CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

CONTENTS

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
03	22 December 2006	• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

SECTION A. General description of small-scale project activity

A.1 Title of the small-scale project activity:

>>

Project Title: Beixu Group Methane to Energy Project
PDD Version: 1.0
Date: 18/09/2008

A.2. Description of the small-scale project activity:

>>

Project Description

The proposed project is located at Beixu Group Co., Ltd. in Linying County, Henan Province. Purpose of the project is to install anaerobic digestion based manure treatment system with methane recovery equipments. Methane collected will be used for electricity generation with internal combustion engines and generators.

Beixu Group Co., Ltd. owns a swine farm with annual population of 100,000. The farm uses flushing system to collect the manure automatically. In project scenario, the manure will be flushed to the anaerobic digestion reactors. After anaerobic digestion, the wastewater is treated aerobically and then used for agriculture irrigation. The project is expected to collect 3,034 tonnes methane a year. The net electricity generation is estimated to be 9,855 MWh a year. The estimated emission reductions amount from methane elimination is 54,553 tCO_2e/yr, and the emission reductions from replacing power generation of Power Grid is 9594 tCO_2e/yr. The total estimated emission reductions are 64,146 tCO_2e/yr. In absence of the project activity, manure will be left to decay in several anaerobic lagoons and equivalent amount of electricity would have been supplied from Central China Power Grid. The lagoon is not covered; methane from decay is emitted into atmosphere directly.

Contribution to Local Sustainable Development

- By replacing anaerobic lagoons with controlled manure management and methane recovery system, methane from decay will be avoided. Hence the proposed project will contribute in reducing GHG emissions of CH4 and help mitigation of global climate change.
- By replacing power generation from fossil fuels based Central China Power Grid with renewable source of biogas, the proposed project will reduce GHG emissions of CO2 from fossil fuels.
- The project activity can also improve water quality, eliminate bad odour, improve the environment and living conditions of the farmers.
- According to the plant owner, additional to 15 job opportunities from construction, the project activity will further provide more than 20 job opportunities in regular operation.
- The effluent and slurry are good organic fertilizers. Demand of inorganic fertilizers will be decreased and pollutions from those fertilizer plants will be reduced indirectly.

A.3. Project participants:

>>

Name of Party Involved ((host) indicates a host Party)	Private and/or public entity(ies) Project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
People's Republic of China (host)	Beixu Group Co., Ltd.	No

Switzerland	South Pole Carbon Asset Management Ltd. (CER buyer, private entity)	No

A.4. Technical description of the small-scale project activity:

A.4.1. Location of the small-scale project activity:

>>

A.4.1.1. Host Party(ies):

>>
People's Republic of China

A.4.1.2. Region/State/Province etc.:

>>
Henan Province

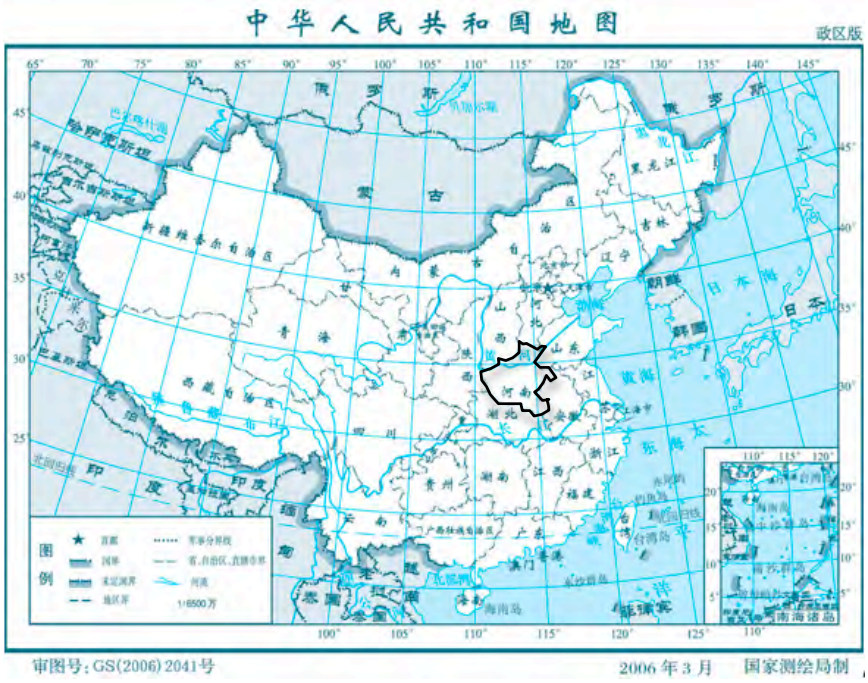
A.4.1.3. City/Town/Community etc:

