PROGRAMME DESIGN DOCUMENT FORM FOR SMALL-SCALE CDM PROGRAMMES OF ACTIVITIES (F-CDM-SSC-PoA-DD) Version 02.0

PROGRAMME OF ACTIVITIES DESIGN DOCUMENT (PoA-DD)

PART I. Programme of activities (PoA)

SECTION A. General description of PoA

A.1. Title of the PoA

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Title: Animal Manure Treatment Programme in Gansu Province

Version: 05

Date: 23/12/2012

Version No.	Date	Description and reason of revision
01	29/08/2011	GSC Version
02	08/06/2012	The first revised version based on CAR&CL.
03	26/09/2012	The second revised version based on CAR&CL.
04	21/11/2012	The re-published version due to the change of Methodolgy
05	23/12/2012	Revised based on comments

A.2. Purpose and general description of the PoA

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1. Policy/measure or stated goal that the PoA seeks to promote

Animal Manure Treatment Programme in Gansu Province (hereafter referred to as the PoA) is located in Gansu Province, P.R. China, which is coordinated and managed by Lanzhou Hualong Poultry Breeding Co. (hereafter referred to as the CME). The purpose of the PoA is to support the construction of animal manure treatment systems in livestock farm to achieve methane recovery and destruction across Gansu Province.

1) Gansu Province lies in north-western China covering vast territory, but the natural condition is harsh and the ecological environment is fragile. Therefore, to effectively utilize various energy resources are very important in Gansu Province. Moreover, there are immense farm land and vast farmer population in Gansu province, so exploration with biogas comprehensive utilization in rural area, especially to vigorously develop biogas utilization in livestock farm, can greatly benefit rural economy as well as sustainable agricultural development. Recent years, the biogas digester construction in livestock farms in Gansu Province is encouraged and actively promoted by General Office of the State Council[1], the Ministry of agriculture[2], in order to improve the livestock farm operation and improve the waste recycle and energy utilization. Nevertheless, due to high investment cost, low internal rate of return (IRR) and little experience of management and operation

[1] http://www.gov.cn/zwgk/2010-05/06/content_1600275.htm

[2] http://www.moa.gov.cn/zwllm/zcfg/nybgz/201112/t20111214_2435273.htm

of biogas plant for the project implementers, the biogas promotion faces significant hurdles in attracting livestock farmers and commercial financing. The objective of the PoA is to help livestock farm owners to alleviate the above problems through the following method: Supply financial support: By offering an additional regular income generated by carbon credits, the PoA will support the project implementer in maintenance and repairing the biogas digester system, in order to achieve the stable operation for a long period.

2) Supply technical support: The CME, cooperating with the Rural Energy Office of Gansu Province and its subsidiaries, will provide further technical service during start up and operation of the biogas digester system.

Expected outcome of the proposed PoA is a large distribution of animal manure treatment systems to achieve methane recovery and destruction in livestock farms in Gansu Province, which finally to support the achievement of local policy and promote the construction of biogas plant in livestock. Therefore, the PoA clearly support the achievement of local policy and facilitates additional and sustainable local development and will improve the living conditions of nearby residents.

2. Framework for the implementation of the proposed PoA

The CME is responsible for CDM capacity building to CPA implementer, and keeps in touch with the related agencies (including DNA, DOE, EB and etc.) for CDM development process, tracking the PoA and each CPA under the PoA, supervising the implementation of the construction and monitoring plan to make sure the data's completeness and accuracy, and taking charge of the issues related CERs issuing activity.

The project implementers under each CPA will be responsible for planning, financing arrangement and the implementation of the project and monitoring plan of the project under the supervision of the CME.

In the absence of the PoA, animal manure would be left to decay anaerobically in the anaerobic lagoons without methane recovery and destruction, which is the same as the baseline scenario.

By recovery and utilization of biogas, the PoA also can contribute to the reduction of greenhouse gases in two ways: 1) the biogas recovery system reduces methane emissions into atmosphere; 2) the recovered biogas replaces conventional fossil fuels for energy purposes, and therefore avoids CO_2 emissions from energy purposes by the fossil fuel. However, compared with the first PoA GSC, the emissions from the type I will not be claimed due to the uncertainty of final energy utilization approach. It means that no CERs will be claimed for substituting fossil fuel by biogas for energy generation.

3. Confirmation that the proposed PoA is a voluntary action by the CME

The PoA is a scheme developed by Lanzhou Hualong Poultry Breeding Co. (the CME) to promote the building of biogas digester system and biogas recovery system in livestock farms in Gansu Province. At Present, there is no mandatory law to enforce livestock farmers to install animal manure treatment system with recovery and utilization of biogas. Therefore, this PoA is not implementing any mandatory policy or regulation of China.

The Confirmation that the proposed PoA is a voluntary action by the CME is based on the Board

Decision dated 20/07/2011. In addition, the China LOA also confirms that Lanzhou Hualong Poultry Breeding Co. is authorized as China's participant to voluntarily participated in and carry out the PoA as the Coordinating/Managing Entity.

4. Contribution to sustainable development by the PoA

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

Environmental benefits:

- Improving the local environment and human health. The proposed PoA aims to reduce negative environmental impacts of intensive livestock production through the installation of biogas digesters and biogas utilization systems. Treatment of large quantities of animal waste through digesters instead of lagoons will reduce organic material in wastewater, nuisance of odors, and bacteria. As stated above, the biogas digester construction in livestock farms in Gansu Province is encouraged and actively promoted by China government. The implementation of the PoA can contribute to achieve better environmental conditions and better life quality in rural communities nearby the livestock farms, which is one of the most important objectives of the policy.

Social and Economic benefits:

- Creating job opportunities. The PoA will increase local employment for skilled labour during construction, installation, operation, and maintenance of equipments and systems, and further facility the goal of the policy to promote local social and economic development.
- Diversifying energy supply. The PoA will diversify energy sources through biogas production and biogas-based utilization systems. The implementation of the PoA can contribute to the reduction of the country's dependence on coal-based power. Gansu Province lies in north-western China covering vast territory, but the natural condition is harsh and the ecological environment is fragile. Therefore, the proposed PoA can help to achieve the policy goal of effectively utilization various energy resources and improve the recycle of waste.

A.3. CMEs and participants of PoA

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1. The CME of the PoA as the entity which communicates with the Board.

The CME of the PoA is Lanzhou Hualong Poultry Breeding Co.

2. Project participants being registered in relation to the PoA. Project participants may or may not be involved in one of the CPAs related to the PoA.

Name of Party involved(*) (hose indicate a host Party)	Private and/or public entity(ies) Project participants(*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant(Yes/No)
People's Republic of China (Host Country)	Lanzhou Hualong Poultry Breeding Co. (public entity)	No
Untied Kingdom of Great Britain and Northern Ireland	A&T Carbon Asset Co., Limited (private entity)	No

A.4. Party(ies)

Name of Party involved (host) indicates a host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
People's Republic of China (Host Country)	Lanzhou Hualong Poultry Breeding Co. (Public entity)	No
Untied Kingdom of Great Britain and Northern Ireland	A&T Carbon Asset Co., Limited (Private entity)	No

A.5. Physical/ Geographical boundary of the PoA

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The programme is implemented in Gansu Province, so the entire Gansu Province administrative area delineates the boundary of the Programme. The geographic coordinate is from 92.2167 ºE to 108.7667 ºE, 32.5167 ºN to 42.9500 ºN.

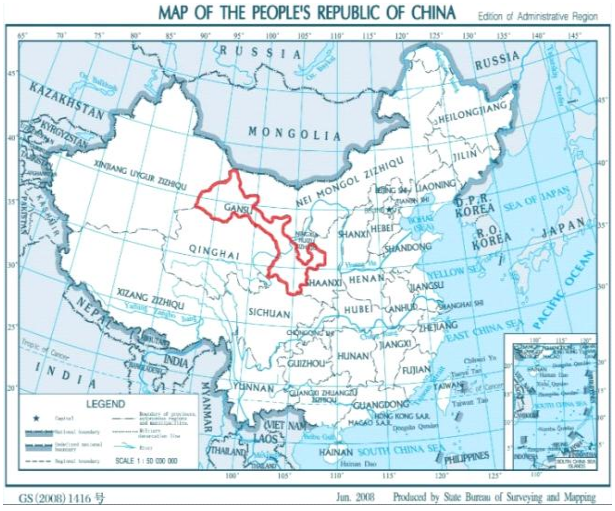

Figure 1. Location of the PoA

A.6. Technologies/measures

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Each CPA may include one or multiple project activities. All the project activities under the CPA of the PoA will introduce anaerobic manure treatment systems with biogas recovery to treat the manure collected from livestock farms, and then utilize the recovered biogas as fuel for energy generation. It also covers treatment of manure collected from several farms in a centralized plant.

In the absence of the PoA, animal manure would be left to decay anaerobically in the anaerobic lagoons and methane is emitted to the atmosphere, which is the same as the baseline scenario.

The technology employed in the project activities under the CPA includes manure treatment system, biogas recovery system and biogas utilization system.

The manure from livestock farm will firstly enter into adjusting tank in order to meet a given proportioning for fermentation, and subsequently enter into anaerobic reactor. The storage time of the manure after removal from the animal barns, including transportation, will not exceed 45 days before being fed into the anaerobic digester. Under anaerobic condition and proper temperature in the reactor, organic matter included in manure from livestock farm will be converted into biogas by methanogenic bacteria. The generated biogas will be recovered and then utilized for energy generation after desulphurization and dehydration. The residue will be used for land application.

The detailed technology flow is shown in the following figure:

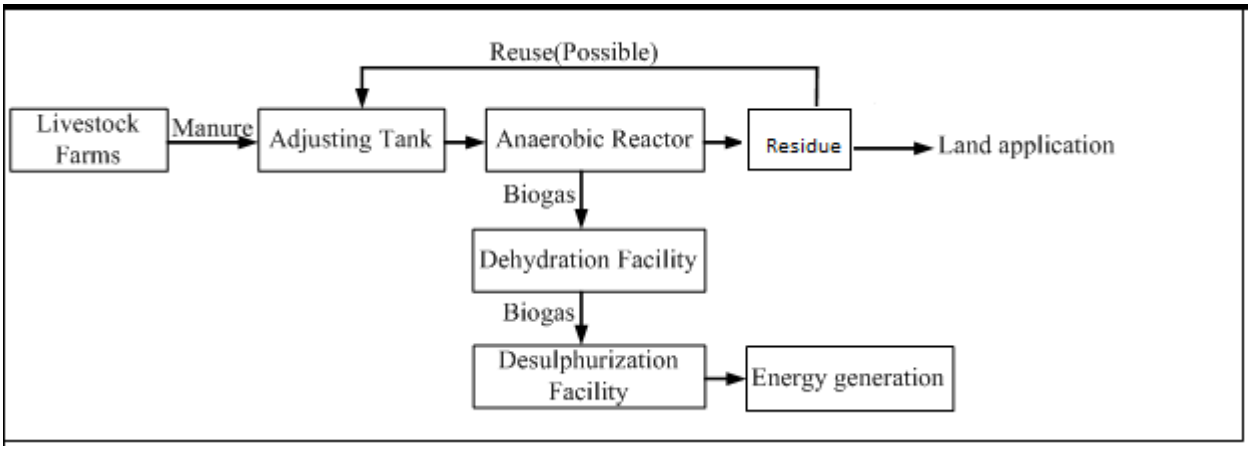

Figure 2. Technology flow adopted in the PoA

Biogas holder will be installed in each project activity to achieve that in the normal case all methane produced from anaerobic digestion can be stored and stabilized, and then be totally used for energy purposes. Besides, flaring system will also be installed in project activities to ensure that in case of emergency all biogas produced by the digester is flared but not emitted to atmosphere and in this case, open flaring or closed flaring will be adopted based on each owner's opinion.

The PoA can contribute to the reduction of greenhouse gases in two ways: 1) the biogas recovery system reduces methane emissions 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. However, due to the uncertainty of final energy utilization approach, for simplification and conservativeness, the proposed CPA will only claim emission reductions from the avoidance of methane emission. No CERs will be claimed for substituting fossil fuel by biogas for energy generation.

All main equipments in the Programme will be domestically produced. The PoA does not require any technology transfer from Annex-I countries to the host country.

A.7. Public funding of PoA

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There is no public funding from Annex-I parties for the programme of activities.

SECTION B. Demonstration of additionality and development of eligibility criteria

B.1. Demonstration of additionality for PoA

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According to paragraph 7 of EB 65 annex3, additionality shall be demonstrated by establishing that in the absence of CDM, none of the implemented CPAs would occur which mean that the additionality of the proposed PoA will be demonstrated on the CPA level.

According to the criteria (17) listed in Section B.2, only the CPA passing the additionality assessment can be included in the PoA. There are three steps to assess additionality as described in Section B.5 of generic CPA. For each project under the CPA, detailed information of additionality assessment is included in each specific CPA-DD.

Thus, in the absence of CDM, none of the implemented CPAs would occur.

B.2. Eligibility criteria for inclusion of a CPA in the PoA

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According to Annex 3 of EB 65, the criteria for inclusion of a CPA in the PoA are as below:

Category	**Eligibility criteria for inclusion of a SSC-CPA in the PoA:**	**The documents for the CME to check whether the features of potential CPAs meet the eligibility criteria before inclusion in the PoA.**
Geographical boundary	1. All the project activities under the CPA should be located in the boundary of the PoA, i.e. within Gansu Province;	--Gansu Province administrative area Map or geo-coordinate
To avoid double counting	2. All the project activities under the CPA should pass the procedure of avoiding double counting described in section C (ii) of PoA-DD;	--Conduct the avoiding double counting procedure as described in section C (ii) of PoA-DD.
The specifications of technology/measure	3. All the project activities under the CPA are to install anaerobic animal manure management systems to achieve methane recovery and destruction by flaring/combustion or gainful use of the recovered biogas. It also covers treatment of manure collected from several farms in a centralized plant. In addition, Biogas holder will be installed in each project activity to achieve that in the normal case all methane produced from anaerobic digestion can be stored and stabilized, and then be totally used for energy purposes. Besides, flaring system will also be installed in project activities to ensure that in case of emergency all biogas produced by the digester is flared but not emitted to atmosphere and in this case, open flaring or closed flaring will be adopted based on each owner's opinion.	--Technical flow diagram
The start date of the CPA	4. The start date of the project activities under the CPA, which is the earliest date among equipment purchase date, debt contract date and construction start date, are later than the first PoA GSC start date of 14/09/2011.	--Equipment purchasing contract --Construction contract -- Debt contract date
The applicability and other requirements of applied methodologies	**Criteria Related to Applicability Conditions of AMS-III.D(version 18.0)**	/
	5. The livestock population in the farm included in the project activities under the CPA under the PoA should be managed under confined conditions;	--On-site photo or --FSR or FSR approval --EIA or EIA approval --History Record of livestock farms

Category	Eligibility criteria for inclusion of a SSC-CPA in the PoA:	The documents for the CME to check whether the features of potential CPAs meet the eligibility criteria before inclusion in the PoA.
		--Statement by Related Agriculture Bureau
	6. Manure or the streams obtained after treatment are not discharged into natural water resources;	--FSR; or --EIA or EIA approval --History Record of livestock farms --Statement by Related Agriculture Bureau --Technical demonstration
	7. The annual average temperature of baseline site where anaerobic manure treatment facility is located is higher than 5 ℃;	--Official data at the nearest meteorological station, or -- Data available from historical on site observations
	8. In the baseline scenario the retention time of manure waste in the anaerobic treatment system should be greater than one month;	--FSR or --EIA or EIA approval --Technical drawing --operation log --Prove from local government; or --Other evidence, e.g. onsite survey.
	9. The baseline scenario for the manure treatment is that the manure waste from the livestock would be treated in anaerobic lagoons with the depth of more than 1m;	--FSR or --EIA or EIA approval --Technical drawing or construction drawing of lagoon --Prove from local government; or --Other evidence, e.g. onsite survey.
	10. No methane recovery and destruction by flaring, combustion or gainful use takes place in the baseline scenario;	--FSR or --EIA --Technical drawing --photo; or --prove from local government; or

Category	Eligibility criteria for inclusion of a SSC-CPA in the PoA:	The documents for the CME to check whether the features of potential CPAs meet the eligibility criteria before inclusion in the PoA.
		--other evidence, e.g. onsite survey.
	11. The residual waste from the animal manure management system must be handled aerobically, e.g. land application;	--FSR; --EIA; --Technical drawing and records --Prove from local government --other evidence, e.g. onsite survey.
	12. Only animal manure will be anaerobically treated but no other organic matters are involved in the CPA;	--FSR; or --EIA --Operation records; --Technical demonstration;
	13. Technical measures will be used to ensure that all biogas produced by the digester is used or flared;	--FSR or --EIA --Technical drawing --Biogas storage tank; and flaring system;
	14. 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.	--FSR; --Operation log --A third party statement
	15. The emission reductions from type III components of each CPA should be less than or equal to 60,000tCO_2/yr.	--CPA lists --ER Calculation worksheet
	16. The baseline scenarios of type III is animal manure would be left to decay anaerobically without methane recovery and destruction.	- FSR or -Onsite survey or -A third party statement
Additionality	17. A CPA should meet any one of following criteria for assessing additionality:	/
	1) Either meet relevant requirement in "*Guidelines for demonstrating additionality of microscale project activities*", including: a) The geographic location of the project activity is in one of the least developed countries or the small island developing States (LDCs/SIDS) or in a special underdeveloped zone (SUZ) of the host country;	--Evidence regarding undeveloped zone ; --FSR or its approval --Equipment brand/nameplate or equipment purchase contract;

Category	Eligibility criteria for inclusion of a SSC-CPA in the PoA:	The documents for the CME to check whether the features of potential CPAs meet the eligibility criteria before inclusion in the PoA.
	b) The emission reductions from type III components of the CPA are no more than 20 ktCO_2e per year. **2) Or meet relevant requirement for the positive list of technologies and project activity types that are defined as automatically additional in "*Guidelines on the demonstration of additionality of small-scale project activities*", including:** a) Project activities solely composed of isolated units where the users of the technology/measure are households or communities or Small and Medium Enterprises (SMEs); b) The emission reductions from type III components of each units under the CPA is no more than 3,000 tCO_2e per year; **3) Or the third method:** The project IRR (before tax) of the project included in the CPA is lower than the benchmark (project IRR before tax) of 7% according to the *Economic Evaluation Method and Parameter of Construction Projects* (3rd edition) for the stock farming.	--ER Calculation worksheet --IRR worksheet
Environmental impact analysis	18. Each project activities included in the CPA must have obtained approval of EIA.	--EIA and its approval
Funding from Annex I parties	19. The project activities under the CPA are not sponsored by any funding from Annex I parties.	As described in section A.4.5 of PoA-DD --Project approval or --Confirmation by the project implementer
Others	20. The CPA crediting period does not exceed 31/01/2041 (the PoA end date).	--CPA-DD
	21. There is no any project activity which satisfied both condition: (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 1km of the boundary of the proposed small-scale CPA, at the closest point.	--FSR; --Documents from local government; --Onsite Survey.

