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

>>

Eligibility criteria of the PoA and justification why they are fulfilled by the CPA:

Nb.	Criterion	Fulfilled?	Evidence
1.	The CPA has been approved by the C/ME.	☒ XXX	• XXX
2.	The SSC-CPA is not a de-bundled component of another CDM programme activity (CPA) or CDM project activity.	☒ XXX	• XXX
3.	All relevant applicability criteria of methodology AMS-III.D (Version 18) shall be met.[3]		
3.1.	• Project activities involve the replacement or modification of an anaerobic animal manure management systems in livestock farms to achieve methane recovery and destruction by flaring/combustion or gainful use of the recovered methane.	☒ XXX	• XXX
3.1.1.	• The livestock population in the farm is managed under confined conditions;	☒ XXX	• XXX

[3] Criteria 3 of AMS III.D, Version 18 is not applicable to the CPAs, as it is only applicable for landfill projects.

3.1.2.	• Manure or the streams obtained after treatment are not discharged into natural water resources (e.g. river or estuaries)	☒ XXX	• XXX
3.1.3.	• The annual average temperature of baseline site where anaerobic manure treatment facility is located is higher than 5°C;	☒ XXX	• XXX
3.1.4.	• 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;	☒ XXX	XXX
3.1.5.	• No methane recovery and destruction by flaring, combustion or gainful use takes place in the baseline scenario.	☒ XXX	XXX
3.2.	• The project activity satisfies the following conditions	☒ XXX	
3.2.1.	• The residual waste from the animal manure management system shall be handled aerobically, otherwise the related emissions shall be taken into account.	☒ XXX	XXX
3.2.2.	• Technical measures shall be used (including a flare for exigencies) to ensure that all biogas produced by the digester is used or flared.	☒ XXX	XXX

3.2.3.	• 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. 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.	☒ XXX	• XXX
3.3.	• Measures are limited to those that result in aggregate emission reductions of less than or equal to 60 kt CO2 equivalent annually from all Type III components of the project activity.	☒ XXX	XXX
4.	The CPA shall fulfil the criteria of additionality demonstration defined in PoA-DD(section E.5.2)	☒ XXX	XXX
5.	All farms meet the criteria below for farms to be included in a certain CPA.		
5.1.	• The farm is located within the geographic boundary of the CPA.	☒ XXX	• XXX
5.2.	• The farm will install a new anaerobic biogas digester to generate and recover biogas for utilization.	☒ XXX	XXX

5.3.	• The farm will install equipment to utilize the biogas to generate electrical and/or thermal energy and/or to supply the gas to local households in the direct surrounding of the farm. No other forms of biogas utilization will be employed (e.g. bottling).	☒ XXX	• XXX
5.4.	• One of the following two sub-criteria is fulfilled.		
5.4.1.	• The baseline animal waste management system cannot be physically transported to another site outside the project boundary (e.g. concrete lagoon).	☒ XXX	• XXX
5.4.2.	• In case the baseline AWMS could be transported physically, it is scrapped, the scrapping has been documented and the scrapped equipment is stored until it was observed by the DOE.	☒ XXX	XXX
6.	The proposed project and the new CPA do not lead to a diversion of official development assistance (ODA).	☒ XXX	• XXX
7.	The starting date of the CPA is determined and not prior to the Global Stakeholder Consultation of the PoA.		
7.1.	The start date of the CPA lies either in the future, or can be determined with suitable evidence.	☒ XXX	• XXX
7.2.	The start date of the CPA is not before the date of public web hosting of the PoA documentation (01/03/2012).	☒ XXX	• XXX

8.	The end date of the CPA does not exceed the PoA end date.	☒ XXX	• XXX
9.	The CPA implements a monitoring plan that is in line with the monitoring plan described in the PoA-DD (section E.7.2)	☒ XXX	• XXX
10.	Measures to avoid double counting are implemented.		
10.1.	• The CPA implementers confirm in written statements that: a) All biogas systems to be newly installed under the CPA are not and will not be part of another CDM project or program activity and that no CERs will be claimed for the biogas system other than those to be claimed by the C/ME on behalf of the participating farms respectively; and b) That they are aware and agree with the inclusion of the CPA to the proposed PoA.	☒ XXX	XXX
10.2.	• A check for double counting of single farms biogas plant to a negative result.	☒ XXX	• XXX
11.	• An EIA has been conducted for each biogas plant that is part of the new CPA and comes to the conclusion that the project does not have significant negative impacts to the environment. Furthermore, the EIA (table or report) has been approved by the responsible authority.	☒ XXX	• XXX

12.	• A local stakeholder meeting has been conducted for each biogas plant that is part of the new CPA and did not result in major negative objections against the project by the local stakeholders.	☒ XXX	• XXX
13.	• A Feasibility Study has been carried out for each biogas plant and the results have been described in Feasibility Study Reports. Furthermore, the FSRs have been approved by the responsible authority.	☒ XXX	• XXX

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

>>

The following table lists the additionality criteria of the PoA-DD. For the demonstration of additionality, is shown that the criteria listed below are fulfilled.

	Criteria	CPA Situation
1.	The additionality is demonstrated through a financial analysis by showing that:	
a)	IRR calculation result without CDM for each farm included is lower than the benchmark IRR defined, showing that the project is not a financially attractive option; and	XXX
b)	IRR with expected CDM revenue for each farm included is higher than the IRR calculated without consideration of the CDM revenues. Thereby, it is shown that the financial barrier is alleviated; and	XXX
c)	The sensitivity analysis shows that the IRR without CDM for each farm included is still lower than the benchmark IRR defined after considering the variation of the major parameters. In case the IRR exceeds the benchmark for one or more of the scenarios, an analysis needs to come to the conclusion that the critical scenarios are unlikely to happen.	XXX

In the following, the additionality discussion is documented in detail. The timeline of the project implementation is as follows [GRAY COLOR INDICATES THAT THESE ITEMS ARE EXEMPLARY ITEMS BASED ON THE FIRST CPA AND MIGHT CHANGE FROM CPA TO CPA]:

EIA	XXX
FSR	XXX
FSR Approval	XXX
EIA Approval	XXX
Subsidy Approval	XXX
Offers from construction companies received	XXX
Estimated date of contract signature (starting date of the CPA)	XXX

For this specific project, criterion 1 is used to demonstrate the additionality. The relevant input parameters of the financial analysis are listed in the table below.

Item	Value	Unit	Source
Total Static Investment	XXX	XXX	XXX
- Construction	XXX	XXX	XXX
- Equipment purchase	XXX	XXX	XXX
- Equipment installation	XXX	XXX	XXX
- Other expense	XXX	XXX	XXX
- Basic reserve fund	XXX	XXX	XXX
Subsidy received	XXX	XXX	XXX
Project life time (incl. construction period)	XXX	XXX	XXX
Daily biogas sold	XXX	XXX	XXX
Price of gas supply to farm (excl. VAT)	XXX	XXX	XXX
Power capacity	XXX	XXX	XXX
Daily electricity generation	XXX	XXX	XXX
Daily electricity self consumption	XXX	XXX	XXX
Yearly operation days	XXX	XXX	XXX
Electricity price from grid (excl. VAT)	XXX	XXX	XXX
Annual O&M cost	XXX	XXX	XXX
- Material	XXX	XXX	XXX
- Power expenses	XXX	XXX	XXX
- Labour costs	XXX	XXX	XXX
- Repair fee	XXX	XXX	XXX
Residual Rate	XXX	XXX	XXX

Annual solid sludge amount	XXX	XXX	XXX
Price of solid sludge	XXX	XXX	XXX
Annual liquid sludge amount	XXX	XXX	XXX
Price of liquid sludge	XXX	XXX	XXX
Value-added Tax	XXX	XXX	XXX
Annual service value	XXX	XXX	XXX
CER price	XXX	XXX	XXX
RMB/EUR Exchange Rate	XXX	XXX	XXX

Table 2: Main financial parameters.

a) A suitable and applicable IRR benchmark is quantified in the CPA-DD.