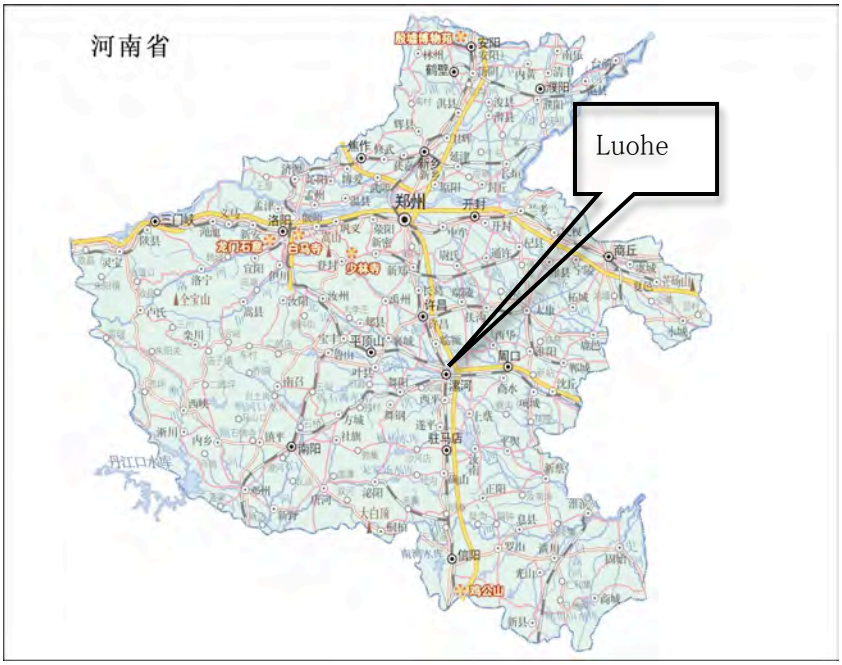
>>
Beixu Town, Linying County, Luohe City

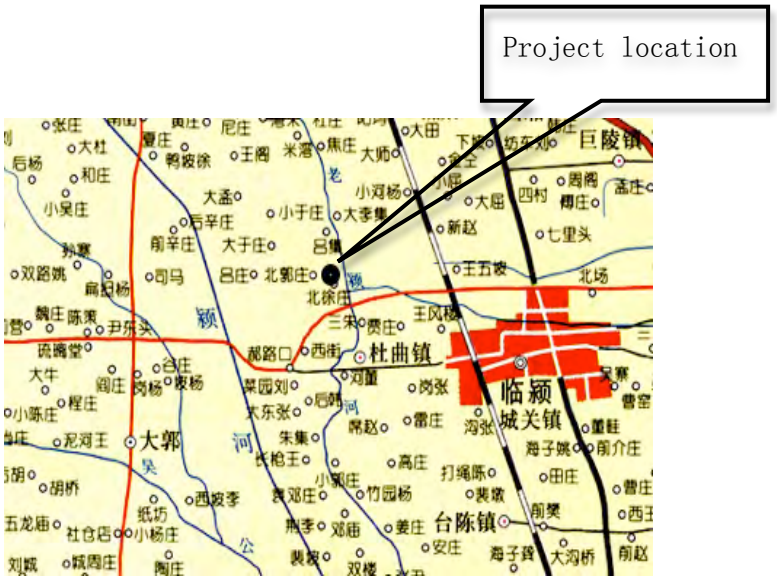
A.4.1.4. Details of physical location, including information allowing the unique identification of this small-scale project activity :

>>
The project is located in Beixu Town, Linying County, Luohe City, Henan Province, P.R.China. 25 kilometers from G311 national road, the exact location of the plant is 33°48′43″N 113°57′06″E. A map indicating the location of the project site is provided in Fig A.1:

Fig. A.1 Project Location







A.4.2. Type and category(ies) and technology/measure of the small-scale project activity:

>>

Sectoral Scope 1: Energy industries (renewable/ non-renewable sources)
Sectoral Scope 15: Agriculture