Items no need to be checked for inclusion of a CPA in the proposed PoA:

Local stakeholder consultations and	As the stakeholder consultation conducted on the PoA level and no further requirements needed, no eligibility criteria was needed.	As described in section F.
Sampling requirements for a PoA	Not applicable as the CME opts for a verification method that does not use sampling. Each CPA will be monitored and verified.	-

B.3. Application of methodologies

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All the project activities under the CPA of the PoA will introduce anaerobic manure treatment systems with biogas recovery to treat the manure collected from livestock farms, and then utilize the recovered biogas as fuel for energy generation. It also covers treatment of manure collected from several farms in a centralized plant.

The following methodology is applied in the PoA:

AMS-III.D.:	***"Methane recovery in animal manure management systems"*** **(Ver 18.0);**

For more information, please refer to:

http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html

The methodology also refers to:

AMS-III.AO.: Methane recovery through controlled anaerobic digestion (Ver 1.0)
Tool to calculate the emission factor for an electricity system (Ver 02.2.1);
Tool to determine project emissions from flaring gases containing methane (Ver 01);

In addition, the PoA also refers to the references below:

Tool for the Demonstration and Assessment of Additionality (Ver 06.0.0);
Guidance on the Assessment of Investment Analysis (Ver 05);
Guidelines for demonstrating additionality of microscale project activities (Ver 04.0);
General Guidelines for SSC CDM methodologies (Ver 19.0);
Standard for Demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programme of activities (Ver 02.0);
Guidelines on the demonstration of additionality of small-scale project activities (Ver 09.0)

For more information, please refer to:

http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html.

According to AMS-III.D, it is approved for use in a PoA.

SECTION C. Management system

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In order to implement the PoA smoothly, an operational and management plan was established by the CME, which is presented as below:

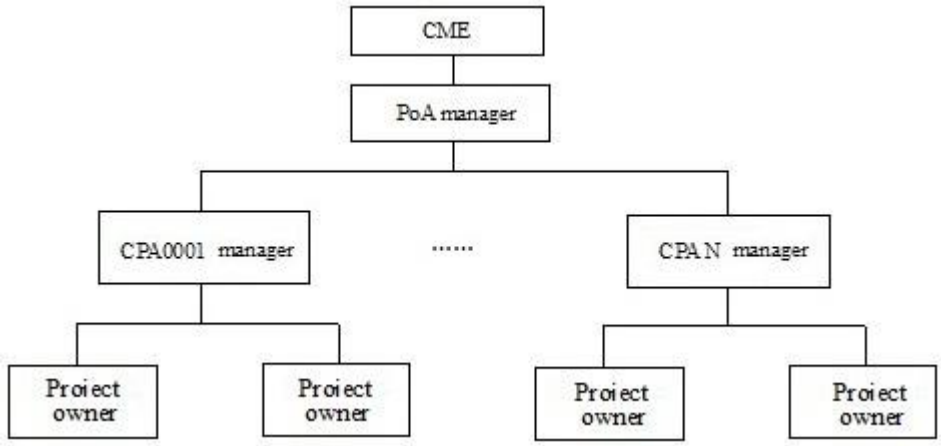


Figure 3. Operational and Management Structure

The responsibility of each entity involved in the PoA is described as the below table:

Entity	Responsibility description
PoA Manager of CME	CME is in full charge of overall management and coordination of the PoA. The detailed responsibility of CME mainly includes: (1) Track the development of PoA; keep communication with EB, DNA and related agencies; (2) Establish the monitoring plan and training plan; (3) Manage the contracts between CME and project owner, and other documents; (4) Take charge of the PoA database establishing and updating and managing; (5) Conduct the double counting checking; (6) Conduct CPA inclusion (eligible check) as well as database updating and management; (7) Take charge of monitoring data analysis and archiving; (8) Take charge of the preparation of monitoring report and calculation of emission reduction; (9) Furthermore, to manage the PoA more efficiently and smoothly, the PoA manager is in charge of improvement of operation and management of the PoA as follows: Regular on-site check regarding operation of biogas systems; - Based on on-site check, identify the opportunity to improve the operation and management plan; - Discuss with CME and farm owner and related technical staff about feasibility of improvement action; - Implement improvement plan;
CPA Manager of CME	- CPA manager assists the CME to manage the CPA, and collect the data and information related to the CPA, and then regularly report to the CME; - Organize training for the related staff;

	- Collect the monitored data information based on the monitoring plan and take charge of monitoring implementation;
Project owner	- Take charge of operation and management of project activity, as well as assist CPA manager to conduct monitoring plan according to monitoring manual; - Take charge of calibration of monitoring equipments periodically.

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

The proposed PoA involves a record keeping system (PoA Database) in order to effectively implement and manage each SSC-CPA. The CME has divided the database construction and management into 3 steps and has defined the management responsibilities for each as detailed in the table below:

Procedure	Entity	Management Responsibilities & Arrangements
Material and data collection	CPA Manager	- Searching for the Pre-qualification activities; - Collecting the monitoring data and materials of the activities which have been included already according to the request list; - Submit the information and materials collected to CPA manager
Technical review	PoA Management	- Completeness check of the information and materials collected; - In charge of the double counting check; - Implement the data reliability check (eligible check) according to the inclusion criteria list - Roughly calculate the ER
Filing and database management	PoA Management	- Regularly update the PoA database; - Document filing and backup; - Report the findings and feedback from the database and filing management; - Continuously improvement according to the feedback.

The PoA database will be updated periodically. A team designated by CME will be in charge of each procedure above and the CME will organize the relevant personnel to participate the training related to PoA before their duty.

All the staffs will be trained by the CME according to the training manual, and the training record and competency evaluation is made available to relevant PPs and the DOE. Besides, the CME will continuously train the staff during the PoA crediting period.

In addition to the above management tasks, the coordinating entity will implement the following operational elements to ensure proper management and oversight of the proposed PoA.

A comprehensive database including all activities in each CPA is set up. All the essential activity information mainly including the following variables is required:

- Activity name;
- Activity owner name;
- Activity detailed location;
- Project Approval No.;
- Breeding Information;
- Information about biogas activity;
- Baseline Information;
- CDM monitoring and verification record;
- Emission reduction;
- IRR(if applicable)

The CME will be responsible for the management of records and data associated with each CPA: The potential activity will be numbered with geo-coordination and registered in the database only if it would pass the eligible criteria checking. The activity status and information will be recorded and updated continuously and periodically during the PoA crediting period. The database will be made accessible to relevant PPs and the DOE. All the paper and electronic documents obtained by the CME will be filed and registered in the library system during the PoA crediting period plus 2 years.

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

Two measures are taken to avoid double counting of emission reductions:

1. Declaration by the owner of activity is used to confirm that there will not be any double counting between this PoA and any other PoA/CDM project.

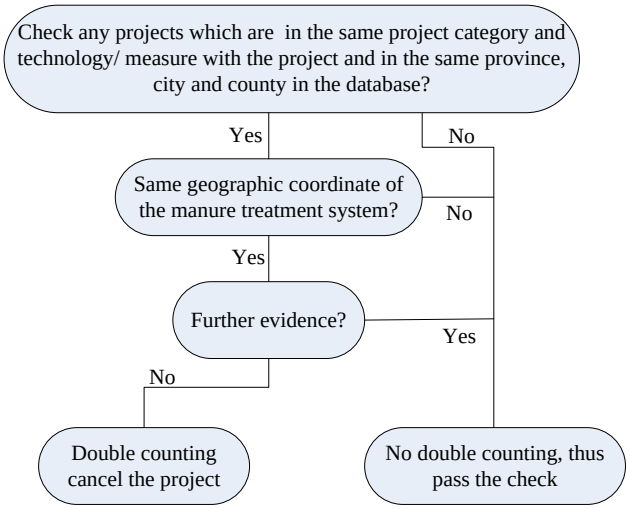
Each of the owner included in the proposed CPA should sign a contract with the CME to confirm that：

(a) They are aware of and have agreed that their activity is being subscribed to the PoA.

(b) They have neither already been registered as a CDM project, nor as a CPA of another PoA.

2. Database check will be applied to ensure that no activity could be double added into this PoA.

All the project activities under the CPA should be registered and recorded in the database controlled by the CME. The CME should be further check if the project activity is included in any CPA of the proposed PoA. Before the activity is registered in the database, a regular check is required to avoid double counting by the following steps:



Each of the project activities has the unique registration number which is the geo-coordination of project.

Thus, only the activity neither registered as a CDM, nor as a CPA of this or another PoA could be added in the PoA.

The database and all the information regarding the project activities under the CPA of PoA were accessible to the project owner, CME, and DOE.

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

According to the Number (21) of the eligibility criteria for inclusion of a CPA in the PoA, the CPA included in the PoA is not a de-bundled component of another CDM programme activity (CPA) or CDM project activity.

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

Contracts will be signed between the CME and the owner of the project included in each CPA before inclusion of the CPA in the PoA. This is to ensure that all entities involved in the CPA operation are agreed that their activities are being subscribed to the PoA.

SECTION D. Duration of PoA

D.1. Start date of PoA

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14/09/2011 (the first GSC date of the PoA)
01/02/2013 (the starting date of crediting period for the PoA)

D.2. Length of the PoA

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28 years

SECTION E. Environmental impacts

E.1. Level at which environmental analysis is undertaken

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1. Environmental Analysis is done at PoA level ☐
2. Environmental Analysis is done at SSC-CPA level ☒

According to the "National Environmental Impact Assessment Law", EIA is required for each construction project, and the EIA of this project type should be conducted on project level, therefore, the EIA will be undertaken at CPA level based on the EIA of each activity in the CPA.

E.2. Analysis of the environmental impacts

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As above environmental analysis will be done at CPA level.

According to the national laws/regulation, each project under the CPA included in PoA will prepare EIA documents and apply for approval of the local environmental protection bureau.
The environment impacts possibly caused by the project and the corresponding measures adopted by the project owner will be analyzed at each specific CPA-DD.

SECTION F. Local stakeholder comments

F.1. Solicitation of comments from local stakeholders

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1. Local stakeholder consultation is done at PoA level ☒
2. Local stakeholder consultation is done at SSC-CPA level ☐

The PoA is set up to develop all the eligible manure treatment and biogas utilization projects in the boundary as PCDM program; and the corresponding stakeholder consultation campaign is aimed to collect the comments and suggestions of local residents in the PoA boundary on the EIA of this project category, the PCDM development and so on.

The PoA implementation is supported by Rural Energy Office of Gansu Province whose routine daily work is the management and supervision of the biogas/ household biogas construction projects in Gansu province. Thus, the local stakeholder comments invitation has been initiated and cooperated by Rural Energy Office of Gansu Province, local rural energy offices and the CME jointly across the PoA boundary. In addition, the PoA can support the achievement of local policy and promote the construction of animal manure treatment systems to achieve methane recovery and destruction in livestock across Gansu province.Thus, in order to collect the comments on the PCDM development from local residents in whole Gansu province which could be taken in further PoA planning and implementation, the CME choose to launch the local stakeholder consultation at the PoA level.
To ensure the sustainability of the PoA, the CME of the PoA carried out a stakeholder consultation process around the Gansu Province during 03/2011 and 04/2011. The whole process is summarized as below:

1. Notification

In order to solicit comments from stakeholders, with the support of Rural Energy Office of Gansu Province and Local Rural Energy Offices under each county of Gansu province, two methods were chosen by CME to publish the notification of the stakeholder survey for the PoA, as follows:

(1) On 01/03/2011 the bulletin was published on the website of Gansu Province Rural Energy Office. The bulletin contains the brief introduction of the PoA, the social impact of the PoA, the introduction of CDM/PCDM, and invites the relevant stakeholders in Gansu province to comment on the PoA through the phone of Gansu Province Rural Energy Office or through the visit on the Local Rural Energy Offices and taking the questionnaires.
(2) During 02/03/2011 and 25/03/2011, the notification was published on bulletin boards located at different city of Gansu province to notify the stakeholder with the support of Local Rural Energy Offices[3].

2. Questionnaire campaign

During 03/2011 and 04/2011, a public survey was conducted in the format of questionnaires[4]. The workers of Local Rural Energy Office and the CME went to countryside to distribute questionnaires. In the same time, people can go to the office of Local Rural Energy to get the questionnaires if they interest in.

The questions in the questionnaires include:

1) The overall attitudes to the PoA;
2) Local economic impact of the PoA;
3) Local income and life quality impact of the PoA;
4) Local new job opportunity impact of the PoA;
5) Local ecological impact of the PoA;
6) The possible negative impact to the local area;
7) Any other comments and suggestions.

F.2. Summary of comments received

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Totally 90 questionnaires were distributed to local stakeholders with a return rate of 100%. The respondents covered different ages and education backgrounds with various occupations. All potential people who may interest in the PoA, the technical person, officials, and rural resident and so on are involved. The following table summarized the basic detail of the respondents from the questionnaires returned.

[3] On 02/03/2011 the Gansu Province Rural Energy Office issued the notification on the implementation of stakeholder consultation for the PoA (numbered as: Gan NongNeng Han [2011] No.11) to all Local Rural Energy Offices under each county of Gansu province. This notification requires the Local Rural Energy Offices publish the bulletin of the stakeholder opinion survey for the PoA in respective county and distribute and collect the questionnaires.

[4] On 30/03/2011, the consultant, A&T Carbon Asset Co., Limited, provided the training of stakeholder survey method to the relevant employees from CME of Lanzhou Hualong Poultry Breeding Co., Gansu Province Rural Energy Office and all Local Rural Energy Offices under each county of Gansu province.

Basic information	Classification	Number of respondents
Gender	Male	85
	Female	5
Age	≤30	7
	31~45	34
	≥45	49
Occupation	Rural people	78
	workers	6
	officials	5
	student	1
Education	Primary level	39
	Middle level	43
	High level	8

F.3. Report on consideration of comments received

Based on the returned questionnaires, the comments are summarized as below:

1) All respondents are in favor of the PoA, no respondent stated objection;

2) 86 respondents (96%) think the projects under the PoA can bring positive impacts to local economic development; 4 respondents (4%) think the projects under the PoA have no impacts on local economic;

3) 85 respondents (94%) believe the projects under the PoA will help to improve the income and life quality of local residents; 5 respondents (6%) think the projects under the PoA have no impacts on income and life quality of local residents;

4) 90 respondents (100%) believe the projects under the PoA can provide new job opportunity;

5) 80 respondents (89%) believe the projects under the PoA will do not put negative impact on local ecological environment; 10 respondents (11%) believe the projects under the PoA have no impacts on local ecological environment;

6) No respondent offers any suggestion regarding the negative impacts of the projects under the PoA;

The returned questionnaires show that the PoA is supported by local residents and will bring various positive impacts to the local area.