According to FSR of the project activity, the Chinese animal husbandry benchmark has been applied for the project farm, the value is 7%[4]

No.	Name of the livestock farm	Benchmark applied
1.	XXX	XXX

b) The financial additionality is demonstrated by showing that the calculated IRR (excluding CDM) is below the applied investment benchmark.

The results of the financial analysis are:

No.	Name of the farm	Benchmark applied	IRR without CDM	IRR with CDM
1.	XXX	XXX	XXX	XXX

To analyse the robustness of this calculation, a sensitivity analysis has been performed using the main input parameters. The results are shown in **Fehler! Verweisquelle konnte nicht gefunden werden.**, **Fehler! Verweisquelle konnte nicht gefunden werden.** and **Fehler! Verweisquelle konnte nicht gefunden werden.**.

[4] The third edition of Economic Evaluation for Construction Project: Methods and Parameters 2006

Fehler! Verweisquelle konnte nicht gefunden werden.

	-10%	-5%	0%	5%	10%
Total static investment	XXX	XXX	XXX	XXX	XXX
Subsidy Received	XXX	XXX	XXX	XXX	XXX
Electricity price	XXX	XXX	XXX	XXX	XXX
Annual electricity generation	XXX	XXX	XXX	XXX	XXX
Thermal energy generation	XXX	XXX	XXX	XXX	XXX
Fossil fuel price	XXX	XXX	XXX	XXX	XXX
Biogas price	XXX	XXX	XXX	XXX	XXX
Annual biogas sold	XXX	XXX	XXX	XXX	XXX
O&M Costs	XXX	XXX	XXX	XXX	XXX
Sludge price	XXX	XXX	XXX	XXX	XXX
Biogas production	XXX	XXX	XXX	XXX	XXX

Table 3: Sensitivity analysis

As can be seen from the table above, none of the analyzed scenarios exceeds the identified benchmarks. The scenarios for which the IRR would exceed the benchmark are the following:

Total static investment	XXX
Subsidy Received	XXX
Electricity price	XXX
Annual electricity generation	XXX
Thermal energy generation	XXX
Fossil fuel price	XXX

Annual biogas sold	XXX
Biogas price	XXX
O&M Costs	XXX
Sludge price	XXX
Biogas production	XXX

Table 4: Parameters for which the benchmark would be exceeded.

All of these scenarios are considered unlikely, therefore the CPA fulfills all of the criteria defined in the PoA, and is regarded as financially additional.

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

>>

The geographic sites of all individual biogas systems included in the CPA define the SSC-CPA boundary. A biogas process consists of manure collection, biogas generation, biogas recovery, and the use or destruction of the recovered gas. The SSC-CPA boundary is as described in the following figure:

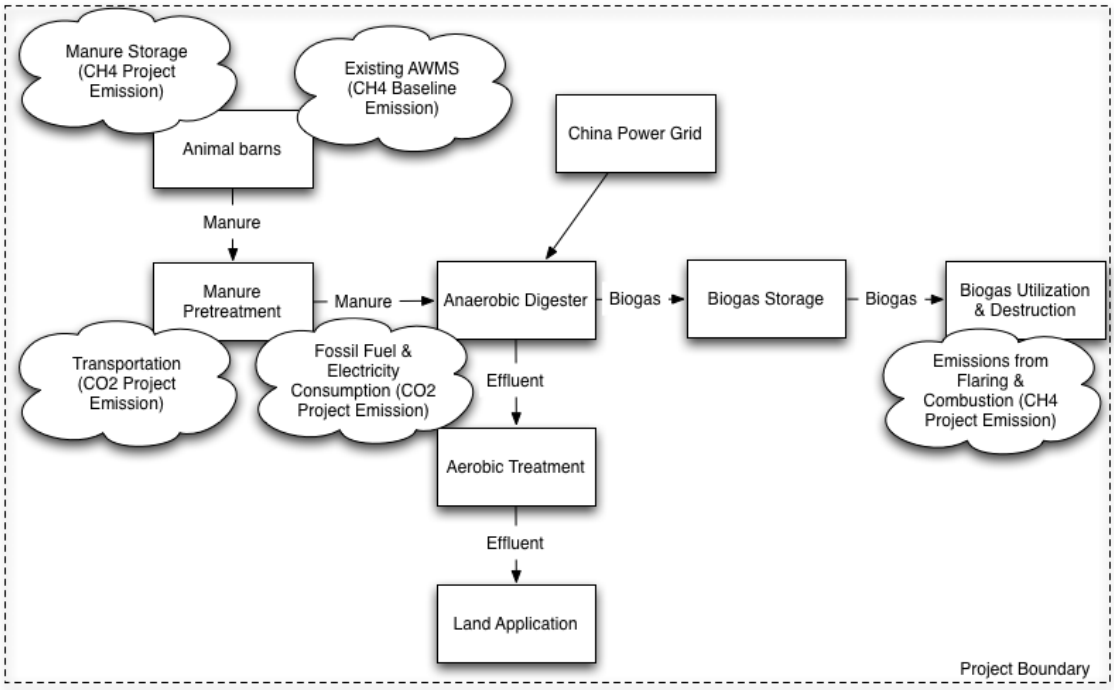

Figure 3: Project boundary of each farm.

Regarding the emission sources and gases to be included in the project boundary, please refer to the following table:

	GHG emission source	Gas	Included?	Justification/Explanation
Baseline emission	Emissions from the open anaerobic lagoon	CO_2	No	Excluded for simplification. This is conservative.
		CH_4	Yes	Major source of baseline emission.
		N_2O	No	Excluded for simplification. This is conservative.
Project emission	Physical leakage of biogas in the manure management systems	CO_2	No	Not applicable; in line with the applied methodologies.
		CH_4	Yes	Major source of project emission
		N_2O	No	Not applicable; in line with the applied methodologies.
	Emissions from flaring or combustion of the gas stream	CO_2	No	Not applicable; in line with the applied methodologies.
		CH_4	Yes	Major source of emission.
		N_2O	No	Not applicable; in line with the applied methodologies.
	CO_2 emissions from onsite electricity and/or fossil fuel consumption	CO_2	XXX	XXX
		CH_4	No	XXX
		N_2O	No	XXX
	CO_2 emissions from manure transportation	CO_2	XXX	XXX
		CH_4	No	XXX
		N_2O	No	XXX
	Emissions from the storage of manure before being fed into the anaerobic digester	CO_2	No	XXX
		CH_4	XXX	XXX
		N_2O	No	XXX

B.5. Emission reductions:

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

>>

Data / Parameter:	EF_{OM}
Data unit:	tCO_2/MWh
Description:	Operating Margin Emission Factor of Central China Power Grid
Source of data used:	XXX
Value applied:	XXX

Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated according to the updated Baseline Emission Factors for Power Grids in China based on " Tool to calculate the emission factor for an electricity system" and EB guidance
Any comment:	

Data / Parameter:	EF_{BM}
Data unit:	tCO_2/MWh
Description:	Build Margin Emission Factor of Central China Power Grid
Source of data used:	XXX
Value applied:	XXX
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated according to the updated Baseline Emission Factors for Power Grids in China based on "Tool to calculate the emission factor for an electricity system" and EB guidance
Any comment:	

Data / Parameter:	TDL_y
Data unit:	%
Description:	Average technical transmission and distribution losses for providing year *y*
Source of data to be used:	As per the *Tool to calculate baseline, project and/or leakage emissions from electricity consumption*, a default value of 20% is used as the value is used to calculate project emissions.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	20
Description of measurement methods and procedures to be applied:	The most recent value from any update version of the *Tool to calculate baseline, project and/or leakage emissions from electricity consumption* will be used.
QA/QC procedures to be applied:	-
Any comment:	COMMENT

Data / Parameter:	$VS_{LT,y}$
Data unit:	kg/head/year
Description:	Volatile solids excreted by animals per year per head
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories Vol.4, Ch.10.

	Table 10A-4,10A-5, 10A-7, 10A-8, 10A-9
Value applied:	XXX
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value above is the default value for the generic livestock of non-developed country. It will be adjusted for the farm involving the generic livestock from the developed country.
Any comment:	

Data / Parameter:	**$VS_{LT,d}$**
Data unit:	kg/head/day
Description:	Volatile solids excreted by animals per day per head
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories Vol.4, Ch.10. Table 10A-4,10A-5, 10A-7, 10A-8, 10A-9
Value applied:	XXX
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value above is the default value for the generic livestock of non-developed country. It will be adjusted for the farm involving the generic livestock from the developed country.
Any comment:	

Data / Parameter:	**B_0**
Data unit:	m^3/kg of VS
Description:	Maximum CH_4 producing capacity for manure produced by an animal
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories Vol.4, Ch.10. Table 10A-4,10A-5, 10A-7, 10A-8, 10A-9
Value applied:	XXX
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default value of the Western Europe swine which is the genetic source of the Duokang farm,2006 IPCC Guidelines for National Greenhouse Gas Inventories Vol.4, Ch.10. Table 10A-4,10A-5, 10A-7, 10A-8, 10A-9
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:	Project owner
Value applied:	100%
Justification of the choice of data or	Manure from the project farm was treated in the anaerobic lagoon and will be treated in the digester.

description of measurement methods and procedures actually applied :	
Any comment:	

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

>>

AMS.III.D --Methane recovery in animal manure management systems (version 18)

NOTE THAT NOT APPLICABLE CALCULATIONS WILL BE REMOVED FROM THE SPECIFIC CPA-DDs.

1. Baseline emission

Based on the AMS.III.D, Baseline methane emission from the AWMS can be calculated using the following equation:

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

With:

$BE_{III.D,y}$	Baseline emissions covered by methodology AMS III.D in year y (tCO2e)	XXX
GWP_{CH4}	Global Warming Potential (GWP) of (tCO_2/ tCH_4)	21
D_{CH4}	CH_4 density (at room temperature (20 °C) and 1 atm pressure) (t/m3)	0.00067
UF_b	Model correction factor to account for model uncertainties	0.94
j	Index of animal waste management system	-
LT	Index for all types of livestock	-
MCF_j	Annual methane conversion factor (MCF) for the baseline animal waste management system "j" (%)	XXX
$B_{0,LT}$	Maxium methane producing potential of the volatile solid generated for animal type "swine"(m^3 CH_4/kg dm)	XXX
$N_{LT,y}$	Annual average number of animals of type "LT" in year "y" (numbers). See equation 2 for details.	XXX
$VS_{LT,y}$	Volatile solids for livestock "swine" entering the animal manure management system in year "y" (on a dry matter weight basis, kg dm/animal/year)	XXX
$MS\%_{BL,j}$	Fraction of manure handled in baseline animal manure management system	XXX

The annual average number of animals $N_{LT,y}$ will be determined according to the following formula:

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

Where:

$N_{LT,y}$	Annual average number of animals of type "LT" in year "y" (numbers).	XXX
$N_{da,y}$	Number of days animal is alive in the farm in the year y (days)	XXX
$N_{p,y}$	Number of animals produced annually of type LT for the year y (numbers)	XXX

There are no country specific datas for B_0, *VS* or *MCF*. Default values used in this project are provided by 2006 IPCC Guideline for National Greehouse Gas Inventories Volume 4 chapter 10. B_0 and *VS* values used in this project are IPCC default values corresponding to Western Europe .The justification the choice of these data will be provided as follow:

- *The genetic source of the production operations livestock originates from an Annex I Party;*

EXPLANATION & JUSTIFICATION

- *The farm uses formulated feed rations (FFR) which are optimized for the various animal(s), stage of growth, category, weight gain/productivity and/or genetics;*

EXPLANATION & JUSTIFICATION

- *The use of FFR can be validated (through on-farm record keeping, feed supplier, etc.);*

EXPLANATION & JUSTIFICATION

- *The project specific animal weights are more similar to developed country IPCC default values.*

EXPLANATION & JUSTIFICATION

2. Project emission

Based on the AMS.III.D, the 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 electricity for the operation of all the installed facilities ($PE_{power,y}$);
(d) CO_2 emissions from incremental transportation distances;
(e) Emissions from the storage of manure before being fed into the anaerobic digester ($PE_{storage,y}$).

Thus, the total project emission in the animal farm n ($PE_{n,y}$) is calculated as:

$$PE_{III.D,y} = PE_{power,y} + PE_{flare,y} + PE_{storage,y} + PE_{PL,y} + PE_{transp,y} \quad (3)$$

Where:

$PE_{III.D,y}$	Project emissions covered by methodology AMS III.D in year y (tCO_2e)	XXX
$PE_{power,y}$	Emissions from the use of fossil fuel or electricity for the operation of the installed facilities in the year y (tCO_2e)	XXX
$PE_{flare,y}$	Emissions from flaring or combustion of the biogas stream in the year y	XXX
$PE_{storage,y}$	Emissions from the storage of manure (tCO_2e)	XXX
$PE_{PL,y}$	Emissions due to physical leakage of biogas in year y (tCO_2e)	XXX
$PE_{transp,y}$	Emissions from incremental transportation in the year y (tCO_2e)	XXX

2.1 CH_4 emission from physical leakage ($PE_{PL,y}$)

The CH_4 emission from physical leakage shall be calculated as per Paragraph 13 option b of AMS III.D, version 18. It is determined as:

$$PE_{PL,y} = 0.05 \cdot GWP_{CH_4} \cdot D_{CH_4} \cdot UF_b \cdot \sum_{j,LT} B_{0,LT} \cdot N_{LT,y} \cdot VS_{LT,y} \cdot MS\%_{Bl,j} \quad (4)$$

$PE_{PL,y}$	Emissions due to physical leakage of biogas in year y	XXX
GWP_{CH4}	Global Warming Potential (GWP) of (tCO_2/ tCH_4) (t/m3)	21
D_{CH4}	CH_4 desity (at room temperature (20 °C) and 1 atm pressure)	0.00067
UF_b	Model correction factor to account for model uncertainties	0.94
$B_{0,LT}$	Maxium methane producing potential of the volatile solid generated for animal type "swine"(m^3 CH_4/kg dm)	XXX
$N_{LT,y}$	Annual average number of swine in year "y" (numbers)	XXX
$VS_{LT,y}$	Volatile solids for livestock "LT" entering the animal manure management system in year "y" (on a dry matter weight basis, kg dm/animal/year)	XXX
$MS\%_{BL,j}$	Fraction of manure handled in baseline animal manure management system	XXX

2.2 CO_2 emissions from flaring or combustion of the gas stream ($PE_{flare,y}$)

For the CPAs under the PoA, all biogas is used to utilize energy. If a flare will be installed, it will only be used as a backup solution. Therefore, no project emissions will be calculated ex-ante. Hence, the value of $PE_{flare,y}$ is zero.