After the mixture of manure and water in Beixu Group Co., Ltd. is pre-treated by the grid machine, the wastewater is anaerobically digested at first, the biogas generated from the anaerobic digester is stored in the gas chamber after being desulphurized as well as desiccated and is used to generate electricity for daily operation of the farm and municipal use. After anaerobic digestion, the wastewater is treated aerobically and then is used for agriculture irrigation. The sludge produced during the aerobic treatment process is used as high quality fertilizer. The effluent and slurry are all supplied to the farmers living around for free. The diagram of the main values of the project activity is shown below:

Table 1: System Characteristics

	Unit	Value
Total Capacity of Digesters	m3	8500
Capacity of Aerobic Pool	m3	5000
COD out of Aerobic treatment	mg/L	Less than150
Installation Capacity	MW	5×0.25
Efficiency of Power Generator	%	23
Biogas exhausting rate	Nm3/h	750
Lifetime of Genetator	year	20
Type of Generator	250GFT	
Power generator producer	Weichai Power Co., Ltd	

Enclosed Flare System Characteristics

	Unit	Value
Treatment Capacity	Nm3/hr@50%CH4	2000
Load change range	Nm3/hr@50%CH4	50~2000

Volumetric fraction of CH4	%	30%~70%
Minimum operating pressure	kPa	3
Temperature of exhaust gas	℃	500-800
Retention time of the gas	s	> 1s
Noise 1m away from the torch	dB	55 dB
Manufacturer	Beijing Fairyland Environmental Technology Co., Ltd	

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

>>

The specific project activity applies for fixed crediting periods, and the estimation of the emission reductions during the crediting period (from 2009 to 2018) is provided in Table 2. Total estimated emission reductions during the crediting period amount to 641,460 tCO_2e.

Table 2 Estimation of the Emission Reductions during the First Crediting Period

Years	Estimation of annual emission reductions (tCO_2e)
2009	64,146
2010	64,146
2011	64,146
2012	64,146
2013	64,146
2014	64,146
2015	64,146
2016	64,146
2017	64,146
2018	64,146
Total estimated reductions (tonnes of CO_2 e)	641,460
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tones of CO_2 e)	64,146

A.4.4. Public funding of the small-scale project activity:

>>

There is no public funding from Annex I countries involved in the project activity.

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a large scale project activity:

>>

The project participants confirm that there is no registered small-scale CDM project activity or an application to register another small-scale CDM project activity with the same project participants and whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

According to Appendix C to the *Simplified Modalities and Procedures for Small-scale CDM Project Activities*, the Project is not a debundled component of a large-scale project activity.

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the small-scale project activity:

>>

AMS.III.D "*Methane recovery in animal manure management systems*" (Version 14).
AMS.I.D "*Grid connected renewable electricity generation*" (Version 13).
Section 10.4 "*Methane emissions from manure management*" of Chapter 10 "*Emissions from Livestock and Manure Management*" under the Volume 4 "*Agriculture, Forestry and other Land use*" of the *2006 IPCC Guidelines for National Greenhouse Gas Inventories*.
Tool to determine project emissions from flaring gases containing methane;
"Tool to calculate the emission factor for an electricity system" (Version 01.1)
http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html
http://cdm.unfccc.int/methodologies/SSCmethodologies/index.html

B.2 Justification of the choice of the project category:

>>

The methodology, AMS.III.D Version 14 is applicable to the proposed project duo to reasons listed in Table 3 below.

Table 3. Applicability Discussion of Methodology

	Methodology Requirements	Project Conditions
1	The livestock population in the farm is managed under confined conditions;	Swine in Beixu Group are all managed under confined conditions.
2	Manure or the streams obtained after treatment are not discharged into natural water resources (e.g. river or estuaries), otherwise AMS III.H. shall be applied;	Streams obtained after treatment will be used as liquid fertilizer in farmland irrigation.
3	The annual average temperature of baseline site where anaerobic manure treatment facility is located is higher than 5°C	The annual average temperature of Lining County is 14.6°C, which is above 5°C.
4	In the baseline scenario the retention time of manure waste in the anaerobic treatment system is greater than 1 month, and in case of anaerobic lagoons in the baseline, their depths are at least 1 m;	The average retention time is 2 months; depth of the anaerobic lagoon is around 4 meters.
5	No methane recovery and destruction by flaring, combustion or gainful use takes place in the baseline scenario.	In the baseline scenario, methane from the lagoon is directly released into atmosphere without any recovery activity.
6	The final sludge must be handled aerobically. In case of soil application of the final sludge the proper conditions and procedures (not resulting in methane emissions) must be ensured.	The final sludge will be dried to make fertilizer for soil application.
7	Technical measures shall be used (including a flare for exigencies) to ensure that all biogas produced by the digester is used or flared.	Normally, methane collected will be consumed by internal-combustion engines (IC) for power generation. A gas tank will be installed to contain