In conclusion, the survey shows that the PoA is supported by local residents and will take positive impact on various aspects, and no negative impacts will be caused by the projects under the PoA.

SECTION G. Approval and authorization

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The LoA from China Development and Reform Commission (China DNA) was issued on 22/02/2012, in which Lanzhou Hualong Poultry Breeding Co. is authorized as China's participant to voluntarily participate in and carry out the PoA as the Coordinating/Managing Entity.

The LoA from United Kingdom Environment Agency (UK DNA) was issued on 22/04/2012, in which A&T Carbon Asset Co., Limitedwas confirmed that they are a project participant.

The LoAs mentioned above had been submitted to DoE by means of hardcopy scan.

PART II. Generic component project activity (CPA)

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Animal Manure Treatment Programme in Gansu Province--CPA-XXXX (hereafter referred to as the CPA) is to recover methane from manure treatment in livestock farms by changing the manure management practice from anaerobic animal manure management systems to biogas digester and then to utilize the recovered biogas to generate energy in Gansu Province.

SECTION A. General description of a generic CPA

A.1. Purpose and general description of generic CPAs

The PoA only includes one type generic CPA, which is to install animal manure treatment systems in livestock farms to achieve methane recovery and destruction, and the recovered methane will be used for energy purposes. This meets the framework of the PoA.

In the absence of the CPA, animal manure would be left to decay anaerobically without methane recovery and destruction, which is the same as baseline scenario.

By recovery and utilization of biogas, the CPA can contribute to the reduction of greenhouse gases in two ways: 1) the biogas recovery system reduces methane emissions 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. However, due to the uncertainty of final energy utilization approach, for simplification and conservativeness, 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 energy generation.

SECTION B. Application of a baseline and monitoring methodology

B.1. Reference of the approved baseline and monitoring methodology(ies) selected

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The following methodologies are applied in the CPA:

AMS-III.D.:	***"Methane recovery in animal manure management systems"*** **(Ver 18.0);**

For more information, please refer to:

http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html

Those methodologies also refer to:

AMS-III.AO.: Methane recovery through controlled anaerobic digestion (Ver 1.0)
Tool to calculate the emission factor for an electricity system (Ver 02.2.1);
Tool to determine project emissions from flaring gases containing methane (Ver 01);
Tool for the Demonstration and Assessment of Additionality (Ver 06.0.0);
Guidance on the Assessment of Investment Analysis (Ver 05);
Guidelines for demonstrating additionality of microscale project activities (Ver 04.0);

General Guidelines for SSC CDM methodologies (Ver 19.0);
Standard for Demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programme of activities (Ver 02.0);
Guidelines on the demonstration of additionality of small-scale project activities (Ver 09.0)

For more information, please refer to:

http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html.

According to AMS-III.D, it is approved for use in a PoA.

B.2. Application of methodology(ies)
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1. <u>Methodology of type III --- manure treatment and avoid methane emission</u>

The project activities under the CPA of the PoA meet the applicability criteria of Methodology **AMS-III.D**. The details analysis on the applicability criteria of Methodology **AMS-III.D** is as the following table:

No.	Applicability Conditions as per AMS-III.D	Situation of a CPA under the PoA
1	This methodology covers project activities involving the replacement or modification of anaerobic animal manure management systems in livestock farms to achieve methane recovery and destruction by flaring/combustion or gainful use of the recovered methane. It also covers treatment of manure collected from several farms in a centralized plant.	The FSR will be checked to confirm that each CPA will introduce animal manure treatment systems in livestock farm to achieve methane recovery and destruction, instead of the existing anaerobic lagoon.
2	The livestock population in the farm is managed under confined conditions;	The onsite photo of livestock farms will be checked to confirm that the livestock in the Project Farm will be all managed under confined conditions. This requirement was added as eligibility criteria (5) for inclusion of a CPA in the PoA described in the Section B.2.
3	Manure or the streams obtained after treatment are not discharged into natural water resources (e.g. river or estuaries), otherwise AMS-III.H "Methane recovery in wastewater treatment" shall be applied;	The EIA and/or FSR document will be checked to confirm that waste residue and liquid after treatment will not be discharged into natural water resources. This requirement was added as eligibility criteria (6) for inclusion of a CPA in the PoA described in the Section B.2.
4	The annual average temperature of baseline site where anaerobic manure treatment facility is located is higher than 5 ℃;	The official data at the nearest meteorological station or data available from historical on site observations will be checked to confirm that the annual average temperature of baseline site is higher than 5 ℃. This requirement was added as

No.	Applicability Conditions as per AMS-III.D	Situation of a CPA under the PoA
		eligibility criteria (7) for inclusion of a CPA in the PoA described in the Section B.2.
5	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;	The operation log or FSR will be checked to confirm that the retention time of manure waste in the anaerobic treatment system is greater than one month and the depths of lagoon is more than 1m. According to eligibility criteria (8) and (9) for inclusion of a SSC-CPA in the PoA described in the Section B.2, it can be met.
6	No methane recovery and destruction by flaring, combustion or gainful use takes place in the baseline scenario.	The FSR or onsite survey or the supporting documents provided by the third party will be checked to confirm that methane from the lagoon is directly released into atmosphere. This requirement was added as eligibility criteria (10) for inclusion of a CPA in the PoA described in the Section B.2.
7	The residual waste from the animal manure management system shall be handled aerobically, otherwise the related emissions shall be taken into account as per relevant procedures of AMS-III.AO "Methane recovery through controlled anaerobic digestion". In case of soil application, proper conditions and procedures (not resulting in methane emissions) must be ensured;	The FSR or onsite survey will be checked to confirm that the residual waste from the animal manure management system is handled aerobically. This requirement was added as eligibility criteria (11) for inclusion of a CPA in the PoA described in the Section B.2.
8	Technical measures shall be used (including a flare for exigencies) to ensure that all biogas produced by the digester is used or flared;	Flaring system and biogas holder will be checked to confirm that all methane is used or flared even emergency situation. This requirement was added as eligibility criteria (13) for inclusion of a CPA in the PoA described in the Section B.2.
9	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.	The FSR and operation log will be checked to confirmed that the storage time of the manure is not exceed 45 days. This requirement was added as eligibility criteria (14) for inclusion of a CPA in the PoA described in the Section B.2.
10	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	The FSR will be checked to confirm that the project does not involve landfill methane recovery, wastewater treatment, composting animal manure, or co-digestion of animal manure and other organic matters. According to eligibility criteria (12) for inclusion of a SSC-CPA in the PoA

No.	Applicability Conditions as per AMS-III.D	Situation of a CPA under the PoA
	organic matters shall use the methodology AMS-III.AO "Methane recovery through controlled anaerobic digestion".	described in the Section B.2, the project activities under the CPA of PoA will introduce anaerobic manure treatments with biogas recovery to treat only animal manure.
11	Different options to utilise the recovered biogas as detailed in paragraph 3 of AMS-III.H are also eligible for use under this methodology. The respective procedures in AMS-III.H shall be followed in this regard.	The FSR will be checked to confirm that the recovered biogas will be used for energy purposes. This requirement was added as eligibility criteria (3) for inclusion of a CPA in the PoA described in the Section B.2.
12	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 for SSC CDM methodologies".	The FSR, FSR approval and ER calculation worksheet will be checked to confirm that each project under the CPA is a newly built animal manure treatment system and they can meet the related and relevant requirements in the "*General Guidelines for SSC CDM methodologies*". This requirement was added as eligibility criteria (15) for inclusion of a CPA in the PoA described in the Section B.2.
13	The requirements concerning demonstration of the remaining lifetime of the replaced equipment shall be met as described in the "General Guidelines for SSC CDM methodologies".	The FSR and its approval will be checked to confirm that each project activity under the CPA is a newly built animal manure treatment system, thus this criterion is not relevant as replacement of equipment is not involved in a CPA under the PoA.
14	Measures are limited to those that result in aggregate emission reductions of less than or equal to 60 kt CO_2 equivalent annually from all Type III components of the project activity.	The ER calculation worksheet will be checked to confirm that the emission reduction sourced from methane recovery for each CPA is lower than the threshold of 60,000 tCO_2e/yr. Therefore, the project is in line with *"General Guidelines for SSC CDM methodologies"*. This requirement was added as eligibility criteria (15) for inclusion of a CPA in the PoA described in the Section B.2.

Based on analysis above, AMS-III.D is applicable to the CPAs under the PoA.

B.3. Sources and GHGs

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As per Methodology AMS-III.D, the boundary of the CPA includes:

(a) The livestock

(b) Animal manure management systems (including centralised manure treatment plant where applicable);

(c) Facilities which recover and flare/combust or use methane

Due to the uncertainty of final energy utilization approach for each unit under the CPA, for simplification and conservativeness, the proposed CPA will only claim emission reductions from the avoidance of methane emission due to the existing AWMS.

Table 1. The emission source and the category of GHG

	Source	Gas	Included?	Justification/Explanation
Baseline	Direct emissions from the waste treatment processes	**CH_4**	**Included**	**The major source of emissions in the baseline**
		N_2O	Excluded	Excluded for simplification. This is conservative
		CO_2	Excluded	CO_2 emissions from the decomposition of organic waste are not accounted
	Emissions from electricity generation	CH_4	Excluded	To simplify the development process, No CERs will be claimed for substituting fossil fuel by biogas for energy generation.
		N_2O	Excluded	Excluded for simplification. This is conservative
		CO_2	Excluded	Excluded for simplification. This is conservative
	Emissions from thermal energy generation	CH_4	Excluded	To simplify the development process, No CERs will be claimed for substituting fossil fuel by biogas for energy generation.
		CH_4	Excluded	Excluded for simplification. This is conservative
		N_2O	Excluded	Excluded for simplification. This is conservative
Project activity	Emissions from physical leakage of biogas in the manure management systems	**CH_4**	**Included**	**The major source of emissions**
		CO_2	Excluded	CO_2 emissions from the decomposition of organic waste are not accounted
		N_2O	Excluded	According to the methodology AMS-III.D, excluded for simplification.
	Emissions from flaring or combustion of the gas stream	CO_2	Excluded	Excluded for simplification.
		CH_4	**Included**	**The major source of emissions in case flaring is involved.**
		N_2O	Excluded	According to the methodology AMS-III.D, excluded for simplification.
	Emissions from the use of fossil fuel or electricity	**CO_2**	**Included**	**The major source of emissions.**
		CH_4	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification.
	Emissions from incremental transportation distances	**CO_2**	**Included**	**In case of incremental transportation was occurred compared with project scenario and baseline scenario, the emissions are accounted.**
		CH_4	Excluded	According to the methodology AMS-III.D, excluded for simplification.
		N_2O	Excluded	According to the methodology AMS-III.D, excluded for simplification.
	Emissions from the storage of manure before being fed into the anaerobic	**CH_4**	**Included**	**This source of emissions 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,**

	digester			**exceeds 24 hours before being fed into the anaerobic digester; and** **(b) The dry matter content of the manure when removed from the animal barns is less than 20%.**
		CO_2	Excluded	According to the methodology AMS-III.D, excluded for simplification.
		N_2O	Excluded	According to the methodology AMS-III.D, excluded for simplification.

A general schematic view of the boundaries for each project under the PoA is shown in the figure below.

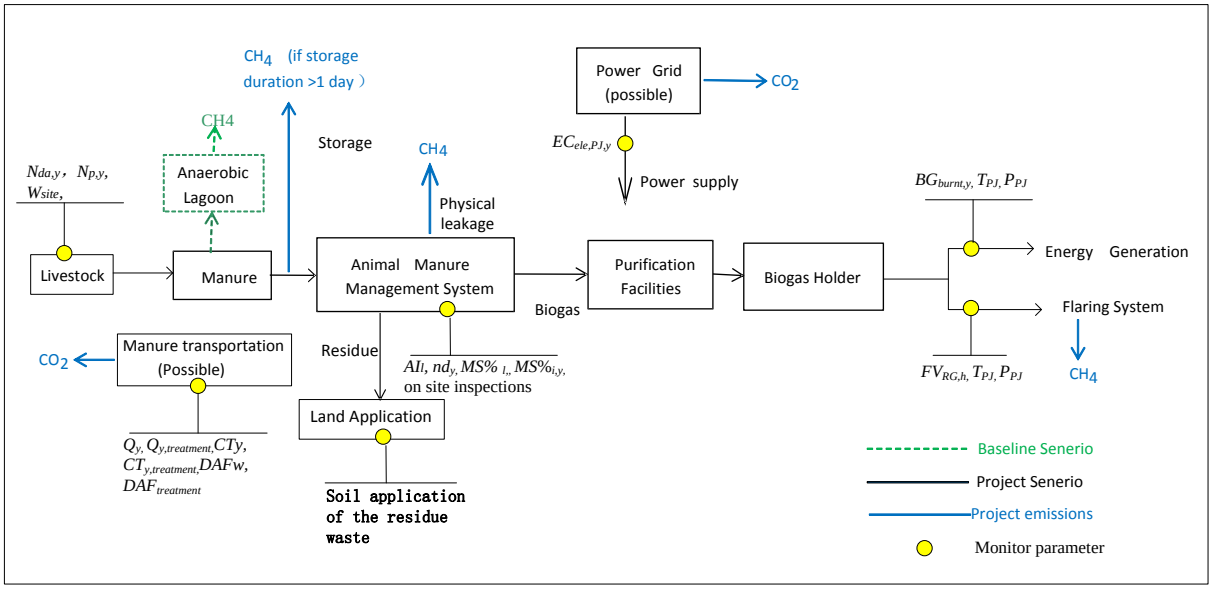

Figure 4. Project boundary

B.4. Description of baseline scenario

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As per AMS-III.D., for animal manure management the baseline scenario is the situation where, in the absence of the project activity, animal manure is left to decay anaerobically within the project boundary and methane is emitted to the atmosphere.

According to eligibility criterion (16) for inclusion of a SSC-CPA in the PoA, the baseline for animal manure management is the treatment of animal manure in anaerobic lagoons without methane recovery. The retention time of manure waste in the anaerobic lagoons is greater than one month, and the depths of lagoons are at least 1 m.