However, to calculate the emission reduction ex-post, the following equation from the methodological tool "Project emissions from flaring" v. 2.0.0 will be applied:

$$PE_{flare,y} = GWP_{CH_4} \cdot \sum_{m=1}^{525600} F_{CH4,RG,m} \cdot (1 - \eta_{flare,m}) \cdot 10^{-3} \quad (5)$$

Where:

$PE_{flare,y}$	Project emissions covered by methodology AMS III.D in year y (tCO_2e)	0
GWP_{CH_4}	Global Warming Potential for CH4 (21 tCO_2e/tCH_4)	21
$F_{CH4,RG,m}$	Mass flow of methane in the residual gas in the minute m (kg)	0
$\eta_{flare,m}$	Flare efficiency in minute m	N/A

The flare efficiency will be determined in accordance to the tool:

Open flare
In the case of open flares, the flare efficiency in the minute m ($\eta_{flare,m}$) is 50% when the flame is detected in the minute m ($Flame_m$), otherwise $\eta_{flare,m}$ is 0%.

For an enclosed flare, option A from the tool (Default Value) will be applied:

The flare efficiency for the minute m ($\eta_{flare,m}$) is 90% when the following two conditions are met to demonstrate that the flare is operating:

1. The temperature of the flare ($T_{EG,m}$) and the flow rate of the residual gas to the flare ($F_{RG,m}$) is within the manufacturer's specification for the flare ($SPEC_{flare}$) in minute m; and
2. The flame is detected in minute m ($Flame_m$).

For enclosed flares that are defined as low height flares, the flare efficiency in the minute m $\eta_{flare,m}$) shall be adjusted, as a conservative approach, by subtracting 0.1 from the efficiency as determined in Options A or B. For example, the default value applied should be 80%, rather than 90%, and if for example the measured value was 99%, then the value to be used shall correspond to 89%.

2.3 CO_2 emissions from the use of electricity or fossil fuel for the operation of the installed facilities in the year y ($PE_{power,y}$)

According to paragraph 15 of the applied methodology, AMS-I.D "Grid connected renewable electricity generation" shall be used for the calculation of project emissions from electricity and the emission factor for the fossil fuel shall be used for the calculation of project emissions due to the use of fossil fuel:

$$PE_{power,y} = PE_{el,y} + PE_{FC,j,y} \quad (6)$$

Where:

$PE_{power,y}$	Emissions from the use of fossil fuel or electricity for the operation of the installed facilities in the year y (tCO_2e)	XXX
$PE_{el,y}$	Project emissions due to the use of electricity (tCO_2e).	XXX
$PE_{FC,j,y}$	Project emissions due to the use of fossil fuel (tCO_2e).	XXX

DESCRIPTION OF APPLICABILITY OF PROJECT EMISSIONS FROM THE USE OF ELECTRICITY.

$$PE_{el,y} = EC_{PJ,y} \cdot EF_{CO_2} \cdot (1 + TDL_y) \quad (7)$$

Where:

$PE_{el,y}$	Emissions from the use of fossil fuel or electricity for the operation of the installed facilities in the year y (tCO_2e)	XXX
$EC_{PJ,y}$	Net quantity of electricity consumed by the project in farm p, year y (MWh)	XXX
EF_{CO_2}	Emission factor of Central China Power Grid (tCO_2/MWh)	XXX
TDL_y	Average technical transmission and distribution losses for providing year *y*. In line with the methodology, this parameter is assumed 20%, as per the provisions for the calculation of project emissions.	20

DESCRIPTION OF APPLICABILITY OF PROJECT EMISSIONS FROM THE USE OF FOSSIL FUEL.

$$PE_{FC,y} = \sum_i FC_{i,y} \cdot COEF_{i,y} \quad (8)$$

Where:

$PE_{FC,j,y}$	Project emissions due to the use of fossil fuel (tCO_2e).	XXX
$FC_{i,j,y}$	Is the quantity of fuel type i combusted during the year y (mass or volume unit/yr);	XXX
$COEF_{i,y}$	Is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)	XXX
i	Are the fuel types combusted during the year y	

with

$$COEF_{i,y} = NCV_{i,y} \cdot EF_{CO_2,i,y} \quad (9)$$

Where:

$COEF_{i,y}$	Is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)	XXX
$NCV_{i,y}$	Is the weighted average net calorific value of the fuel type i in year y (GJ/mass or volume unit)	XXX
$EF_{CO_2,i,y}$	Is the weighted average CO_2 emission factor of fuel type i in year y (tCO_2/GJ)	XXX
i	Are the fuel types combusted in process j during the year y	

2.4 CO_2 emissions from incremental transportation distances

As per relevant paragraph in AMS-III.AO, Project emissions due to incremental transport distances are calculated based on the incremental distances between:

(a) 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;
(b) When applicable, the collection points of wastewater and treatment site as compared to baseline wastewater treatment site;
(c) Treatment sites and the sites for soil application, landfilling and further treatment of the produced compost.

$$PE_{transp,y} = \frac{Q_y}{CT_y} \cdot DAF_w \cdot EF_{CO_2,transport} + \frac{Q_{res-waste,y}}{CT_{res-waste,y}} \cdot DAF_{res-waste} \cdot EF_{CO_2,transport} \quad (10)$$

Where:

$PE_{transp,y}$	Emissions from incremental transportation in the year y (tCO_2e)	XXX
Q_y	Quantity of raw manure transported the year *y* (tonnes)	XXX
CT_y	Average truck capacity for transportation (tonnes/truck)	XXX
DAF_w	Average incremental distance for manure transportation (km/truck)	XXX
$EF_{CO_2,transport}$	CO2 emission factor from fuel use due to transportation (kgCO2/km, default values 245 gCO2/km for light vehicles and 129 gCO2/km for heavy vehicles as per tool "Project and leakage emissions from road transportation of freight")	XXX
$Q_{res-waste,y}$	Quantity of residual waste transported the year y (tonnes)	XXX
$CT_{res-waste,y}$	Average truck capacity for residual waste transportation (tonnes/truck)	XXX
$DAF_{res-waste}$	Average incremental distance for residual waste transportation (km/truck)	XXX

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

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%.

$$PE_{storage,y} = GWP_{CH_4} \cdot D_{CH_4} \sum_{LT,l} \left[\frac{365}{AI_l} \sum_{d=1}^{AI} \left(N_{LT,y} \cdot VS_{LT,d} \cdot MS\%_l \left(1 - e^{-k(AI_l - d)}\right) \cdot MCF_l \cdot B_{0,LT} \right) \right] \quad (11)$$