		surplus biogas. A torch will be used for exigencies.
8	The recovered methane from the above measures may also be utilised for the applications instead of flaring or combustion.	Biogas recovered will be used for electricity generation directly.
9	The aggregate emission reductions should be less than or equal to 60 ktCO2 equivalent annually from all type Ⅲ components of the project activity.	The emission reductions from all type Ⅲ components of the project activity are 54,553 tCO2e/yr, less than 60 ktCO2 equivalent.

B.3. Description of the project boundary:

>>

As per AMS.III.D, the project boundary is the physical, geographical site of the livestock and manure management systems, and the facilities which recover and flare/combust or use methane. Because equivalent amount of power generation from Central China Power Grid will be saved, the grid is also included within project boundary.

Table. 4 Emission Sources of GHG gas

	Emission Source	GHG Gas	Included	Explanation
Baseline	AWMS system	CO_2	No	Not mentioned in AMS.III.D
		CH_4	Yes	Major emissions source
		N_2O	No	Not mentioned in AMS.III.D
	Power Generation	CO_2	Yes	Major emission source
		CH_4	No	Not mentioned in AMS.III.D
		N_2O	No	Not mentioned in AMS.III.D
Project Scenario	AWMS system	CO_2	Yes	From power consumption by project activity
		CH_4	Yes	Physical leakage of biogas in project activity
		N_2O	No	Not mentioned in AMS.III.D
	Power Generation	CO_2	Yes	From power consumption by project activity
		CH_4	Yes	Methane emission from biogas flaring
		N_2O	No	Not mentioned in AMS.III.D

B.4. Description of baseline and its development:

>>

The proposed project activity is a small-scale project. The methodology applied, AMS.III.D Version 14, does not provide step-wise procedures for determination of baseline scenario. Instead, it simply claims that:

"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."

Baseline Scenario: Current situation of manure management with anaerobic lagoon; methane from decay of swine manure is released into atmosphere without recovery; equivalent amount of electricity is supplied from Central China Power Grid.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity:

As per *Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities*, project participants shall provide an explanation to show that the project activity would not have occurred anyway due to at least one of the following barriers:

(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.

Discussion of Investment Barrier Analysis

Investment analysis determines whether the proposed project activity is economically or financially less attractive than baseline scenario, without the revenue from the sale of certified emission reductions (CERs). To conduct the investment analysis, the PDD uses the following sub-steps:

Step 1. Determine appropriate analysis method

The "Tool for the Demonstration and Assessment of Additionality" (Version 05.2) provides three investment analysis methods for selection, which are simple cost analysis (Option I), investment comparison analysis (Option II) and benchmark analysis (Option III).

Besides the revenue from the CDM, the project activity does generate financial and economic benefits through electricity generation. Therefore Option I "simple cost analysis" is not appropriate. Currently the plant owner does not have any investment options other than the proposed project activity, hence Option II "investment comparison analysis" is not preferable; the PDD here applies Option III "benchmark analysis" to perform the investment analysis and demonstrate that the proposed project activity is not likely to be the most financially attractive option.

Step 2 – Option III. Apply benchmark analysis

The proposed project uses project IRR as the financial indicator. The official benchmark IRRs are publicly available. According to "The Economic Assessment Interim Procedures for Power Engineering

Technical Transformation Projects (try out)[1]", the project benchmark IRR is 8% for Power Technical Transformation projects in China.

Step 3. Calculation and comparison of financial indicators:

The key figures and project IRR with and without revenue from CERs are listed in the following Table B.8. Without CERs revenue, the project IRR of the proposed project is only 3.2%, lower than the benchmark IRR. While considering CERs revenue, the IRR of the proposed project is 21%, higher than the benchmark.