B.5. Demonstration of eligibility for a generic CPA

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The CPA is eligible for inclusion in the PoA because it meets all of the criteria outlined:

Criteria for inclusion of a CPA in the PoA	The documents for the CME to check whether the features of potential CPAs meet the eligibility criteria before inclusion in the PoA.	Situation of the CPA	Satisfied the criteria?Y/ N
1. All the project activities under the CPA should be located in the boundary of the PoA, i.e. within Gansu Province;	-- Gansu Province administrative area Map or geo-coordinate	Refer to Gansu Province administrative area map or geo-coordinate, the locations of the project activity/ies included in the CPA are located within Gansu Province.	Y/N
2. All the project activities under the CPA should pass the procedure of avoiding double counting described in section C (ii) of PoA-DD;	--Conduct the avoiding double counting procedure as described in section C (ii) of PoA-DD.	According to the avoiding double counting procedure as described in section C (ii) of the PoA-DD, all the project activity was pass the procedure : According to the information from the CME and each project owner involved in this CPA, the owner of each project activity included in the proposed CPA has signed a contract with the CME to confirm that: (a) They are aware of and have agreed that their activity is being subscribed to the PoA; (b) They have neither already been registered as a CDM project, nor as a CPA of another PoA. Furthermore, the CME has completed database check to ensure that no activity could be double added into this PoA.	Y/N
3. All the project activities under the CPA are to install anaerobic animal manure management systems to achieve methane recovery and destruction by flaring/combustion or gainful	--Technical flow figure	According to the FSR and its approval, all the project activities under the CPA are to install anaerobic animal manure management systems to achieve methane	Y/N

Criteria for inclusion of a CPA in the PoA	The documents for the CME to check whether the features of potential CPAs meet the eligibility criteria before inclusion in the PoA.	Situation of the CPA	Satisfied the criteria?Y/ N
use of the recovered biogas. It also covers treatment of manure collected from several farms in a centralized plant. In addition, Biogas holder will be installed in each Project to achieve that in case of emergency all methane produced from anaerobic digestion can be stored but not emitted to atmosphere. In addition, in order to ensure that all methane produced by the digester is destroyed, flaring system is installed in project activities and in this case, open flaring or closed flaring will be adopted based on each owner's opinion.		recovery and destruction by flaring/combustion or gainful use of the recovered biogas.	
4. The start date of the project activities under the CPA, which is the earliest date among equipment purchase date, debt contract date and construction start date, are later than the PoA GSC start date of 14/09/2011.	--Equipment purchasing contract --Construction contract --Debt contract	The start date of the project activities under the CPA, which is the earliest date among equipment purchase date, debt contract date and construction start date, later than the PoA first GSC start date of 14/09/2011.	Y/N
5. The livestock population in the farm included in the project activities under the CPA under the PoA should be managed under confined conditions;	--On-site photo or --FSR or FSR approval --EIA or EIA approval --History Record of livestock farms --Statement by Related Agriculture Bureau	According to onsite photo of livestock farms or EIA , it can be confirmed that the livestock in the Project Farm is managed under confined conditions.	Y/N
6. Manure or the streams obtained after treatment	--FSR; or	According to the EIA requirements, waste	Y/N

Criteria for inclusion of a CPA in the PoA	The documents for the CME to check whether the features of potential CPAs meet the eligibility criteria before inclusion in the PoA.	Situation of the CPA	Satisfied the criteria?Y/ N
are not discharged into natural water resources;	--EIA or EIA approval --History Record of livestock farms --Statement by Related Agriculture Bureau --Technical demonstration	residue and liquid after treatment are not discharged into natural water resources. In addition, refer to the project FSR, the waste residue and liquid are used as fertilizers, and therefore will not be discharged into natural water resources.	
7. The annual average temperature of baseline site where anaerobic manure treatment facility is located is higher than 5 ℃;	--Official data at the nearest meteorological station, or -- Data available from historical on site observations	According to official data at the nearest meteorological station or data available from historical on site observations, the annual average temperature of baseline site where anaerobic manure treatment facility is located is higher than 5 ℃.	Y/N
8. In the baseline scenario the retention time of manure waste in the anaerobic treatment system should be greater than one month;	--FSR or --EIA or EIA approval --Technical drawing --Operation log --Prove from local government; or --Other evidence, e.g. onsite survey.	According to FSR or technical drawing or operation log, it can be known the baseline retention time of manure waste in the anaerobic treatment system of the activities are all greater than one month.	Y/N
9. The baseline scenario for the manure treatment is that the manure waste from the livestock would be treated in anaerobic lagoons with the depth of more than 1m;	--FSR or --EIA or EIA approval --Technical drawing or construction drawing of lagoon --Prove from local government; or --Other evidence, e.g. onsite survey.	According to the onsite survey or the supporting documents provided by the third party, e.g. construction drawing of lagoon, EIA, the lagoon-depths of the activities are all deeper than 1m.	Y/N

Criteria for inclusion of a CPA in the PoA	The documents for the CME to check whether the features of potential CPAs meet the eligibility criteria before inclusion in the PoA.	Situation of the CPA	Satisfied the criteria?Y/ N
10. No methane recovery and destruction by flaring, combustion or gainful use takes place in the baseline scenario;	--FSR or --EIA --Technical drawing --photo; or --prove from local government; or --other evidence, e.g. onsite survey.	According to the information from the CME and each project owner involved in this CPA, no methane recovery and destruction by flaring, combustion or gainful use takes place in the baseline scenario.	Y/N
11. The residual waste from the animal manure management system must be handled aerobically, e.g. land application;	--FSR; --EIA; --Technical drawing and records --Prove from local government --other evidence, e.g. onsite survey.	According to the information from the CME and each project owner involved in this CPA and the project FSR, the residual waste from the animal manure management system will be handled aerobically.	Y/N
12. Only animal manure will be anaerobically treated but no other organic matters are involved in the CPA;	--FSR; or --EIA --Operation records; --Technical demonstration;	According to the information from the CME and each project owner involved in this CPA, only animal manure will be treated but no other organic matters are involved in the CPA.	Y/N
13. Technical measures will be used to ensure that all biogas produced by the digester is used or flared;	--FSR or --EIA --Technical drawing --Biogas storage tank; and flaring system;	According to the FSR, biogas holder will be installed in each project activity to achieve that in case of emergency all methane produced from anaerobic digestion can be stored but not emitted to atmosphere, and therefore ensure that all methane produced by the digester is destroyed. Besides, flaring system is also	Y/N

Criteria for inclusion of a CPA in the PoA	The documents for the CME to check whether the features of potential CPAs meet the eligibility criteria before inclusion in the PoA.	Situation of the CPA	Satisfied the criteria?Y/ N
		installed in project activities to ensure that all biogas produced by the digester is used or flared.	
14. 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.	--FSR; --Operation records or --Technical flow demonstration	According to the FSR and operation records, the storage time of the manure after removal from the animal barns of the activities is from X days to X days, and are all shorter than 45 days.	Y/N
15. The emission reductions from type III components of each CPA should be less than or equal to 60,000tCO_2/yr.	--CPA lists --ER Calculation worksheet	The emission reductions from type III components of CPA is X tCO_2/yr, which is below 60,000tCO_2/yr.	Y/N
16. The baseline scenarios of type III is animal manure would be left to decay anaerobically without methane recovery and destruction.	-Baseline situation survey	According to the baseline survey of the CPA, in the absence of the project activity, all manure from the livestock farm was left to decay anaerobically without methane recovery and destruction.	
17. A CPA should meet any one of following criteria for assessing additionality: (1) Either meet relevant requirement in "*Guidelines for demonstrating additionality of microscale project activities*". (2) Or meet relevant requirement for the positive list of technologies and project activity types that are defined as automatically additional in "*Guidelines on the demonstration of additionality of small-scale project activities*".	--Evidence regarding undeveloped zone ; --FSR or its approval --Equipment brand/nameplate or equipment purchase contract; --ER Calculation worksheet --IRR worksheet	The CPA meets the criterion (1) or (2) or (3).	Y/N

Criteria for inclusion of a CPA in the PoA	The documents for the CME to check whether the features of potential CPAs meet the eligibility criteria before inclusion in the PoA.	Situation of the CPA	Satisfied the criteria?Y/ N
(3) Or meet that the project IRR (before tax) of the project included in the CPA is lower than the benchmark (project IRR before tax) of 7% according to the *Economic Evaluation Method and Parameter of Construction Projects* (3rd edition) for the livestock farming.			
18. Each project activities included in the CPA must have obtained approval of EIA.	--EIA and its approval	Each project activities included in the CPA have obtained approval of EIA.	Y/N
19. The project activities under the CPAs are not sponsored by any funding from Annex I parties.	--Project approval or --Confirmation by the project implementer	According to the FSR approval and confirmation by the project implementer, the project activities under the CPAs are not sponsored by any funding from Annex I parties.	Y/N
20. The CPA crediting period does not exceed 31/01/2041 (the PoA end date).	--CPA-DD	The end date of CPA crediting period is DD/MM/YYYY, which does not exceed the PoA end date.	Y/N
21. There is no any project activity which satisfied both condition: (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 1km of the boundary of the proposed small-scale CPA, at the closest point.	--FSR; --Documents from local government; --Onsite Survey.	According to the information from the CME and each project owner involved in this CPA, there is no any activity with the same sectoral scope, whose boundary is within 1km of the boundary of the proposed small-scale CPA.	Y/N

Additionality demonstration of the CPA

According to eligibility criteria (17) for inclusion of a SSC-CPA in the PoA, the activity included in the proposed CPA could be proved additional via the following three steps.

Step 1 : Checking if the CPA can meet relevant requirement in "*Guidelines for demonstrating additionality of microscale project activities*".

According to the "*Guidelines for demonstrating additionality of microscale project activities*", if the two criteria list below can be meet, then the CPAcould be determined as additional directly.

No.	Criteria in the guideline	Detailed criteria for the CPA under the PoA
1	The geographic location of the project activity is in one of the least developed countries or the small island developing States (LDCs/SIDS) or in a special underdeveloped zone (SUZ)of the host country.	The geographic location of the projects in the CPA is in a special underdeveloped zone of the P.R. China identified by the Government via any one of the following methods[5]: (a)The proportion of population with income less than USD 2 per day (PPP)[6] in the region is greater than 50% calculated by using the most recent available data in official notifications for development assistance including for planning, management, and investment; (b)The GNI per capita in the country is less than USD 3000 and the population of the region is among the poorest 20% in the poverty ranking of the host country as per the applicable national policies and procedures which is calculated by using the most recent available data in official notifications for development assistance including for planning, management, and investment;

[5] According to the "*Guidelines for demonstrating additionality of microscale project activities*", in cases where, based on the recommendation of the designated national authority of the host country, the SUZ in the host country has been approved by Executive Board of the clean development mechanism (CDM), the list of such SUZ shall be maintained on the UNFCCC website
(e.g. at <http://cdm.unfccc.int/DNA/submissions/index.html>). In the case of these SUZ listed on the CDM website there is no need for the project proponents to provide proofs as indicated in method (a) and (b) below.

[6] Purchasing power parity.

2	The emission reductions from type III components of the project is no more than 20 $ktCO_2e$ per year .	The emission reductions from type III components of the CPA is no more than 20 $ktCO_2e$ per year

If the Sep1 can be satisfied, then the CPA is additional. Otherwise, proceed to Step 2.

<u>Step 2</u>: Checking if each project included in the CPA can meet relevant requirement for the positive list of technologies and project activity types that are defined as automatically additional in "*Guidelines on the demonstration of additionality of small-scale project activities*".

According to the "*Guidelines on the demonstration of additionality of small-scale project activities*", project activities solely composed of isolated units where the users of the technology/measure are households or communities or Small and Medium Enterprises (SMEs) and where the size of each unit is no larger than 5% of the small-scale CDM are defined as automatically additional for project sizes up to and including the small-scale CDM thresholds.
According to CPA eligibility criteria (15), the project size of all the activities included in the CPA are below the limitation of small-scale CDM projects. Thus, the following table is applied to check whether or not the activities in the proposed CPA are applicable for this Approach on the additionality demonstration.

No.	Criteria in the guideline	Detailed criteria for the activity in the CPA under the PoA
1	Project activities solely composed of isolated units where the users of the technology/measure are households or communities or Small and Medium Enterprises (SMEs)	All the equipment units in the activity is solely isolated where the users are households or communities or Small and Medium Enterprises (SMEs)
2	The size of each unit is no larger than 5% of the small-scale CDM	The annual emission reduction of each unit for the Type III measure is no larger than 3,000 tCO_2e.

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

If the Sep2 can be satisfied, then the CPA is additional. Otherwise, proceed to Step 3.

<u>Step 3</u>: Checking if each project included in the CPA can meet investment barrier in "*Guidelines on the demonstration of additionality of small-scale project activities*", which also refer to "*Tool for the Demonstration and Assessment of Additionality" and "Guidance on the Assessment of Investment Analysis".*

The CPA is additional only if all the projects under the CPA are proved to be additional according to the "*Guidelines on the demonstration of additionality of small-scale project activities*".

According to the "*Guidelines on the demonstration of additionality of small-scale project activities*", following methods could be used for the demonstration of additionality:
(a) Investment barrier: a financially more viable alternative to the project activity would have led to higher emissions;
(b) Technological barrier: a less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions;
(c) Barrier due to prevailing practice: prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions;
(d) Other barriers: without the project activity, for another specific reason identified by the project participant, such as institutional barriers or limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies, emissions would have been higher.

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

Sub-step 1 Determine appropriate analysis method

Sub-step 2 Determine the benchmark

Sub-step 3 Calculation and comparison of financial indicators

Sub-step 4 Sensitivity analysis

Sub-step 1 Determine appropriate analysis method

The "*Tool for the Demonstration and Assessment of Additionality*" suggests three analysis methods which are simple cost analysis (Option I), investment comparison analysis (Option II) and benchmark analysis (Option III).

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

Investment comparison analysis method is only applicable to projects whose alternatives are similar investment projects. For the project under the CPA, the alternative of the project is the continue of the existing situation, which is not an investment project. Therefore, the investment comparison analysis is not preferable.

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

Sub-step 2 Determine the benchmark

The project IRR (before tax) of the project included in the CPA is lower than the benchmark (project IRR before tax) of 7% according to the *Economic Evaluation Method and Parameter of Construction Projects* (3rd edition) for the stock farming.

Sub-step 3 Calculation and comparison of financial indicators

Basic parameters for calculation of financial indicators of each project will be shown as the table below.

Table 2. Financial Parameters of a project in the CPA

Parameter	Value	Units	Source
Fixed asset investment			
Operation hour			
Annual power output			
Electricity price (VAT Incl.)			
Annual supplied biogas amount			
Biogas sale price (VAT Incl.)(if applicable)			
Coal saving due to thermal generation by biogas(if applicable)			
Coal purchase price (VAT Incl.)(if applicable)			
Revenue (other possible revenue based on the real case CPA)			
Project lifetime (include construction period)			
Annual O&M cost			
Value added tax rate (VAT)			
Expense for city maintenance and construction			
Education fee addition			
CER price			

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

The CPA is not financially attractive if the project IRR is lower than the benchmark IRR.

Sub-step 4 Sensitivity analysis

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

Due to the uncertainty of final energy utilization approach for each project, it is difficult to identify the sensitivity factors in advance, so the sensitivity analysis will be conducted in typical SSC-CPA. A sensitivity analysis is 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 indicators varied in the range of -10%-+10%. If the project IRR of a typical SSC-CPA could not reach the benchmark even the variation range of the factor reaches 10%, then the CPA is additional.

If the Sep3 can be satisfied, then the CPA is additional. Otherwise, the CPA is not additional.

B.6. Estimation of emission reductions of a generic CPA
B.6.1. Explanation of methodological choices
>>

I. Calculate baseline emissions

Baseline emissions of the project include baseline emissions from methane. Thus, the baseline emission is calculated as follows:

$$BE_y = BE_{CH4,y} \quad (1)$$

Where:

BE_y	Baseline emissions in year *y* (tCO_2e)
$BE_{CH4,y}$	Baseline emissions due to methane recovery in year *y* (tCO_2e)

Calculation of $BE_{CH4,y}$

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

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);

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:

$$BE_{CH4,y} = GWP_{CH4} * D_{CH4} * UF_b * \sum_{j,LT} MCF_j * B_{0,LT} * N_{LT,y} * VS_{LT,y} * MS\%_{Bl,j} \quad (2)$$

Where:

$BE_{CH4,y}$	Baseline emissions due to methane recovery in year *y* (tCO_2e)
GWP_{CH4}	Global Warming Potential (GWP) of CH_4 (21 tCO_2e/tCH_4)

D_{CH4}	CH_4 density (0.00067 t/m^3 at room temperature (20 ℃) 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)[7]

Determination of $B_{0,LT}$

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

Determination of $VS_{LT,y}$

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

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

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

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

Where:

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

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

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

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

Determination of MCF_j

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

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

Determination of $N_{LT,y}$

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

$$N_{LT,y} = N_{da,y} * \left(\frac{N_{p,y}}{365} \right) \quad (4)$$

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)

II. Calculate project emissions

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

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

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

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

(d) CO_2 emissions from incremental transportation distances;

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

$$PE_y = PE_{PL,y} + PE_{flare,y} + PE_{power,y} + PE_{transp,y} + PE_{storage,y} \quad (5)$$

Where:

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

Determination of $PE_{PL,y}$

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

$$PE_{PL,y} = 0.10 * GWP_{CH4} * D_{CH4} * \sum_{i,LT} B_{0,LT} * N_{LT,y} * VS_{LT,y} * MS\%_{i,y} \quad (6)$$

Where:

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

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:

$$PE_{flare,y} = \sum_{h=1}^{8760} TM_{RG,h} \times \left(1 - \eta_{flare,h}\right) \times \frac{GWP_{CH4}}{1000} \quad (7)$$

Where:

$PE_{flare,y}$	Emissions from flaring or combustion of the biogas stream in the year y (tCO_2e)
$TM_{RG,h}$	Mass flow rate of methane in the biogas 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)

$$TM_{RG,h} = FV_{RG,h} \times fv_{CH4,RG,h} \times \rho_{CH4,n} \quad (8)$$

Where:

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

$FV_{RG,h}$ Volumetric flow rate of the residual gas in dry basis at normal conditions in hour h;(m^3/h)

$fv_{CH4,RG,h}$ Volumetric fraction of methane in the residual gas on dry basis in hour h; The default value of 60% will be used.

$\rho_{CH4,n}$ Density of methane at normal conditions (0.716); (kg/m^3)

Accordingly to the paragraph 22 of AMS-III.D, if the amount of biogas 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.