Where:

$PE_{storage,y}$	Emissions from the storage of manure (tCO_2e)	XXX
GWP_{CH_4}	Global Warming Potential for CH4 (21)	21
D_{CH_4}	CH_4 density (0.00067 t/m^3 at room temperature (20 °C) and 1 atm pressure)	0.00067
AI_l	Annual average interval between manure collection and delivery for treatment at a given storage device l (days)	XXX
$N_{LT,y}$	Annual average number of animals of type "LT" in year "y" (numbers)	XXX
$VS_{LT,d}$	Amount of volatile solid production by type of animal LT in a day (kg VS/head/d)	XXX
$MS\%_l$	Fraction of volatile solids (%) handled by storage device l	XXX
k	Degradation rate constant (0.069)	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 AII	XXX
MCF_l	Annual methane conversion factor for the project manure storage device l from Table 10.17, Chapter 10, Volume 4 (%)	XXX
$B_{0,LT}$	Maximum methane producing capacity for the volatile solid generated for animal type LT (m^3 $CH_4(kgdm)^{-1}$)	XXX

3. Leakage

According to paragraph 17 of the applied methodology, for AMS-III.D, no leakage calculation is required.

In addition to paragraph 17, paragraph 27 of the methodology requires to justify the destruction of replaced equipment in case the project activity involves replacement of equipment that might also be transferred outside the project boundary and cause leakage emissions.

Although this project activity does replace existing manure management systems, these systems (e.g. open lagoon) cannot be transferred to other locations outside the project boundary (ref. eligibility criteria 5.4.1). The facilities used to store and treat animal manure are not mobile equipment, but stationary installations. Thus, the leakage for this PoA is considered 0.

4. Emission reduction

Based on baseline emissions and project emissions, the annual emission reduction can be calculated:

$$ER_{III.D,y} = BE_{III.D,y} - PE_{III.D,y}$$

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$ER_{III.D,y}$	Emission reductions covered by methodology AMS III.D in year y	XXX

	(tCO_2e)	
$BE_{III.D,y}$	Baseline emissions in year y, covered by methodology AMS III.D (tCO_2e)	XXX
$PE_{III.D,y}$	Project emissions covered by methodology AMS III.D in year y (tCO_2e)	XXX

The emission reductions achieved by the project activity 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. The emission reductions achieved in any year are the lower value of the following:

$$ER_{III.D,y,ex\ post} = min\left[\left(BE_{III.D,y,ex\ post} - PE_{III.D,y,ex\ post}\right), \left(MD_y - PE_{power,y,ex\ post}\right)\right] \quad 13$$

Where:

$ER_{III.D,y,ex\ post}$	Emission reductions achieved by the project activity based on monitored values for year y (tCO_2e)
$BE_{III.D,y,ex\ post}$	Baseline emissions calculated using equation 2 (for projects using option in paragraph 9 (a))[5] using ex post monitored values of $N_{LT,y}$ and if applicable $VS_{LT,y}$
$PE_{III.D,y,ex\ post}$	Project emissions calculated using equation 1 using ex post monitored values of $N_{LT,y}$, $MS\%_y$, and if applicable $VS_{LT,y}$
MD_y	Methane captured and used gainfully by the project activity in year y (tCO_2e).
$PE_{powery,ex\ post}$	Emissions from the use of fossil fuel or electricity for the operation of the installed facilities based on monitored values in the year y (tCO_2e)

The value MD_y will be determined according to the following equation;

$$MD_y = BG_{Burnt,y} \cdot w_{CH_4} \cdot D_{CH_4} \cdot FE \cdot GWP_{CH_4} \quad 14$$

Where:

MD_y	Methane captured and used gainfully by the project activity in year y (tCO_2e).
$BG_{Burnt,y}$	Biogas flared or combusted in year y (m^3)
w_{CH_4}	Methane content in biogas in the year y (volume fraction). A default value of 60% is applied as per the methodology.
D_{CH_4}	CH_4 density (0.00067 t/m^3 at room temperature (20 °C) and 1 atm pressure)
FE	Flare efficiency in year y (fraction)
GWP_{CH_4}	Global Warming Potential for CH4 (21)

[5] of methodology AMS III.D, version 18.

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

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Year	Estimation of project activity emissions (tonnes of CO_2 e)	Estimation of baseline emissions (tonnes of CO_2 e)	Estimation of leakage (tonnes of CO_2 e)	Estimation of overall emission reductions (tonnes of CO_2 e)
Year 1	XXX	XXX	XXX	XXX
Year 2	XXX	XXX	XXX	XXX
Year 3	XXX	XXX	XXX	XXX
Year 4	XXX	XXX	XXX	XXX
Year 5	XXX	XXX	XXX	XXX
Year 6	XXX	XXX	XXX	XXX
Year 7	XXX	XXX	XXX	XXX
Year 8	XXX	XXX	XXX	XXX
Year 9	XXX	XXX	XXX	XXX
Year 10	XXX	XXX	XXX	XXX
Total (tonnes of CO_2 e)	XXX	XXX	XXX	XXX

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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DESCRIPTION OF THE MONITORING PLAN

The data to be monitored is listed as following

Data / Parameter:	**$BG_{burnt,y}$**
Data unit:	nm^3
Description:	The total amount of biogas supplied to the boiler, generator, flare and/or households.
Source of data to be	Flow meter

used:	
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 accumulated volume recording (e.g. hourly/daily accumulated reading).
QA/QC procedures to be applied:	Flow meter will undergo maintenance/calibration subject to appropriate industry standard by qualified entity. The systems will be built and operated to ensure that there is no air ingress into the biogas pipeline.
Any comment:	COMMENT As per the methodology, a default methane concentration of 60% is applied. Therefore, the methane concentration of the biogas will not be monitored. A normalized flow meter will be used, therefore it is not necessary to monitor and record temperature and pressure separately.

Data / Parameter:	$F_{CH4,RG,m}$
Data unit:	kg
Description:	Mass flow of methane in the residual gas on a dry basis at reference conditions in the minute m (kg)
Source of data to be used:	Calculated according to the applied methodology.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	The methodology already provides procedures to calculate the mass flow of methane in the residual gas stream. As per the methodology, the gas flow is measured. Applying the default concentration of 60% as per the methodology and the density of methane as per the methodology, the mass flow of methane is calculated.
QA/QC procedures to be applied:	Flow meters will undergo maintenance/calibration subject to appropriate industry standard by qualified entity. The systems will be built and operated to ensure that there is no air ingress into the biogas pipeline.
Any comment:	As per the methodology, a default methane concentration of 60% is applied. Therefore, the methane concentration of the biogas will not be monitored.