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

As fossil fuel is not involved in each SSC-CPA, $PE_{power,y}$ is equivalent to project emissions from electricity consumption. According to AMS-III.D, project emissions from electricity consumption are determined as per the procedures described in AMS-I.D, which is calculated as below:

$$PE_{power,y} = EC_{ele,PJ,y} \times EF_{grid,CM,y} \quad (9)$$

Where:

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

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

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

According to the*"Tool to calculate the emission factor for an electricity system",* The CO_2 emission factor for the displacement of electricity generated by power plants in an electricity system is determined by calculating the "operating margin"(OM) and "build margin"(BM) as well as the "combined margin"(CM).

The tool provides procedures to determine the following parameters:

Parameter	SI Unit	Description
$EF_{grid,CM,y}$	tCO_2e/MWh	Combined margin CO_2 emission factor for the project electricity system in year y
$EF_{grid,BM,y}$	tCO_2e/MWh	Build margin CO_2 emission factor for the project electricity system in

		year y
$EF_{grid,OM,y}$	tCO_2e/MWh	Operating margin CO_2 emission factor for the project electricity system in year y

The following is the detailed process of calculating the baseline CO_2 emission factor of the grid which the Project connected to according to the steps provided by the *Tool to calculate the emission factor for an electricity system (*hereafter referred to as the *Tool).*

Sub-step 1. Identify the relevant electricity system.

Chinese DNA has published a delineation of the project electricity system and connected electricity system. The project physically connects through transmission and distribution lines to the NWPG. It is composed of the local power grids covering Shaanxi, Gansu and Qinghai Province, Ningxia Hui and Xinjiang Wei Autonomous Region. Therefore, the project selects the NWPG for the calculation of baseline emission factor.

Sub-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.

Since the data of the off-grid power plants is not available, Option I is applied to calculate the operating margin and build margin emission factor.

Sub-step 3. Select a method to determine operating margin (OM).

According to the *Tool*, four methods compute the Operating Margin Emission factor can be used as follows:

(a) Simple OM, or

(b) Simple adjusted OM, or

(c) Dispatch data analysis OM, or

(d) Average OM.

The simple OM method only can be used when low-cost/must run resources constitute less than 50% of total amount of grid generating output 1) in the recent five years, or 2) by taking into account long-term normal for hydroelectricity generation. If the dispatch data is available the (c) Dispatch Data Analysis OM method should be the first methodological choice, while in case of the Project, the (a) Simple OM method is adapted with two reasons as follows:

(1) In cases where China presently the power grid dispatch and load data are unavailable as business

secrets, so (b) and (c) cannot apply in the Project for calculating the Operating Margin Emission Factor ($EF_{grid,OM,y}$).

(2) During the most recent 5 years, from 2006 to 2010 the hydroelectricity, nuclear-electricity and other low-cost/must run resources annual proportion in NWPG is 24.71%, 23.15%, 21.86%, 24.96% and 23.12% from year 2006 to year 2010 respectively[8], which are much less than 50%.

For simple OM, the emission factor can be calculated using either of the two following data vintages:

- Ex ante option: A 3-year generation weighted average, based on the most recent data available at the time of submission of the CDM-PDD for validation, without requirement to monitor and recalculate the emissions factor during the crediting period, or
- Ex post option: The year in which the project activity displaces grid electricity, requiring the emission factor to be updated annually during monitoring. If the data required calculating the emission factor for year y usually only available later than six months after the end of year y.

Project participant employs "ex-ante" for its operation margin calculation with two reasons as follows:

1) the full generation-weighted average for the most recent 3 years for which data are available at the time of PDD submission; and

2) The calculation adopts *Notification on Determining Baseline Emission Factor of China's Grid (17/10/2012),* which is published by Chinese DNA, therefore it is considered as authoritative data. In this notification, the OM is calculated *ex-ants*.

Sub-step 4. Calculate the operating margin emission factor according to the selected method.

From the *Tool to calculate the emission factor for an electricity system*, ($EF_{grid,simple,OM}$) may be calculated:

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.

Because the fuel consumption data is unavailable for each power plant / unit, Operation A cannot be used. At the same time 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 so Option B was the only operation can be used.

Where Option C is used, the simple OM method formula of $EF_{Grid,OM,Simple,y}$ calculation is:

[8] China Energy Statistical Yearbook, 2007 to 2011, China Electric Power Yearbook 2007 to 2011.

$$EF_{Grid,OM,simple,y} = \frac{\sum_i FC_{i,y} \bullet NCV_{i,y} \bullet EF_{CO2,i,y}}{\sum EG_y} \quad (10)$$

where:

$EF_{grid,OMsimply,y,}$ simple operating margin CO_2 emission factor in year y(tCO_2/MWh);

$FC_{i,y}$ amount of fossil fuel type i consumed in the project electricity system in year y;

$NCV_{i,y}$ net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit);

$EF_{CO2,i,y}$ CO_2 emission factor of fossil fuel type i in year y (tCO_2/GJ) and

EG_y net electricity generated and delivered to the grid by power plant / unit m 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) or the applicable year during monitoring (ex post option), following the guidance on data vintage in step 2.

When there exists net electricity imports from a connected electricity system within the same host country(ies):

(1) the emission factor(s) of the specific power plant(s) from which electricity is imported, if and only if the specific plants are clearly known, or

(2) the emission factor of the exporting grid, if the specific plants are not clearly known.

The data on electricity generation and auxiliary electricity consumption are obtained from the *China Electric Power Yearbook* from 2009 to 2011 (published annually). The data on different fuel consumptions for power generation and the net caloric values of the fuels are obtained from the *China Energy Statistical Yearbook* from 2009 to 2011 (published annually after 2003). The emission factors of the fuels adopted are obtained from *Table 1.3* and *Table 1.4* of the *2006 IPCC Guidelines for National Greenhouse Gas Inventories*, Volume 2, Chap 1, Page 1.21-1.24.

The detailed calculation can be find in Appendix 4, the $EF_{grid,OM,y}$ = **0.9914** tCO_2/MWh

***Sub-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 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.

The PDD choose Option 1.

According to the *Tool*, the following equation (11) is adopted to calculate $EF_{grid,BM,y}$.

$$EF_{Grid,BM,y} = \frac{\sum_{m} EG_{m,y} \cdot EF_{EL,m,y}}{\sum_{m} EG_{m,y}} \quad (11)$$

Where:

$EF_{grid,BM,y}$ 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 generation data is available;

Consider of data availability, The Project adopted the following deviation method which was published by Chinese DNA and accepted by CDM EB[9]:

1) Use of capacity additions during the last 1~3 years for estimating the build margin emission factor for grid electricity.

2) Use of weights estimated using installed capacity in place of annual electricity generation.

And it is suggested to use the efficiency level of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy.

Therefore for the Project: First, calculate the share of different power generation technology in recent

[9] http://cdm.unfccc.int/Projects/Deviations ; DNV deviation request, "Request for clarification on use of approved methodology AM0005 for several projects in China"

capacity additions. Second, calculate the weight for capacity additions of each power generation technology. And finally calculate the emission factor use the efficiency level of the best technology commercially available in China.

Since data of installed capacities cannot be separated to coal based, oil based and gas based at present, BM is calculated with following steps and formula:

(1) Calculate the power generation emissions for solid, liquid and gas fuel and each share of total emissions based on the *Energy Balance Table* of the most recent year

$$\lambda_{Coal,y} = \frac{\sum_{i \in COAL, j} F_{i,j,y} \times NCV_{iy} \times EF_{i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{iy} \times EF_{i,j,y}} \quad (12)$$

$$\lambda_{Oil,y} = \frac{\sum_{i \in OIL, j} F_{i,j,y} \times NCV_{iy} \times EF_{i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{iy} \times EF_{i,j,y}} \quad (13)$$

$$\lambda_{Gas,y} = \frac{\sum_{i \in GAS, j} F_{i,j,y} \times NCV_{iy} \times EF_{i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{iy} \times EF_{i,j,y}} \quad (14)$$

where:

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

NCV_{ij} Net calorific value (energy content) per mass or volume unit of a fuel *i* in year *y*;

$EF_{i,j,y}$ the CO_2 emission coefficient of fuel i (tCO2/GJ);

(2) Calculate emission factor for thermal power of the grid based on the result of Step a and the efficiency level of the best technology commercially available in China

$$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas} \times EF_{Gas,Adv,y} \quad (15)$$

Where $EF_{Coal,Adv,y}$, $EF_{Oil,Adv,y}$ and $EF_{Gas.Adv,y}$ represents the efficiency level of the best coal-fired, oil-based and gas-based power generation technology commercially available in China.

Step c. Calculate BM of the grid based on the result of Step b and the share of thermal power of recent 20% capacity additions.

$$EF_{grid,BM,y} = \frac{CAP_{Thermal,y}}{CAP_{Total,y}} \times EF_{Thermal,y} \quad (16)$$

Where $CAP_{Total,y}$ is total capacity additions while $CAP_{Thermal,y}$ is capacity additions of thermal power.

The data on different fuel consumptions for power generation and the net caloric values of the fuels are obtained from the *China Energy Statistical Yearbook* from 2009 to 2011 (published annually after 2003). The emission factors and oxidation factors of the fuels adopted are obtained from *Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories.*

With reference to the *Notification on Determining Baseline Emission Factors of China Power Grid,* the weighted average fuel consumption for power generation of 600-1,000 MW sub-critical coal-fired power generators built in 2010 (309.9 gCe/kWh) and the 390 MW oil/gas based combined cycle power generators (236.6 gCe/kWh) are taken as the efficiency level of the best technology commercially available in China.

The detailed calculation can be find in Appendix 4, the $EF_{grid,BM,y}$ = 0.5398 tCO_2/MWh.

Sub-step 6. Calculate the combined margin emissions factor.

Based on the *Tool*, the baseline emission factor ($EF_{grid,CM,y}$) is calculated as the weighted average of the operating margin emission factor ($EF_{grid,OM,y}$) and the build margin emission factor ($EF_{grid,BM,y}$), as

$$EF_{grid,CM,y} = \omega_{OM} \cdot EF_{grid,OM,y} + \omega_{BM} \cdot EF_{grid,BM,y} \quad (17)$$

According to the *Tool*, both the weight w_{OM} and the weight w_{BM} take 0.5 as default. Therefore the combined baseline emission factor

$EF_{grid,CM,y}$ =0.5 ×0.9914+0.5 ×0.5398=0.7656 (tCO_2e/MWh).

Determination of $PE_{transp,y}$

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

$$PE_{y,transp} = (Q_y / CT_y) * DAF_w * EF_{CO2} + (Q_{y,treatment} / CT_{y,treatment}) * DAF_{treatment} * EF_{CO2} \quad (18)$$

Where:

Q_y	Quantity of manure treated in the year *y* (tonnes)
CT_y	Average truck capacity for transportation (tonnes/truck)
DAF_w	Average incremental distance for manure transportation (km/truck)
EF_{CO2}	CO_2 emission factor from fuel use due to transportation ($kgCO_2e$/km, IPCC default values or local values may be used)

$Q_{y,treatment}$	Quantity of product in year *y* (tonnes)
$CT_{y,treatment}$	Average truck capacity for product transportation (tonnes/truck)
$DAF_{treatment}$	Average distance for transportation (km/truck)

Determination of $PE_{storage,y}$

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

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

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

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

$$PE_{storage,y} = GWP_{CH_4} * D_{CH_4} * \sum_{LT,l}\left[\frac{365}{AI_l}\sum_{d=1}^{AI}(N_{LT,y} * VS_{LT,d} * MS\%_l * (1-e^{-k\ (AI_l-d)}) * MCF_l * B_{0_{LT}})\right] \quad (19)$$

Where:

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

III. Calculate Leakage emissions

According to AMS.III-D, the following conditions apply for use of this methodology in a project activity under a programme of activities:

In case the project activity involves the replacement of equipment, and the leakage effect of the use of the replaced equipment in another activity is neglected, because the replaced equipment is scrapped, an

independent monitoring of scrapping of replaced equipment needs to be implemented. The monitoring should include a check if the number of project activity equipment distributed by the project and the number of scrapped equipment correspond with each other. For this purpose scrapped equipment should be stored until such correspondence has been checked. The scrapping of replaced equipment should be documented and independently verified.

As no equipment is replaced and transferred from outside the boundary to the PoA. Therefore, as per AMS-III.D, leakage can be neglected.

IV. Calculate Emission Reductions

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

$$ER_y = BE_y - PE_y \quad (20)$$

Where:

ER_y Emission reductions in year y (tCO_2e)

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

$$ER_{CH4,y,ex\,post} = \min[(BE_{CH4,y,ex\,post} - PE_{CH4,y,ex\,post}), (MD_y - PE_{power,y,ex\,post})] \quad (21)$$

Where:

$ER_{CH4,y,ex\,post}$ Emission reductions achieved from methane recovery based on monitored values for year y (tCO_2e)

$BE_{CH4,y,ex\,post}$ Baseline emissions calculated using equation 1 of AMS-III.D (for projects using option in paragraph 9 (a)) using *ex post* monitored values of $N_{LT,y}$

$PE_{CH4,y,ex\,post}$ Project emissions calculated using equation 5 of AMS-III.D using *ex-post* monitored values of $N_{LT,y}$, $MS\%_{i,y}$, $MS\%_l$, AI_l, $Q_{res\,waste,y}$ and if applicable $VS_{LT,y}$

MD_y Methane captured and 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 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:

$$MD_y = BG_{burnt,y} * w_{CH4,y} * D_{CH4} * FE * GWP_{CH4} \quad (22)$$

Where:

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

Accordingly to the paragraph 22 of AMS-III.D, if the amount of biogas 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.

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

Data / Parameter	MCF_j
Unit	%
Description	Annual methane conversion factor (MCF) for the baseline animal waste management system "j"
Source of data	IPCC default values provided in table 10.17 of 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 Chapter 10.
Value(s) applied	Please see individual CPA-DD
Choice of data or Measurement methods and procedures	For the MCF value, country-specific MCF values are not available, so he IPCC default values provided in table 10.17 of 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 Chapter 10 was used.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	$B_{O,LT}$
Unit	m^3/CH_4/kg dm
Description	Maximum methane producing potential of the volatile solid generated for animal type "LT"
Source of data	Default values from tables 10 A-4 to 10 A-9 of 2006 IPCC Guidelines for National Greenhouse Gas Inventories volume 4 Chapter 10.
Value(s) applied	Please see individual CPA-DD
Choice of data or Measurement methods and procedures	According to AMS-III.D, The maximum methane-producing capacity of the manure (Bo) varies by species and diet. Since country specific Bo 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. For the proposed PoA, animal were purchased and growing in China, so default Asia values from 2006 IPCC Guidelines was chosen to calculation, it is reasonable.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	$MS\%_{Bl,j}$
Unit	%
Description	Fraction of manure handled in baseline animal manure management system "j"
Source of data	The CPA principal
Value(s) applied	Please see individual CPA-DD
Choice of data or Measurement methods and procedures	All manure handled in baseline animal manure management.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	$W_{default}$
Unit	kg
Description	Default average animal weight of a defined population
Source of data	Default values from tables 10 A-4 to 10 A-9 of 2006 IPCC Guidelines for National Greenhouse Gas Inventories volume 4 Chapter 10.
Value(s) applied	Please see individual CPA-DD
Choice of data or Measurement methods and procedures	IPCC default value is credible data source.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	$VS_{default}$
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	Default values from tables 10 A-4 to 10 A-9 of 2006 IPCC Guidelines for National Greenhouse Gas Inventories volume 4 Chapter 10.
Value(s) applied	Please see individual CPA-DD
Choice of data or Measurement methods and procedures	IPCC default value is credible data source.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	MCF_l
Unit	-
Description	Annual methane conversion factor for the project manure storage device *l*
Source of data	Table 10.17, Chapter 10, Volume 4, 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value(s) applied	See individual CPA-DD
Choice of data or Measurement methods and procedures	According to the Methodology AMS III.D., IPCC default value should be used.
Purpose of data	Calculation of project emissions
Additional comment	-

Data / Parameter	EG_y
Unit	MWh
Description	Net electricity generated and delivered to the grid by power plant / unit m in year y
Source of data	*China Electric Statistical Yearbook, 2009-2011*
Value(s) applied	Values depend on specifically fuel, referring to Appendix 4.
Choice of data or Measurement methods and procedures	According to the *Tool to calculate the emission factor for an electricity system* requirement, use accurate and reliable local or national data where available.
Purpose of data	Calculation of project emissions
Additional comment	Reasonable

Data / Parameter	$FC_{i,y}$
Unit	mass or volume unit
Description	Amount of fossil fuel type i consumed in the project electricity system in year y
Source of data	*China Energy Statistical Yearbook, 2009-2011*
Value(s) applied	Values depend on specifically fuel, referring to Appendix 4.
Choice of data or Measurement methods and procedures	According to the *Tool to calculate the emission factor for an electricity system* requirement, use accurate and reliable local or national data where available.
Purpose of data	Calculation of project emissions
Additional comment	Reasonable

Data / Parameter	$F_{i,j,y}$
Unit	Mass or volume
Description	The fuel consumption of fuel i in power plant j during year y

Source of data	*China Energy Statistical Yearbook, 2009-2011*
Value(s) applied	Values depend on specifically fuel, referring to Appendix 4.
Choice of data or Measurement methods and procedures	According to the *Tool to calculate the emission factor for an electricity system* requirement, use accurate and reliable local or national data where available.
Purpose of data	Calculation of project emissions
Additional comment	Reasonable

Data / Parameter	$NCV_{i,y}$
Unit	TJ/t, TJ/km^3
Description	Net calorific value (energy content) per mass or volume unit of a fuel *i* in year *y*
Source of data	*China Energy Statistical Yearbook, 2010*
Value(s) applied	Values depend on specifically fuel, referring to Appendix 4.
Choice of data or Measurement methods and procedures	According to the *Tool to calculate the emission factor for an electricity system* requirement, use accurate and reliable local or national data where available.
Purpose of data	Calculation of project emissions
Additional comment	Reasonable

Data / Parameter	$EF_{CO2,i,y}$
Unit	tC/TJ (tCO_2e/TJ)
Description	CO_2 emission factor of fossil fuel type i in year y (tCO_2/GJ)
Source of data	*IPCC 2006 Revised Guidelines*
Value(s) applied	Values depend on specifically fuel, referring to Appendix 4.
Choice of data or Measurement methods and procedures	According to the *Tool to calculate the emission factor for an electricity system* requirement, use IPCC default value.
Purpose of data	Calculation of project emissions
Additional comment	Reasonable

Data / Parameter	$OXID_{i,y}$
Unit	%
Description	Oxidation factor of the fuel *i* in year *y*
Source of data	*IPCC 2006 Revised Guidelines*
Value(s) applied	Values depend on specifically fuel, referring to Appendix 4.