Data / Parameter:	$\eta_{flare,m}$
Data unit:	%
Description:	Flare efficiency in minute m (fraction)
Source of data to be	Default Values

used:	
Value of data applied for the purpose of calculating expected emission reductions in section B.5	N/A
Description of measurement methods and procedures to be applied:	As per the methodology, 100% will be assumed for the efficiency for the share of biogas that is used for energy purposes. In case a flare is installed at the specific CPA, it will be determined as per the provisions in the methodological tool "Project emissions from flaring": Open flare In the case of open flares, the flare efficiency in the minute m ($\eta_{flare,m}$) is 50% when the flame is detected in the minute m (Flamem), otherwise $\eta_{flare,m}$is 0%. For an enclosed flare, option A from the tool (Default Value) will be applied: The flare efficiency for the minute m ($\eta_{flare,m}$) is 90% when the following two conditions are met to demonstrate that the flare is operating: 1. The temperature of the flare (TEG,m) and the flow rate of the residual gas to the flare is within the manufacturer's specification for the flare (SPECflare) in minute m; and 2. The flame is detected in minute m (Flamem). For enclosed flares that are defined as low height flares, the flare efficiency in the minute m $\eta_{flare,m}$) shall be adjusted, as a conservative approach, by subtracting 0.1 from the efficiency as determined in Options A or B. For example, the default value applied should be 80%, rather than 90%, and if for example the measured value was 99%, then the value to be used shall correspond to 89%.
QA/QC procedures to be applied:	The efficiency will be determined as per the methodological tool "Project emissions from flaring".
Any comment:	This is only applicable to CPAs with an installed flare.

Data / Parameter:	$T_{EG,m}$
Data unit:	°C
Description:	Temperature in the exhaust gas of the enclosed flare in minute m
Source of data to be used:	Measurements by project participants
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:	Measure the temperature of the exhaust gas in the flare by an appropriate temperature measurement equipment. Measurements outside the operational temperature specified by the manufacturer may indicate that the flare is not functioning correctly and may require maintenance. Flare manufacturers will provide suitable monitoring ports for the monitoring of the temperature of the flare. These would normally be expected to be in the middle third of the flare. Where more than one temperature port is fitted to the flare, the flare manufacturer will provide written instructions detailing the conditions under which each location shall be used and the port most suitable for monitoring the operation of the flare according to manufacturers specifications for temperature.
QA/QC procedures to be applied:	Temperature measurement equipment will be replaced or calibrated in accordance with their maintenance schedule.
Any comment:	Unexpected changes such as a sudden increase/drop in temperature can occur for different reasons. These events should be noted in the site records along with any corrective action that was implemented to correct the issue. Monitoring of this parameter is applicable in case of enclosed flares. Measurements are required to determine if manufacturer's flare specifications for operating temperature are met

Data / Parameter:	$Flame_m$
Data unit:	Flame on or Flame off
Description:	Flame detection of flare in the minute m
Source of data to be used:	Project participants
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:	Measure using a fixed installation optical flame detector: Ultra Violet detector or Infra Red or both. Once per minute. Detection of flame recorded as a minute that the flame was on, otherwise recorded as a minute that the flame was off

QA/QC procedures to be applied:	Equipment shall be maintained and calibrated in accordance with manufacturer's recommendations.
Any comment:	Applicable to all flares

Data / Parameter:	$EC_{PJ,y}$
Data unit:	MWh
Description:	Net electricity consumed by the project in farm p.
Source of data to be used:	Electricity meter, onsite measurements
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:	METER/CALCULATION. Data will be reported monthly.
QA/QC procedures to be applied:	Electricity will be subject to regular maintenance and testing regime to ensure accuracy once a year.
Any comment:	COMMENT

Data / Parameter:	$N_{da,y}$
Data unit:	Number
Description:	Number of days animal is alive in the farm in the year y (number)
Source of data to be used:	Farm owner
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:	Livestock number will be monitored and reported monthly.
QA/QC procedures to be applied:	The value will be determined based on monthly records of the farm owner. They can be crosschecked with sales records.
Any comment:	COMMENT

Data / Parameter:	$N_{p,y}$
Data unit:	Number
Description:	Number of animals produced annually of type LT for the year y

	(number)
Source of data to be used:	Farm owner
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:	Livestock number will be monitored and reported monthly.
QA/QC procedures to be applied:	The value will be determined based on monthly records of the farm owner (e.g. sales records, food purchase).
Any comment:	Archive electronically during the crediting period plus 2 years.

Data / Parameter:	MCF_i
Data unit:	fraction
Description:	Methane Conversion Factor
Source of data to be used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories Vol.4, Ch.10. Table 10.17
Value of data applied for the purpose of calculating expected emission reductions in section B.5	No. / City / Annual average temperature / MCF **1.** / XXX / XXX / XXX
Description of measurement methods and procedures to be applied:	The mean annual temperature will be achieved from official sources (e g. Sichuan Statistic Year Book) and MCF_j will be retrieved from the IPCC Guidelines as listed above.
QA/QC procedures to be applied:	Will be checked by the C/ME directly.
Any comment:	

Data / Parameter:	**nd_y**
Data unit:	Days
Description:	Number of days that the animal manure management system was operational
Source of data to be used:	Farm records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	XXX
Description of measurement methods	Annually, based on daily records and monthly aggregation If any farm has no operations on a given day it needs to be documented (e.g.

and procedures to be applied:	logbook) and taken into account for the calculation of $BE_{ex\text{-}post}$
QA/QC procedures to be applied:	All data will be electronically archived for a period of two years from the end of the crediting period.
Any comment:	

Data / Parameter:	**AI_l**
Data unit:	days
Description:	Annual average interval between manure collection and delivery for treatment at digester
Source of data to be used:	Regular record by Farm owner
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:	In case, 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 the dry matter content of the manure when removed from the animal barns is less than 20%, *AI* shall be recorded. Annual amount based on record of *AI*.
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	Proper soil application of residual waste
Data unit:	
Description:	The proper application of residual waste
Source of data to be used:	
Value of data applied for the purpose of calculating expected emission reductions in section B.5	N/A
Description of measurement methods and procedures to be applied:	The aerobic soil application of digester effluent shall be evaluated against a description of aerobic procedures by the Sichuan Biogas Association. In case the applied measures of effluent treatment do not meet the standard, project emissions shall be calculated according to the methodology.
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	Genetic source of the production operations livestock
Data unit:	
Description:	Genetic source of the production operations livestock
Source of data to be used:	Farm-Specific suitable evidence
Value of data applied for the purpose of calculating expected emission reductions in section B.5	N/A
Description of measurement methods and procedures to be applied:	In case the CPA applies developed country VS values, the genetic origin of the animals shall be monitored. The developed country values are only applicable if the genetic origin of the animals is an Annex I party.
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	The formulated feed rations (FFR)
Data unit:	
Description:	The formulated feed rations (FFR)
Source of data to be used:	Farm-Specific suitable evidence
Value of data applied for the purpose of calculating expected emission reductions in section B.5	N/A
Description of measurement methods and procedures to be applied:	In case the CPA applies developed country VS values, the FFR shall be monitored. The developed country values are only applicable if the farm uses formulated feed rations (FFR) which are optimized for the various animal(s), stage of growth, category, weight gain/productivity and/or genetics;
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	$FC_{i,j,y}$
Data unit:	Mass or volume unit per year (e.g. ton/yr or m^3/yr)
Description:	Quantity of fuel type i combusted in process j during the year y
Source of data to be used:	Continuously onsite measurements
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:	• Use either mass or volume meters. In cases where fuel is supplied from small daily tanks, rulers can be used to determine mass or volume of the fuel consumed, with the following conditions: The ruler gauge must be part of the daily tank and calibrated at least once a year and have a book of control for recording the measurements (on a daily basis or per shift); • Accessories such as transducers, sonar and piezoelectronic devices are accepted if they are properly calibrated with the ruler gauge and receiving a reasonable maintenance; • In case of daily tanks with pre-heaters for heavy oil, the calibration will be made with the system at typical operational conditions.
QA/QC procedures to be applied:	The consistency of metered fuel consumption quantities should be cross-checked by an annual energy balance that is based on purchased quantities and stock changes. Where the purchased fuel invoices can be identified specifically for the CDM project, the metered fuel consumption quantities should also be cross-checked with available purchase invoices from the financial records.
Any comment:	

Data / Parameter:	$NCV_{i,y}$
Data unit:	GJ per mass or volume unit (e.g. GJ/m^3, GJ/ton)
Description:	Weighted average net calorific value of fuel type i in year y
Source of data to be used:	IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
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:	The data will be cross-checked with the latest publications of IPCC.
QA/QC procedures to be applied:	The data will be cross-checked with the latest publications of IPCC.
Any comment:	

Data / Parameter:	$EF_{CO_2,i,y}$
Data unit:	tCO_2/GJ
Description:	Weighted average CO_2 emission factor of fuel type i in year y
Source of data to be used:	IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Value of data applied for the purpose of	XXX

calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	The data will be crosschecked with the latest publications of IPCC.
QA/QC procedures to be applied:	The data will be crosschecked with the latest publications of IPCC.
Any comment:	

Data / Parameter:	$MS\%_l$
Data unit:	%
Description:	Fraction of volatile solids (%) handled by storage device *l*
Source of data used:	Laboratory analysis
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:	In case manure is stored for longer than 24 hours after removal from the barns and before feeding into the digester, this value will be monitored monthly.
QA/QC procedures to be applied:	Will be monitored monthly in case the manure is stored for more than 24 hours between removal from the barns and feeding into the digester.
Any comment:	

Data / Parameter:	**AI_l**
Data unit:	days
Description:	Annual average interval between manure collection and delivery for treatment at digester
Source of data to be used:	Regular record by Farm owner
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 . In case, 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 the dry matter content of the manure when removed from the animal barns is less than 20%, *AI* shall be recorded. Annual amount based on record of *AI*.
QA/QC procedures to	

be applied:	
Any comment:	

Data / Parameter:	Q_y
Data unit:	tons
Description:	Quantity of raw manure transported the year *y*
Source of data to be used:	Onsite data sheets recorded monthly using weigh bridge.
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:	Onsite data sheets recorded monthly using weigh bridge. Weigh bridge will be subject to periodic calibration.
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	CT_y
Data unit:	tons/truck
Description:	Average truck capacity for transportation
Source of data to be used:	On site measurement
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 using weigh bridges.
QA/QC procedures to be applied:	Onsite data sheets using weigh bridge. Weigh bridge will be subject to periodic calibration.
Any comment:	

Data / Parameter:	DAF_w
Data unit:	km/truck
Description:	Average incremental distance for manure transportation
Source of data to be used:	On site measurement

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:	Onsite measurement by project owner.
QA/QC procedures to be applied:	The distance will be cross-checked with publically available sources.
Any comment:	

Data / Parameter:	$Q_{res-waste,y}$
Data unit:	tons
Description:	Quantity of residual waste transported the year *y*
Source of data to be used:	Onsite data sheets recorded monthly using weigh bridge.
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:	Onsite data sheets recorded monthly using weigh bridge. Weigh bridge will be subject to periodic calibration.
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	$CT_{res-waste,y}$
Data unit:	tons/truck
Description:	Average truck capacity for residual waste transportation
Source of data to be used:	On site measurement
Value of data applied for the purpose of calculating expected emission reductions in section B.5	XXX
Description of measurement methods	On site measurement using weigh bridges.

and procedures to be applied:	
QA/QC procedures to be applied:	Onsite data sheets using weigh bridge. Weigh bridge will be subject to periodic calibration.
Any comment:	

Data / Parameter:	$DAF_{res-waste}$
Data unit:	km/truck
Description:	Average incremental distance for manure transportation
Source of data to be used:	On site measurement
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:	Onsite measurement by project owner.
QA/QC procedures to be applied:	The distance will be cross-checked with publically available sources.
Any comment:	

Data / Parameter:	$EF_{CO_2,transport}$
Data unit:	$kgCO_2/t\ km$
Description:	CO_2 emission factor from fuel use due to transportation
Source of data used:	Methodological tool "Project and leakage emissions from road transportation of freight"
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:	The appropriate data will be reviewed annually.
QA/QC procedures to be applied:	
Any comment:	

Data management

All paper-based information and the electronic database will be submitted to the C/ME by the farm owner periodically and be stored by the C/ME during the crediting period plus 2 years and provided to the DOE

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:

The environmental analysis has been done at CPA level.

DESCRIPTION OF EIA AND APPROVAL

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

>>

The environmental impacts during project construction period and the controlling measures are summarized as follows:

Environmental aspect	Pollution source	Controlling measure	Analysis result
Air pollution	XXX	XXX	XXX
Water pollution	XXX	XXX	XXX
Solid pollution	XXX	XXX	XXX
Noise	XXX	XXX	XXX

The environmental impacts during project operation period and the controlling measures are summarized as follows:

Environmental impact aspect	Pollution source	Controlling measure	Analysis result
Air pollution	XXX	XXX	XXX
Water pollution	XXX	XXX	XXX
Solid pollution	XXX	XXX	XXX
Noise	XXX	XXX	XXX

Conclusion:
The proposed CPA is in line with the national and local regulation, it is an environmental protection activity, and will not do harm to the environment.

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:

>> According to Chinese environmental regulation, an Environmental Impact Assessment (EIA) is required for biogas projects. However, the required outcome of the EIA for most biogas projects is not a full EIA report, but just an EIA result table. The outcome of the EIA, irrespectively of whether this is a full EIA report or an EIA result table will be approved by the local Environmental Protection Bureau (EPB).

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.

As project farms will have different impact to the surrounding environment, and as well as various comments from the stakeholders, the C/ME proposes conducting stakeholder consulting at SSC-CPA level.

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

>>

DESCRIPTION HOW COMMENTS HAVE BEEN INVITED AND COMPILED

D.3. Summary of the comments received:

>>
SUMMARY OF COMMENTS

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

REPORT ON DUE ACCOUNT

Annex 1

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

Organization:	XXX
Street/P.O.Box:	XXX
Building:	XXX
City:	XXX
State/Region:	XXX
Postfix/ZIP:	XXX
Country:	XXX
Telephone:	XXX
E-Mail:	XXX
Represented by:	XXX
Title:	XXX
Salutation:	XXX
Last Name:	XXX
First Name:	XXX

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

ANNEX 3

BASELINE INFORMATION

1. Calculation of the CCPG Grid Emission Factor

Where, the calclulation of $EF_{CO2,y}$ is shown as follows:

In accordance with the "Tool to calculate the emission factor for an electricity system (version 2.2.1)",the emission factor of grid electricity generation ($EF_{EG,GR,y}$) should be determined by calculating the operating margin (OM) and build margin (BM) as well as the combined margin (CM).

This PDD refers to the Operating Margin (OM) Emission Factor and the Build Margin (BM) Emission Factor published by the Chinese DNA on XXX, which is publicly available at this website:

XXX

The steps of calculating the emission factor are stated as follows. All the data quoted in the calculation process are presented in Annex 3 of the PDD.