Choice of data or Measurement methods and procedures	According to the *Tool to calculate the emission factor for an electricity system* requirement, use IPCC default value.
Purpose of data	Calculation of project emissions
Additional comment	Reasonable

Data / Parameter	**Internal use rate of power plant**
Unit	%
Description	The internal power consumption of power plants in year(s) *y*
Source of data	*China Electric Power Yearbook 2009-2011*
Value(s) applied	See Appendix 4 for details.
Choice of data or Measurement methods and procedures	Data used are from Chinese authorities.
Purpose of data	Calculation of project emissions
Additional comment	Reasonable

Data / Parameter	$CAP_{i,j,y}$
Unit	MW
Description	Installed capacities of power plant category *i* of province *j* in years *y*.
Source of data	*China Electric Power Yearbook 2009-2011*
Value(s) applied	See Appendix 4 for details.
Choice of data or Measurement methods and procedures	Data used are from Chinese authorities.
Purpose of data	Calculation of project emissions
Additional comment	Reasonable

Data / Parameter	$EF_{Coal,Adv}$
Unit	%
Description	The fuel consumption rate of coal-fired power plants which are applied by the most advanced commercialized technologies.
Source of data	China DNA
Value(s) applied	39.65%
Choice of data or Measurement methods and procedures	Data that is collected from the official statistics.
Purpose of data	Calculation of project emissions

Additional comment	Reasonable

Data / Parameter	$EF_{Oil,\ Adv}$
Unit	%
Description	The fuel consumption rate of Oil-fired power plants which are applied by the most advanced commercialized technologies.
Source of data	China DNA
Value(s) applied	51.93%
Choice of data or Measurement methods and procedures	Data that is collected from the official statistics.
Purpose of data	Calculation of project emissions
Additional comment	Reasonable

Data / Parameter	$EF_{Gas,\ Adv}$
Unit	%
Description	The fuel consumption rate of Gas-fired power plants which are applied by the most advanced commercialized technologies.
Source of data	China DNA
Value(s) applied	51.93%
Choice of data or Measurement methods and procedures	Data that is collected from the official statistics.
Purpose of data	Calculation of project emissions
Additional comment	Reasonable

Data / Parameter	$\mathbf{EF_{grid,CM,y}}$
Unit	tCO_2/MWh
Description	Combined margin CO_2 emission factor for grid connected power generation in year *y* calculated using the latest version of the .Tool to calculate the emission factor for an electricity system.
Source of data	As per the "Tool to calculate the emission factor for an electricity system."
Value(s) applied	0.7656
Choice of data or Measurement methods and procedures	As per the "Tool to calculate the emission factor for an electricity system."
Purpose of data	Calculation of project emissions
Additional comment	Office data

Data / Parameter	$fv_{CH4,RG,h}$
Unit	-
Description	Volumetric fraction of methane in the residual gas on dry basis in hour h
Source of data	Tool to determine project emissions from flaring gases containing methane
Value(s) applied	60%
Choice of data or Measurement methods and procedures	A default value of 60% methane content can be used.
Purpose of data	Calculation of project emissions
Additional comment	-

Data / Parameter	$w_{CH4,y}$
Unit	-
Description	Methane content in biogas in the year *y*
Source of data	AMS-III.D.
Value(s) applied	60%
Choice of data or Measurement methods and procedures	According to AMS-III.D., a default value of 60% methane content can be used.
Purpose of data	Calculation of project emissions
Additional comment	-

Data / Parameter	η_{flare}
Unit	-
Description	Flare efficiency in hour h
Source of data	Tool to determine project emissions from flaring gases containing methane
Value(s) applied	0
Choice of data or Measurement methods and procedures	0 is used for biogas flaring. This is conservative.
Purpose of data	Calculation of project emissions
Additional comment	Only applied for the CPAs in which the flaring is involved. Accordingly to AMS-III.D, if the amount of biogas 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.

Data / Parameter	EF_{CO2}
Unit	tCO_2/km
Description	CO_2 emission factor from fuel use due to transportation
Source of data	Since there is no such parameter in IPCC 2006 Guidelines, thus the value in IPCC 1996 is applied
Value(s) applied	0.001011
Choice of data or Measurement methods and procedures	Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual, Moderate Control index for US Heavy Duty Diesel Vehicles in Table 1-32, page 1.75
Purpose of data	Calculation of project emissions
Additional comment	Only applied for the CPAs in which the material transportation is involved

Data / Parameter	$\rho_{CH4,n}$
Unit	kg/m^3
Description	Density of methane at normal conditions
Source of data	Tool to determine project emissions from flaring gases containing methane
Value(s) applied	0.716
Choice of data or Measurement methods and procedures	Tool to determine project emissions from flaring gases containing methane
Purpose of data	Calculation of project emissions
Additional comment	-

Data / Parameter	*FE*
Unit	%
Description	Flare efficiency in the year *y*
Source of data	Tool to determine project emissions from flaring gases containing methane
Value(s) applied	0
Choice of data or Measurement methods and procedures	0 is used for biogas flaring. This is conservative. 100% for the combustion for energy.
Purpose of data	Calculation of project emissions
Additional comment	-Accordingly to AMS-III.D, if the amount of biogas 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

B.6.3. Ex-ante calculations of emission reductions

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In order to provide a sample calculation for ER, the data from the first real case CPA is chosen and the

calculation process is as below.

I. Calculate baseline emissions $BE_{CH4,y}$

According to AMS-III.D, $BE_{CH4,y}$ 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 the CPA.

(1) Determination of $N_{LT,y}$

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

$$N_{LT,y} = N_{da,y} * \left(\frac{N_{p,y}}{365} \right) \quad \text{(B-1)}$$

$N_{da,y}$		$N_{p,y}$		$N_{LT,y}$	
Market Swine	Breeding Swine	Market Swine	Breeding Swine	Market Swine	Breeding Swine
days	days	numbers	numbers	numbers	numbers
180	365	9,000	600	4,438	600

(2)Determination of MCF_j

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

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

Annual average temperature (℃)	MCF_j
9.3	66%

(3) Determination of $VS_{LT,y}$

Volatile solids (*VS*) are the organic material in livestock manure and consist of both biodegradable and non-biodegradable fractions. For the calculations the total *VS* excreted by each animal species is required. The preferred method to obtain *VS* is to use data from nationally published sources. These values shall be compared with IPCC default values and any significant differences shall be explained. If data from nationally published sources are not available, country-specific *VS* excretion rates can be estimated from feed intake levels, via the enhanced characterisation method (tier 2) described in section 10.2 in 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 chapter 10. If country specific VS values are not available IPCC default values from 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 chapter 10 table10 A-4 to 10 A-9 can be used provided that the project participants assess the suitability of those data to the specific situation of the treatment site particularly with reference to feed intake levels;

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

$$VS_{LT,y} = \left(\frac{W_{site}}{W_{default}} \right) * VS_{default} * nd_y \qquad \text{(B-2)}$$

W_{site}		$W_{default}$		$VS_{default}$		nd_y	$VS_{LT,y}$	
Market Swine	Breeding Swine	Market Swine	Breeding Swine	Market Swine	Breeding Swine	-	Market Swine	Breeding Swine
kg	kg	kg	kg	kg dm/animal/day		days	kg dm/animal/year	
55	200	28	28	0.30	0.30	365	215.09	782.14

(4)Determination of $B_{0,LT}$

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

$B_{0,LT}$	
Market Swine	Breeding Swine
m^3CH_4/kg-dm	m^3CH_4/kg-dm
0.29	0.29

So, the baseline emission is as follows:

$$BE_{CH4,y} = GWP_{CH4} * D_{CH4} * UF_b * \sum_{j,LT} MCF_j * B_{0,LT} * N_{LT,y} * VS_{LT,y} * MS\%_{Bl,j} \qquad \text{(B-3)}$$

Parameters	Unit	Market Swine	Breeding Swine

GWP_{CH4}	tCO_2e/tCH_4	21	21
D_{CH4}	t/m^3	0.00067	0.00067
MCF_j	%	66%	66%
$B_{0,LT}$	$m^3CH_4/kg\text{-}dm$	0.29	0.29
$N_{LT,y}$	numbers	4,438	600
$VS_{LT,y}$	kg dm/animal/day	215.09	782.14
$MS\%_{Bl,j}$	%	100%	100%
UF_b	-	0.94	0.94
$BE_{CH4,y}$	tCO_2e	2,417	1,188
SUM	tCO_2e	3,604.55	

II. Calculate project emissions

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

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

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

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

(d) CO_2 emissions from incremental transportation distances ($PE_{transp,y}$);

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

(a) Determination of $PE_{PL,y}$

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

$$PE_{PL,y} = 0.10 * GWP_{CH4} * D_{CH4} * \sum_{i,LT} B_{0,LT} * N_{LT,y} * VS_{LT,y} * MS\%_{i,y} \quad \text{(P-1)}$$

Parameters	Unit	Market Swine	Breeding Swine
GWP_{CH4}	tCO_2e/tCH_4	21	21
D_{CH4}	t/m^3	0.00067	0.00067
$B_{0,LT}$	$m^3CH_4/kg\text{-}dm$	0.29	0.29
$N_{LT,y}$	numbers	4,438	600
$VS_{LT,y}$	kg dm/animal/day	215.09	782.14
$MS\%_{i,y}$	%	100%	100%
-	-	0.1	0.1
$PE_{PL,y}$	tCO_2e	390.52	191.48

SUM	tCO_2e	581.01

(b) 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:

$$PE_{flare,y} = \sum_{h=1}^{8760} TM_{RG,h} \times (1 - \eta_{flare,h}) \times \frac{GWP_{CH4}}{1000} \quad \text{(P-2)}$$

Where:

$PE_{flare,y}$ Emissions from flaring or combustion of the biogas stream in the 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)

$$TM_{RG,h} = FV_{RG,h} \times fv_{CH4,RG,h} \times \rho_{CH4,n} \quad \text{(P-3)}$$

Where:

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

$FV_{RG,h}$ Volumetric flow rate of the residual gas in dry basis at normal conditions in hour h;(m^3/h)

$fv_{CH4,RG,h}$ 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) . The default value of 60% will be used.

$\rho_{CH4,n}$ Density of methane at normal conditions (0.716); (kg/m^3)

All the biogas recovered in the CPA will be utilized for energy generation, thus, $PE_{flare,y}$ is ex-ante calculated as zero.

(c) Determination of $PE_{power,y}$

As fossil fuel is not involved in each SSC-CPA, $PE_{power,y}$ is equivalent to project emissions from electricity consumption. According to AMS-III.D, project emissions from electricity consumption are determined as per the procedures described in AMS-I.D, which is calculated as below:

$$PE_{power,y} = EC_{ele,PJ,y} \times EF_{grid,CM,y} \quad \text{(P-4)}$$

As electricity consumed by the project in first CPA is sourced from electricity generated by itself, this component emission is zero.

(d) Determination of $PE_{transp,y}$

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

$$PE_{y,transp} = (Q_y / CT_y) * DAF_w * EF_{CO2} + (Q_{y,treatment} / CT_{y,treatment}) * DAF_{treatment} * EF_{CO2} \quad \text{(P-5)}$$

For the project in first real CPA, as the no incremental transportation was occurred, therefore, project emission due to incremental transportation is zero.

(e) 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 (i) and condition (ii) below are satisfied:

(i)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

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

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

$$PE_{storage,y} = GWP_{CH_4} * D_{CH_4} * \sum_{LT,l}\left[\frac{365}{AI_l}\sum_{d=1}^{AI}(N_{LT,y} * VS_{LT,d} * MS\%_l * (1-e^{-k\ (AI_l - d)}) * MCF_l * B_{0_{LT}})\right] \quad \text{(P-6)}$$

As the storage time of the manure after removal from the animal barns, including transportation, is not exceed 24 hours before being fed into the anaerobic digester, so project emission due to storage of manure is zero.

So the project emission is as below:

$$PE_y = PE_{PL,y} + PE_{flare,y} + PE_{power,y} + PE_{transp,y} + PE_{storage,y} \quad \text{(P-7)}$$

$PE_{PL,y}$	$PE_{flare,y}$	$PE_{power,y}$	$PE_{transp,y}$	$PE_{storage,y}$	PE_y
tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e
581.01	0	0	0	0	581.01

III. Calculate Leakage emissions

According to AMS.III-D, the following conditions apply for use of this methodology in a project activity under a programme of activities:

In case the project activity involves the replacement of equipment, and the leakage effect of the use of the replaced equipment in another activity is neglected, because the replaced equipment is scrapped, an independent monitoring of scrapping of replaced equipment needs to be implemented. The monitoring should include a check if the number of project activity equipment distributed by the project and the number of scrapped equipment correspond with each other. For this purpose scrapped equipment should be stored until such correspondence has been checked. The scrapping of replaced equipment should be documented and independently verified.

As no equipment is replaced and transferred from outside the boundary to the PoA. Therefore, as per AMS-III.D., leakage can be neglected.