Step 1: Identify the relevant electric system

The Chinese DNA has published a delineation of the project electricity system and connected electricity systems, according to the "Tool to calculate the emission factor for an electricity system (Version 2.2.1)". These delineations can be used. The electricity generated from the proposed project is supplied to the Central China Power Grid (CCPG). The spatial extension of the CCPG comprises all power plants that are physically connected to it, which covers Henan province, Hubei province, Hunan province, Jiangxi province, **Sichuan province** and the municipality of Chongqing.

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

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.

In the proposed project, only grid power plants are included in the calculation. So the Option I is chosen.

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.

Any of the four methods can be used, the simple OM method (Option (a)) can only be used if low-cost/ must-run resources constitute of less than 50% of total Grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production. Among the total electricity generation of the Central China Power Grid which the proposed project is connected to, the amount of low cost/must run resources accounts for 38.54% (2004), 38.18% (2005), 35.26% (2006), 35.47% (2007) and 39.27% (2008)[6], all less than 50%. Thus, the method (a) Simple OM can be used to calculate the baseline emission factor of operating margin for the proposed project.

For the simple OM, the emission factor is selected to be calculated using either of the data vintages between any of: ex-ante option or ex-post. For this PDD ex-ante option is selected, which is a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period.

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

According to the Tool to calculate the emission factor for an electricity system, the simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2e/MWh) of all power plants serving the system, not including low cost / must run power plants / units. The three following options may be used to calculate the simple OM emission factor:

- Option A: Based on the net electricity generation and a CO_2 emission factor of each power unit; 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.

  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

According to "Tool to calculate the emission factor for an electricity system" (version 02.2.1), Option A should be preferred and must be used if fuel consumption data is available for each power plant / unit. However, due to the necessary data, including the fuel consumption and net electricity generation of each power plant, is not available in China, Option B is adopted. Accordingly only nuclear and renewable power generation are considered as low-cost/must-run power sources and data of the quantity of electricity supplied to the Grid by these sources should be available for the calculation.

As per Option B, 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:

[6] China Electric Power Yearbook, 2005-2009

$$EF_{grid,OM,simple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO_2,i,y}}{EG_y} \quad (3)$$

Where:

$EF_{grid,OM,simple,y}$	Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
$FC_{i,y}$	The amount of fuel i (in a mass or volume unit) consumed by project electricity system in year(s) y
$NCV_{i,y}$	Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)
$EF_{CO_2,i,y}$	CO_2 emission factor of fossil fuel type i in year y (tCO_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	Either the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex ante option), following the guidance on data vintage in *step 2*

The simple OM is calculated with reference to the *2011 Baseline Emission Factors for Regional Power Grids in China*[7] issued by the Chinese DNA.

Step 5: Calculate the build margin (BM) emission factor

Two options can be chosen to calculate the build margin:

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.

In terms of vintage of data, Option 1 is chosen.

[7] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2720.pdf

The build margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units *m* during the most recent year *y* for which power generation data is available, calculated as follows:

$$EM_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad (4)$$

Where:

$EM_{grid,BM,y}$	Build margin CO_2 emission factor in year *y* (tCO_2/MWh)
$EG_{m,y}$	Net quantity of electricity generated and delivered to the Grid by power unit *m* in year *y* (MWh)
$EF_{EL,m,y}$	CO_2 emission factor of power unit m in year y (tCO_2/MWh)
m	Power units included in the build margin
y	Most recent historical year for which power units included in the build margin

In accordance with the "Tool to calculate the emission factor for an electricity system", the CO_2 emission factor of each power unit *m* ($EF_{EL,m,y}$) should be determined as per the guidance of options A1, A2 or A3 under Step 4(a) *Simple OM* , using for *y* the most recent historical year for which power generation data is available, and using for *m* the power units included in the build margin.

On account of data availability, the following adapted calculation has been approved by the CDM EB. Using this modified method, newly-built capacity is weighted by the composition of power generation technologies, and then emission factors are calculated using the efficiencies of the best available technologies.

Because capacities of technologies using coal, oil and gas can't be separated from the total thermal power generation from available statistics, the following method is used for the calculation: First, use recent one year available energy balance data and calculate percentages of CO_2 emissions of power generation using solid, liquid and gas fuel in the total CO_2 emission. Second, calculate Grid thermal power emission factor, using the percentages (as weights) and emission factors of technologies corresponding to best available efficiencies. Lastly, the thermal power emission factor is multiplied by the percentage of thermal power in the newest 20% capacity in the Grid, and the result is the Build Margin (BM) emission factor of the Grid.

The equations are as follows:

1. Calculate percentage of CO_2 emission of power generation using solid, liquid and gas fuel in the total CO_2 emission.

$$\lambda_{coal,y} = \frac{\sum_{i \in coal,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \quad (5)$$

$$\lambda_{oil,y} = \frac{\sum_{i \in oil,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \quad (6)$$

$$\lambda_{gas,y} = \frac{\sum_{i \in gas, j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \quad (7)$$

Where:

$F_{i,j,y}$	The fuel *i* consumed by the province *j* in the year y (in a mass or volume unit)
$EF_{CO2,i,j,y}$	The CO_2 emission coefficient (tCO_2e /MJ) of fuel *i*
$NCV_{i,y}$	Net calorific value of fuel i in year y (MJ/ a mass or volume unit）
	The feet *Coal, Oil* and *Gas* is for solid fuels, liquid fuels and gas fuels.

2. Calculate Grid thermal power emission factor

$$EF_{thermal} = \lambda_{coal,y} \times EF_{coal,Adv} + \lambda_{oil,y} \times EF_{oil,Adv} + \lambda_{gas,y} \times EF_{gas,Adv} \quad (8)$$

Where:

$EF_{Coal,Adv}$, $EF_{Oil,Adv}$, and $EF_{Gas,Adv}$ are emission factors corresponding to commercially optimal efficient power generation technology using coal, oil and gas.

3. Calculate BM emission factor

$$EF_{grid,BM,y} = \frac{CAP_{thermal,y}}{CAP_{total,y}} \times EF_{thermal,y} \quad (9)$$

Where:

$CAP_{thermal,y}$	The newly built thermal capacity at year *y*.
$CAP_{total,y}$	Total newly built capacity at year *y*.

The build margin emissions factor ($EF_{Grid,BM,y}$) is calculated with reference to the *2011Baseline Emission Factors for Regional Power Grids in China* issued by Chinese DNA[8]

Step 6: Calculate the combined margin (CM) emissions factor

The baseline emission factor is the weighted average of the Operating Margin emission factor ($EF_{grid,OM,y}$) and the Build Margin emission factor ($EF_{grid,BM,y}$):

$$EF_{EG,GR,y} = \omega_{OM} \times EF_{grid,OM,y} + \omega_{BM} \times EF_{grid,BM,y} \quad (10)$$

Where:

$EF_{grid,BM,y}$	Build 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)
w_{OM}	Weighting of operating margin emissions factor (%)

[8] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2720.pdf

w_{BM} Weighting of build margin emissions factor (%)

Where the weight w_{OM} and w_{BM} by default, are 50% for the first crediting period.

According to the emission factor value provided by Chinese DNA:

	EF_{OM}(tCO_2/MWh)	EF_{BM}(tCO_2/MWh)	$EF_{EG,GR,y}$
CCPG	XXX	XXX	XXX

DATA TABLES FOR GRID EMISSION FACTOR CALCULATION

Annex 4

MONITORING INFORMATION

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