IV**. Calculate Emission Reductions**

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

$$ER_y = BE_y - PE_y \quad \text{(E-1)}$$

BE_y	PE_y	ER_y
tCO_2e	tCO_2e	tCO_2e
3,604.55	581.01	3,023

B.7. Application of the monitoring methodology and description of the monitoring plan
B.7.1. Data and parameters to be monitored by each generic CPA

Data / Parameter	$N_{da,y}$
Unit	Number
Description	Number of days animal is alive in the farm in the year y
Source of data	The data used in each SSC-CPA is sourced from the farm owners, the actual data should be monitored annually based on monthly records.
Value(s) applied	Please see individual CPA-DD
Measurement methods and procedures	The data should be recorded in the management log periodically.
Monitoring frequency	Annually, based on monthly records
QA/QC procedures	- The consistency between the value and indirect information (records of sales or records of food purchases) should be assessed.
Purpose of data	Calculation of baseline emissions
Additional comments	-

Data / Parameter	$N_{p,y}$
Unit	Number
Description	Number of animals produced annually of type LT for the year y
Source of data	The data used in each SSC-CPA is sourced from the farm owners, the actual data should be monitored annually based on monthly records.
Value(s) applied	Please see individual CPA-DD
Measurement methods and procedures	The data should be recorded in the management log periodically.
Monitoring frequency	Annually, based on monthly records
QA/QC procedures	- The consistency between the value and indirect information (records of sales, records of food purchases) should be assessed.
Purpose of data	Calculation of baseline emissions
Additional comments	-

Data / Parameter	W_{site}
Unit	kg
Description	Average animal weight of a defined livestock population at the CPA site
Source of data	Farm Owners
Value(s) applied	Please see individual CPA-DD
Measurement methods and procedures	Farm owners will measure weight of livestock alive with mass scale and calculate the average in a project year.
Monitoring frequency	- Annually
QA/QC procedures	- The mass scale will be calibrated periodically.
Purpose of data	Calculation of baseline emissions
Additional comments	-

Data / Parameter	$BG_{burnt,y}$
Unit	m^3
Description	The amount of biogas utilized in year y
Source of data	Onsite measurement
Value(s) applied	Please see individual CPA-DD
Measurement methods and procedures	Continuously, based on continuous flow measurement with accumulated volume recording (e.g. hourly/daily accumulated reading)
Monitoring frequency	The flow meter will undergo maintenance/calibration periodically subject to appropriate industry standards by qualified entity.
QA/QC procedures	-
Purpose of data	Calculation of baseline emissions
Additional comments	-

Data / Parameter	T_{PJ}
Unit	℃
Description	Temperature of the biogas at the flow measurement site
Source of data	Onsite measurement
Value(s) applied	N/A
Measurement methods and procedures	The temperature of the biogas will be recorded daily using thermometer and monthly averaged.
Monitoring frequency	- Daily
QA/QC procedures	Thermometer will undergo maintenance/calibration periodically subject to appropriate industry standards.
Purpose of data	Calculation of baseline emissions
Additional comments	-

Data / Parameter	P_{PJ}
Unit	Pa
Description	Pressure of the biogas at the flow measurement site
Source of data	Onsite measurement
Value(s) applied	N/A
Measurement methods and procedures	The pressure of the biogas will be recorded daily using manometer and monthly averaged.
Monitoring frequency	- Daily
QA/QC procedures	The manometer will undergo maintenance/calibration periodically subject to appropriate industry standards.
Purpose of data	Calculation of baseline emissions
Additional comments	-

Data / Parameter	Q_y
Unit	tonnes
Description	Quantity of manure treated in the year
Source of data	Project owner, the actual data should be monitored annually based on daily measurement and monthly aggregation
Value(s) applied	Please see individual CPA-DD
Measurement methods and procedures	On-site data sheets recorded monthly using weigh bridge.
Monitoring frequency	Annually, based on daily measurement and monthly aggregation
QA/QC procedures	- Weighbridge will be subject to periodic calibration (in accordance with stipulation of the weighbridge supplier)
Purpose of data	Calculation of project emissions
Additional comments	Applicable only if project emissions on account of transportation shall be accounted for.

Data / Parameter	$Q_{y,treatment}$
Unit	tonnes
Description	Quantity of product in year
Source of data	Project owner, the actual data should be monitored annually based on daily measurement and monthly aggregation
Value(s) applied	Please see individual CPA-DD
Measurement methods and procedures	On-site data sheets recorded monthly using weigh bridge.
Monitoring frequency	Annually, based on daily measurement and monthly aggregation.
QA/QC procedures	- Weighbridge will be subject to periodic calibration (in accordance with stipulation of the weighbridge supplier), also cross check with sales of compost
Purpose of data	Calculation of project emissions
Additional comments	Applicable only if project emissions on account of transportation shall be accounted for.

Data / Parameter	CT_y
Unit	tonnes/truck
Description	Average truck capacity for transportation
Source of data	Project owner, the actual data should be monitored annually based on monthly records.
Value(s) applied	Please see individual CPA-DD
Measurement methods and procedures	On site measurement.
Monitoring frequency	
QA/QC procedures	-The rated loading capacity of truck will be used to crosscheck.
Purpose of data	Calculation of project emissions
Additional comments	Applicable only if project emissions on account of transportation shall be accounted for.

Data / Parameter	$CT_{y,treatment}$
Unit	tonnes/truck
Description	Average truck capacity for product transportation
Source of data	Project owner, the actual data should be monitored annually based on monthly records.
Value(s) applied	Please see individual CPA-DD
Measurement methods and procedures	On site measurement.
Monitoring frequency	- Annually
QA/QC procedures	- The rated loading capacity of truck will be used to crosscheck.
Purpose of data	Calculation of project emissions
Additional comments	Applicable only if project emissions on account of transportation shall be accounted for.

Data / Parameter	DAF_w
Unit	km/truck
Description	Average incremental distance for manure transportation
Source of data	Project owner, the actual data should be monitored annually based on monthly records.
Value(s) applied	Please see individual CPA-DD
Measurement methods and procedures	On site measurement
Monitoring frequency	- Annually
QA/QC procedures	-
Purpose of data	Calculation of project emissions
Additional comments	Applicable only if project emissions on account of transportation shall be accounted for.

Data / Parameter	$DAF_{treatment}$
Unit	km/truck
Description	Average distance for product transportation
Source of data	Project owner, the actual data should be monitored annually based on monthly records.
Value(s) applied	Please see individual CPA-DD
Measurement methods and procedures	On site measurement
Monitoring frequency	- Annually
QA/QC procedures	-
Purpose of data	Calculation of project emissions
Additional comments	Applicable only if project emissions on account of transportation shall be accounted for.

Data / Parameter	$FV_{RG,h}$
Unit	m^3/h
Description	Volumetric flow rate of the residual gas in dry basis at normal conditions in hour h
Source of data	Onsite measurement
Value(s) applied	Please see individual CPA-DD
Measurement methods and procedures	Biogas sent to the flare will be monitored through the use of biogas flow meter continuously and reported cumulatively on weekly basis.
Monitoring frequency	- Continuously
QA/QC procedures	-The flow meter will undergo maintenance/calibration periodically subject to appropriate industry standards by qualified entity .
Purpose of data	Calculation of project emissions
Additional comments	The flow meter will undergo maintenance/calibration annually subject to appropriate industry standards by qualified entity.

Data / Parameter	$EC_{ele,PJ,y}$
Unit	MWh/year
Description	Quantity of electricity consumed by the Project in year y
Source of data	The data used come from FSR, the actual data should be measured with electricity meter.
Value(s) applied	Please see individual CPA-DD
Measurement methods and procedures	Electricity meters should be installed to measure the quantity of electricity consumed by each SSC-CPA in year y.
Monitoring frequency	continuously
QA/QC procedures	- Electricity meters will undergo maintenance/calibration periodically subject to appropriate industry standards. Uncertainty of the meters to be obtained from the manufacturers.
Purpose of data	Calculation of project emissions
Additional comments	-

Data / Parameter	$MS\%_{i,y}$
Unit	%
Description	Fraction of manure handled in system *i* in year *y*
Source of data	The farm owners, all manure handled in CPA animal manure management.
Value(s) applied	The data used in each SSC-CPA is come from the farm owners, the actual data should be monitored annually based on daily measurement and monthly aggregation.
Measurement methods and procedures	Onsite measurement. 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. The quantity of animal manure from different farms and different animal types shall 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
Monitoring frequency	Annually
QA/QC procedures	-
Purpose of data	Calculation of baseline emissions
Additional comments	-

Data / Parameter	T_i
Unit	℃
Description	Annual Average ambient temperature at weather station nearby project site.
Source of data	weather station nearby project site
Value(s) applied	Please see individual CPA-DD
Measurement methods and procedures	Monitoring frequency will be monthly. Archive electronically during the crediting period plus 2 years.

Monitoring frequency	-
QA/QC procedures	-
Purpose of data	Calculation of baseline emissions
Additional comments	-

Data / Parameter	AI_l
Unit	days
Description	Annual average interval between manure collection and delivery for treatment at a given storage device l
Source of data	Project owner, the actual data should be monitored annually based on monthly records.
Value(s) applied	Please see individual CPA-DD
Measurement methods and procedures	Onsite measurement
Monitoring frequency	- Annually, based on monthly records
QA/QC procedures	Applicable only if project emissions on account of storage of manure before being fed into the anaerobic digester shall be accounted for.
Purpose of data	Calculation of project emissions
Additional comments	-

Data / Parameter	nd_y
Unit	day
Description	Number of days in year "y" where the animal manure management system is operational.
Source of data	Assumed 365 days in a each SSC-CPA, actual data is from the measurement.
Value(s) applied	365
Measurement methods and procedures	The data is based on daily records and monthly aggregation and obtained from the operation records of the treatment plant
Monitoring frequency	-Annually,
QA/QC procedures	-
Purpose of data	Calculation of baseline emissions
Additional comments	-

Data / Parameter	$MS\%_l$
Unit	%
Description	Fraction of volatile solids (%) handled by storage device *l*
Source of data	Project owner, the actual data should be monitored annually based on monthly records.
Value(s) applied	Please see individual CPA-DD
Measurement methods and procedures	
Monitoring frequency	- monthly.
QA/QC procedures	Applicable only if project emissions on account of storage of manure before being fed into the anaerobic digester shall be accounted for.
Purpose of data	Calculation of project emissions
Additional comments	-

Data / Parameter	**On site inspections**
Unit	-
Description	On site inspections for each individual farm included in the project boundary where the project activity is implemented for each verification period.
Source of data	Measured
Value(s) applied	NA
Measurement methods and procedures	-
Monitoring frequency	-
QA/QC procedures	-
Purpose of data	-
Additional comments	-

Data / Parameter	Soil application of the residue waste
Unit	-
Description	Soil application (not resulting in methane emissions) of the residual waste.
Source of data	The actual information should be assessed through onsite check
Value(s) applied	Please see individual CPA-DD
Measurement methods and procedures	The soil application when the final sludge used will be monitored and recorded by the project owner.
Monitoring frequency	-
QA/QC procedures	-
Purpose of data	-
Additional comments	-

B.7.2. Description of the monitoring plan for a generic CPA

>>

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

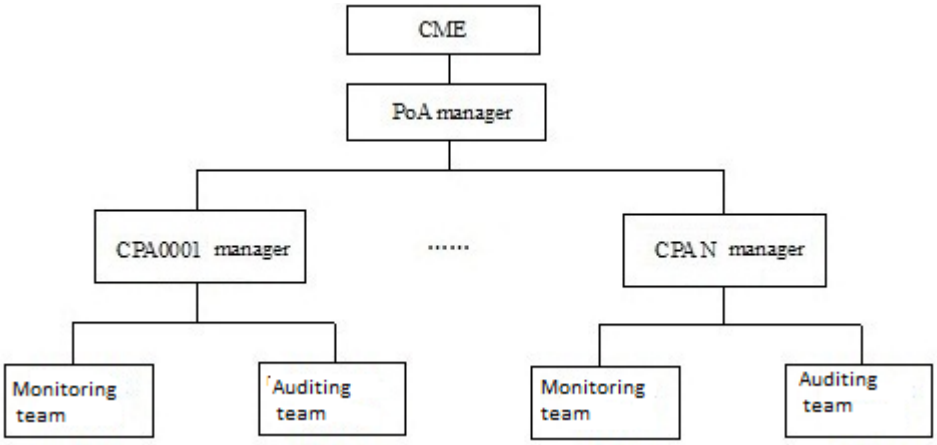


Figure 5. Monitoring Structure

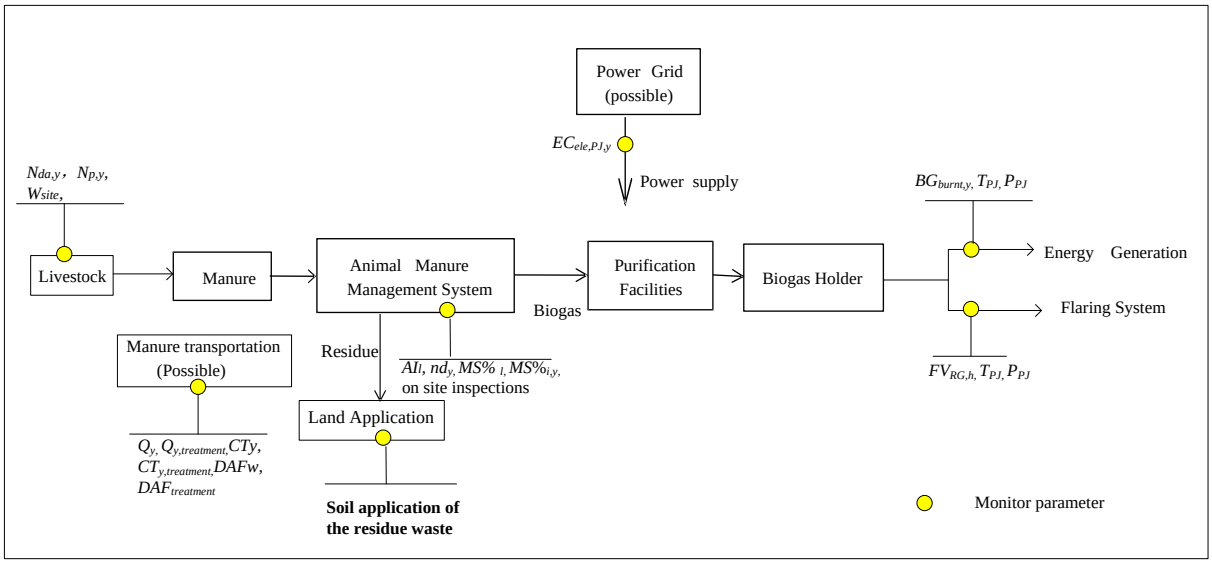
Position	Responsibility description
PoA manager	PoA manager is designated by CME and is in full charge of monitoring and issues related to PoA, in particular: (1) Track the development of PCDM; keep communication with EB, DNA and related agencies; (2) Establish the monitoring plan and training plan. (3)Collect the data, and supervise implementation of the PoA; (4)Prepare monitoring report and calculate emission reduction;
Person in charge of CPA	Take in charge of all monitoring matters related to this CPA, including managing monitoring team and auditing team and implementing training for monitoring team and auditing team.
Monitoring team	Take in charge of monitoring implementation and the data collection according to the Monitoring Manual.
Auditing team	Audit the work regarding monitoring and conduct the QC/QA procedures as per the Monitoring Manual. Take in charge of the calibration of monitoring equipments.

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

1. Monitoring Parameters

For monitoring parameters, please refer to Section B.7.1.

2. Installation of Monitoring equipments



Note: More information about the monitor parameters please refer to Section B.7.1.

Figure 6. Monitoring system for project scenario III

3. Data Collection and Management

All data continuously measured are transmitted to the CME (Each activity owner will take responsibility for data collection). The regular summary should be made and reported to technology department by statistician periodically; all the data after internal validation should be saved up to 2 years after the end of the crediting period.

4. Measuring instrument fault/emergency treatment procedures

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

5. QA/QC

In order to maintain high precision for meters, the calibration should be implemented according to state and/or sector standards and rules and certificated after calibration.
The meters should be calibrated periodically. Within 10 days on the date of:
(1) The error of duty meters and checking meters oversteps the permissible range;
(2) Repairs due to meters failure.

6. Training

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

7. Verification

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

Appendix 1: Contact information on entity/individual responsible for the PoA

Organization	Lanzhou Hualong Poultry Breeding Co.
Street/P.O. Box	No.1 Guangjiaping, Xigu District, Lanzhou City, Gansu Province
Building	-
City	Lanzhou City
State/Region	Gansu Province
Postcode	730060
Country	People's Republic of China
Telephone	+86-931-7542956
Fax	+86-931-7537311
E-mail	hlch888@163.com
Website	-
Contact person	Zhang Aiwen
Title	-
Salutation	Mr
Last name	Zhang
Middle name	-
First name	Aiwen
Department	-
Mobile	+86 139-9315-5980
Direct fax	+86-931-7537311
Direct tel.	+86-931-7542956
Personal e-mail	hlch888@163.com

Organization	A&T Carbon Asset Co., Limited
Street/P.O. Box	Breckland, Linford Wood
Building	- Cedar House
City	- Milton Keynes
State/Region	- Buckinghamshire
Postcode	MK14 6EX
Country	United Kingdom of Great Britain and Northern Ireland
Telephone	+86 10 6583 0366
Fax	+86 10 6583 3191
E-mail	Xia.wang@atholdings.com
Website	www.atholdings.com
Contact person	Wang Xia
Title	Asia business director
Salutation	Mr.
Last name	Wang
Middle name	-
First name	Xia
Department	Business Department
Mobile	+8613911538197
Direct fax	+86-10-65833191
Direct tel.	+86-10-6583 0366 ext. 866
Personal e-mail	Xia.wang@atholdings.com

Appendix 2: Affirmation regarding public funding

There is no public funding from Annex-I parties for the PoA.

Appendix 3: Application of methodology(ies)

See the applicable sections above.

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

Except the information described in Section B.6.2 about the ex-anti calculation of emission reductions, the further background information is as follows:

The project refers to the *2012 Baseline Emission Factors for Regional Power Grids in China* that is published by the National Development and Reform Committee of China (Chinese DNA) on 17/10/2012 for the OM and BM emission factors of the Northwest Power Grid (NWPG). In the reference, emission factors of NWPG are calculated based on the approved *"Tool to calculate the emission factor for an electricity system"*. The $EF_{grid,CM,y}$, $EF_{grid,OM,y}$, and $EF_{grid,BM,y}$ of Northwest Power Grid (NWPG) could be calculated as following:

Calculate the operating margin emission factor according to the selected method

Option (C) was chosen to calculate the Operating Margin Emission Factor ($EF_{grid,OM,y}$) as bellows:

Table 1 Electricity Generation of NWPG in 2008

Province name	Electricity generation of fuel-fired power plants（MWh）	Auxiliary power ratio（%）	Total Electricity Supplied to the Grid（MWh）
Shaanxi	71,500,000	6.95	66,530,750
Gansu	46,800,000	6.4	43,804,800
Qinghai	10,700,000	7.14	9,936,020
Ningxia	44,000,000	7.57	40,669,200
Xinjiang	39,700,000		39,700,000
Total			**200,640,770**

Sources: China Electric Power Yearbook 2009

Table 2 Electricity Generation of NWPG in 2009

Province name	Electricity generation of fuel-fired power plants（MWh）	Auxiliary power ratio（%）	Total Electricity Supplied to the Grid（MWh）
Shaanxi	77,400,000	7.24	71,796,240
Gansu	44,100,000	6.88	41,065,920
Qinghai	10,700,000	7.01	9,949,930
Ningxia	44,700,000	7.76	41,231,280
Xinjiang	45,200,000	5.16	42,867,680
Total	**222,100,000**		**206,911,050**

Sources: China Electric Power Yearbook 2010

Table 3 Electricity Generation of NWPG in 2010

Province name	Electricity generation of fuel-fired power plants（MWh）	Auxiliary power ratio（%）	Total Electricity Supplied to the Grid（MWh）
Shaanxi	95,800,000	7.23	88,873,660
Gansu	59,100,000	6.73	55,122,570
Qinghai	10,900,000	6.58	10,182,780
Ningxia	57,200,000		57,200,000
Xinjiang	53,900,000	8.7	49,210,700
Total	**276,900,000**		**260,589,710**

Sources: China Electric Power Yearbook 2011

Table 4 Calculating CO_2 Emission of NWPG in 2008

Fuel	Unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total	CO_2 Emission（tCO2e）
		A	**B**	**C**	**D**	**E**	**G=A+B+…+E**	**H=G*I*J*K/100000(mass) H=G*I*J*K/10000(volume)**
Raw Coal	10^4t	3620	2216.9	507.44	2330.72	1924.9	10599.96	193,477,720
Cleaned coal	10^4t						0	0
Other Washed Coal	10^4t	9.22			53.85	8.2	71.27	520,335
Briquettes	10^4t						0	0
Coke	10^8m^3						0	0
Coke Oven Gas	10^8m^3	0.35	0.74			0.13	1.22	76,113
Other Gas	10^4t	18.38	0.2				18.58	362,249
Crude Oil	10^4t						0	0
Gasoline	10^4t	0.05				0.01	0.06	1,744
Diesel Oil	10^4t	1.03	0.44	0.26	0.05	1.64	3.42	105,902
Fuel Oil	10^4t		0.86	0.04		0.02	0.92	29,045
LPG	10^4t						0	0
Refinery Gas	10^8m^3					7.25	7.25	160,939
Natural Gas	10^4t	0.94	0.24	2.99		7.2	11.37	2,403,565
Other Petroleum Products	10^4t					0.01	0.01	302
Other Coking Products	10^4t						0	0
Other Energy	10^4tce	93.67	10.58		21.24		125.49	0
Total								**197,137,915**

Sources: China Energy Statistical Yearbook 2009

Table 5 Calculating CO_2 Emission of NWPG in 2009

Fuel	Unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total	CO_2 Emission（tCO_2e）
		A	**B**	**C**	**D**	**E**	**G=A+B+…+E**	**H=G*I*J*K/100000(mass) H=G*I*J*K/10000(volume)**
Raw Coal	10^4t	3949.22	2060	467.05	2350.13	2380	11206.4	204,546,878
Cleaned coal	10^4t						0	0
Other Washed Coal	10^4t	8.34			56.01	6.66	71.01	518,437
Briquettes	10^4t						0	0
Coke	10^4t						0	0
Coke Oven Gas	10^8m^3	0.49	0.8			0.12	1.41	87,967
Other Gas	10^8m^3	18.37	0.44				18.81	366,733
Crude Oil	10^4t						0	0
Gasoline	10^4t	0.02					0.02	581
Diesel Oil	10^4t	0.6	0.52	0.2	0.07	0.7	2.09	64,718
Fuel Oil	10^4t		0.25	0.08		0.06	0.39	12,313
LPG	10^4t	0.02					0.02	618
Refinery Gas	10^4t					8.56	8.56	190,019
Natural Gas	10^8m^3	0.91	0.07	3.93		7.83	12.74	2,693,177
Other Petroleum Products	10^4t						0	0
Other Coking Products	10^4t						0	0
Other Energy	10^4tce	73.76	18.52		18.08		110.36	0
Total								**208,481,441**

Sources: China Energy Statistical Yearbook 2010

Table 6 Calculating CO_2 Emission of NWPG in 2010

Fuel	Unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total	CO_2 Emission（tCO_2e）
		A	**B**	**C**	**D**	**E**	**G=A+B+…+E**	**H=G*I*J*K/100000(mass) H=G*I*J*K/10000(volume)**
Raw Coal	10^4t	4850.49	2771.89	483.72	2916.46	2494.9	13517.46	246,729,926
Cleaned Coal	10^4t				1.05		1.05	24,148
Other Washed Coal	10^4t	11.01			42.96	6.82	60.79	443,822
Briquettes							0	0
Coke	10^4t						0	0
Coal Gangue	10^8m^3	355.13	37.86		163.58	2.85	559.42	4,084,269
Coke Oven Gas	10^8m^3	1.97	0.89			0.7	3.56	222,101
Blast Furnace Gas	10^4t	18.24	4.06			5.28	27.58	2,272,860
Converter Gas	10^4t		0.31				0.31	35,713
Other Gas	10^4t						0	0
Crude Oil	10^4t						0	0
Gasoline	10^4t	0.01		0.03		0.01	0.05	1,454
Diesel Oil	10^4t	0.67	0.42	0.21	0.23	0.39	1.92	59,453
Fuel Oil	10^8m^3		0.17	0.09	0.1	0.7	1.06	33,465
Naphtha	10^4t						0	0
Lubricant	10^4t						0	0
Paraffin	10^4tce						0	0
Solvent Oil							0	0
Asphalt	10^4t						0	0
Petroleum coke	10^4t						0	0
LPG	10^4t						0	0
Refinery Gas	10^4t					12.2	12.2	270,822
Natural Gas	10^8m^3	0.87		2.48	0.3	8.54	12.19	2,576,909
Other Petroleum Products	10^4t					0.01	0.01	302
Other Coking Products	10^4t						0	0
Other Energy	10^4tce	1.76	2.68				4.44	0
Total								**256,755,243**

Sources: China Energy Statistical Yearbook 2011

Therefore, $EF_{grid,OM,simple}$ **=0.9914 tCO$_2$e/MWh**

Calculate the build margin emission factor

The Emission Factor, Oxidation, Average Low Caloric Value applied in the calculation of the Operating Margin and Build Margin emission factor are listed in table 7.

Table 7 Related Parameters

Fuel	Oxidation Rate I [1]	Average Low Caloric Value J[2,4]	Emission Factor($kgCO_2e/TJ$)[3]
Raw Coal	100%	20,908 kJ/kg	87,300
Cleaned Coal	100%	26,344 kJ/kg	87,300
Other Washed Coal	100%	8,363 kJ/kg	87,300
Briquettes	100%	20,908 kJ/kg	87,300
Coal Gangue	100%	8,363 kJ/kg	87,300
Coke	100%	28,435 kJ/kg	95,700
Other Coking Products	100%	28,435 kJ/kg	95,700
Crude Oil	100%	41,816 kJ/kg	71,100
Gasoline	100%	43,070 kJ/kg	67,500
Diesel Oil	100%	42,652 kJ/kg	72,600
Fuel Oil	100%	41,816 kJ/kg	75,500
Petroleum Coke	100%	31,947 kJ/kg	82,900
Other Petroleum Products	100%	41,816 kJ/kg	75,500
Natural Gas	100%	38,931 kJ/m^3	54,300
LNG	100%	51,434 kJ/kg	54,300
Coke Oven Gas	100%	16,726 kJ/m^3	37,300
Blast Furnace Gas	100%	219,000 kJ/m^3	3,763
Converter Gas	100%	145,000 kJ/m^3	7,945
Other Gas	100%	5,227 kJ/m^3	37,300
LPG	100%	50,179 kJ/kg	61,600
Refinery Gas	100%	46,055 kJ/kg	48,200

Source 1,2,3,4: China Energy Statistical Yearbook 2010 p285; 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 Energy； Public Institutions Energy Consumption Statistical System, drafted by Bureau of Government Offices Administration, approved by National Bureau of Statistics in July 2011.

Sub-step 1. Calculating the percentages of CO_2 emissions from the coal-fired, oil-fired and gas-fired power plants in total fuel-fired CO_2 emissions

Table 8 The percentages of CO_2 emissions from the coal-fired, oil-fired and gas-fired power plants in total fuel-fired CO_2 emissions

Fuel	Unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Subtotal	CO_2 Emission（tCO_2e）
		A	**B**	**C**	**D**	**E**	**G=A+…+E**	**K=G*H*I*J/100000**
Raw Coal	10^4 t	4850.49	2,771.89	483.72	2,916.46	2,494.90	13,517.46	246,729,926
Cleaned Coal	10^4 t	0	0	0	1.05	0	1.05	24,148
Other Washed Coal	10^4 t	11.01	0	0	42.96	6.82	60.79	443,822
Briquettes	10^4 t	0	0	0	0	0	0.00	0
Coal Gangue	10^4 t	355.13	37.86	0	163.58	2.85	559.42	4,084,269
Coke	10^4 t	0	0	0	0	0	0.00	0
Other Coking Products	10^4 t	0	0	7.99	0	0	7.99	217,426
Subtotal								**251,499,591**
Crude Oil	10^4 t	0	0	0	0	0	0	0
Gasoline	10^4 t	0.01	0	0.03	0	0.01	0.05	1,454
Diesel Oil	10^4 t	0.67	0.42	0.21	0.23	0.39	1.92	59,453
Fuel Oil	10^4 t	0	0.17	0.09	0.1	0.7	1.06	33,465
Petroleum Coke	10^4 t	0	0	0	0	0	0	0
Other Petroleum Products	10^4 t	0	0	0	0	0.01	0.01	316
Subtotal								**94,688**
Natural Gas	10^7m^3	8.7	0	24.8	3	85.4	121.9	2,576,909
LNG	10^4 t	0	0	0	0	0	0	0
Coke Oven Gas	10^7m^3	19.7	8.9	0	0	7	35.6	222,101
Blast Furnace Gas	10^7m^3	182.4	40.6	0	0	52.8	275.8	2,272,860
Converter Gas	10^7m^3	0	3.1	0	0	0	3.1	35,713
Other Gas	10^7m^3	0	0	0	0	0	0	0
LPG	10^4 t	0	0	0	0	0	0	0
Refinery Gas	10^4 t	0	0	0	0	12.2	12.2	270,822
Subtotal								**5,378,404**
Other Energy	10^4tce	1.76	2.68	0	0	0	4.44	0
Total								**256,972,683**

Sources: China Energy Statistical Yearbook 2011

The result from the above table: $\lambda_{Coal,y}$ = **97.87%,** $\lambda_{Oil,y}$ = **0.04%,** $\lambda_{Gas,y}$ = **2.09%**

Sub-step 2. Calculating the fuel-fired emission factor

$$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y}$$

Where:
$EF_{Thermal}$ is the fuel-fired emission factor;
$EF_{Coal,Adv}$, $EF_{Oil,Adv}$ and $EF_{Gas,Adv}$ are corresponding to the emission factors of coal, oil and gas fired power plants which are applied by the most advanced commercialized technologies.

According to the announcement "China's Regional Grid Baseline Emission Factors Renewed", the weighted average of 20 least coal consumption per kWh supplied of new built 600-1,000 MW sub critical units in 2010 is adopted to determine the emission factor of the best advanced coal fired generation technology, which is 309.9 gce/kWh. In other word, the efficiency of best advanced coal fired generation technology is 39.65%.

The maximum electricity supplied efficiency of oil and gas fired generation plants are regarded as approximate estimation of commercially optimal efficiency technology. Similarly, the fuel consumption per kWh supplied of best advanced oil and gas fired generation technology is determined to be 236.6 gce/kWh, which means a generation efficiency of 51.93% .these data were show as below:

Table 9 Emission factors of Coal, Oil and Gas with the most advanced commercialized technologies applied by the fuel-fired power plants

	Parameters	Fuel consumption rate (%)	Fuel Emission Factor ($kgCO_2e/TJ$)	Oxidation	Emission Factor (tCO_2e/MWh)
		A	B	C	D=3.6/A/10000*B*C
Coal-fired plant	$EF_{Coal,Adv}$	39.65	87,300	1	0.7927
Oil-fired plant	$EF_{Oil,Adv}$	51.93	75,500	1	0.5234
Gas-fired plant	$EF_{Gas,Adv}$	51.93	54,300	1	0.3765

Sources: The Baseline Emission Factors of Chinese Power Grids 2012, NDRC.

Then, calculating
$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y}$ = 0. 78386 tCO_2e/MWh

Sub-step 3. Calculating the Build Margin Emission Factor.

$$EF_{grid,BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal}$$

Where:

$EF_{BM,y}$ = the Build Margin emission factor with advanced commercialized technologies for year *y*;
CAP_{Total} = the new capacity additions;
$CAP_{Thermal}$ = the new fuel-fired capacity additions.

Table 10 Installed Capacities of the NWPG 2010

Installed Capacity	Unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total
Fuel-fired	MW	21,370	13,240	1,930	12,710	11,720	60,970
Hydro	MW	2,210	6,110	10,680	430	2,990	22,420
Nuclear	MW	0	0	0	0	0	0
Wind & Others	MW	0	1,390	0	600	1,360	3,352
Total	MW	23,580	20,740	12,610	13,740	16,070	86,742

Sources：China Electric Power Yearbook 2011

Table 11 Installed Capacities of the NWPG 2009

Installed Capacity	Unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total
Fuel-fired	MW	19,900	10,990	1,930	8,820	9,520	51,160
Hydro	MW	1,920	5,940	8,740	430	2,430	19,460
Nuclear	MW	0	0	0	0	0	0
Wind&Others	MW	0	750	0	270.3	860	1,880
Total	MW	21,820	17,680	10,670	9,520	12,810	72,500

Sources：China Electric Power Yearbook 2010

Table 12 Installed Capacities of the NWPG 2008

Installed Capacity	Unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total
Fuel-fired	MW	17,850	8,980	2,000	7,540	8,200	44,570
Hydro	MW	1,810	5,440	5,910	430	2,190	15,780
Nuclear	MW	0	0	0	0	0	0
Wind & Others	MW	0	600	0	170	510	1,280
Total	MW	19,660	15,020	7,910	8,140	10,900	61,630

Sources：China Electric Power Yearbook 2009

Table 13 Change Installed Capacity from 2008-2010

	Year 2008	Year 2009	Year 2010	2008-2010 New Capacity	2009-2010 New Capacity	Percentage of 2008-2010 New Capacity Additions
	A	B	C	D	E	F
Fuel-fired (MW)	44,570	51,160	60,970	19,270	12,020	68.87%
Hydro (MW)	15,780	19,460	22,420	6,640	2,960	23.73%
Nuclear (MW)	0	0	0	0	0	0.00%
Wind(MW)	1,280	1,880.3	3,352	2,072	1,472	7.40%
Total	**61,630**	**72,500**	**86,742**	**27,982**	**16,452**	**100.00%**
Percentage of Year 2010				32.26%	18.97%	

Then, the result is $EF_{BM,y} = EF_{grid,BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal}$

$= 0.78386 \times 68.87\% = \mathbf{0.5398}$ tCO_2e/MWh

Calculate the combined margin Emission Factor (EF_y)

$\boldsymbol{EF_{grid,CM,y}} = 0.5 \times EF_{grid,OM,y} + 0.5 \times EF_{grid,BM,y} = 0.5 \times 0.9914 + 0.5 \times 0.5398 = \mathbf{0.7656}$ tCO_2e/MWh

Appendix 5: Further background information on the monitoring plan

No additional information.

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History of the document

Version	Date	Nature of revision(s)
02.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the programme design document form for small-scale CDM programmes of activities" (EB 66, Annex 13).
01	EB33, Annex43 27 July 2007	Initial adoption.
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