Table 5 Key Financial Figures and Projet IRR with/without CERs Revenue

Parameter	Unit	Value	Source
Total Investment	10,000 RMB	2,200	FSR
Annual O&M Cost	10,000 RMB	376.25	FSR
Installation Capacity	MW	1.25	FSR
Annual Net Power Supply	MWh	9,855	FSR
Electricity Tariff	RMB/ kWh	0.663	FSR
Income tax	%	25	FSR
VAT	%	17	FSR
Residual value	%	5	FSR
Annual CERs	tonnes/ Yr	64,146	Estimation
CERs Price	EUR/ tonne	9.1	Equipment purchase agreement
Project Lifetime	Yr	15	FSR
IRR without CERs Revenue	%	3.2%	/
IRR with CERs Revenue	%	21%	Estimation

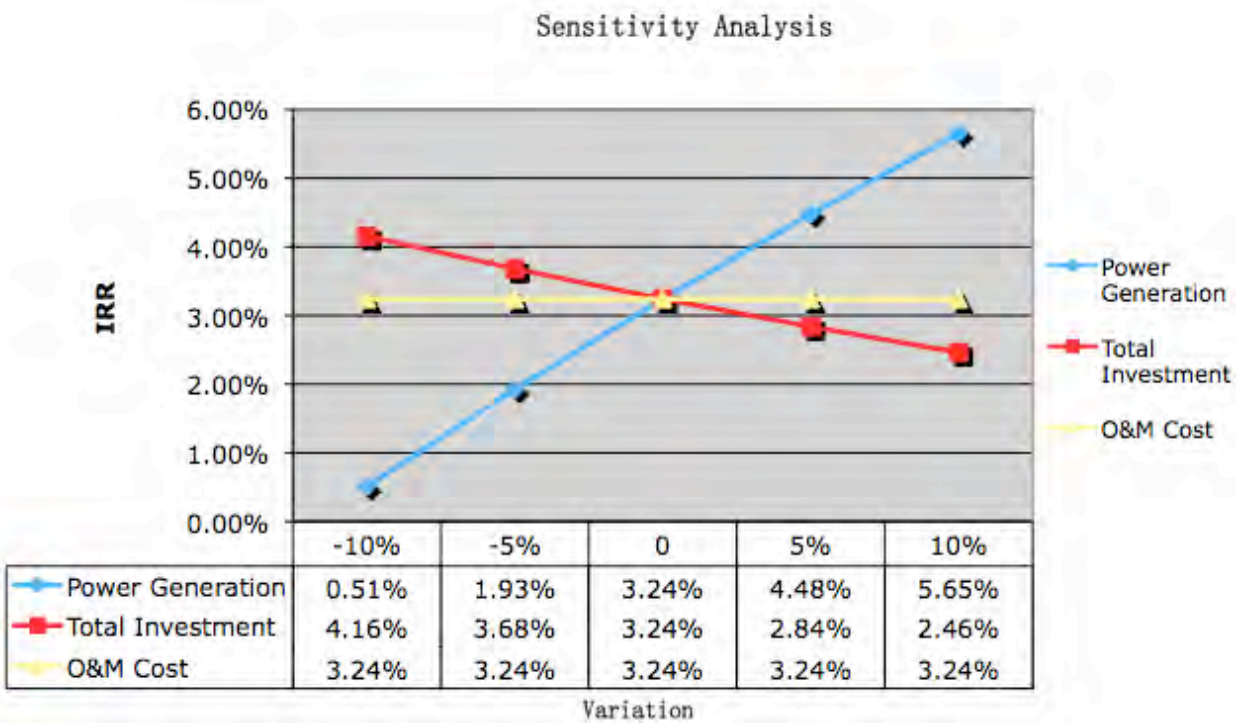
Step 4. Sensitivity analysis:

Purpose of sensitivity analysis is to show whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions. The variables chosen for sensitivity analysis are cost of operation and maintenance (O&M), total investment and sales from electricity, for which the variation is basically from fluctuation in power generation.

Variations in IRR driven from fluctuation of O&M cost, total investment and sales of electricity are summarized in Figure 3 as following:

[1] Issued by the State Power Company Power Generation and Transmission Operation Department, published by China Electric Power Press.

Fig.3 Sensitivity Aalysis



	-10%	-5%	0	5%	10%
Power Generation	0.51%	1.93%	3.24%	4.48%	5.65%
Total Investment	4.16%	3.68%	3.24%	2.84%	2.46%
O&M Cost	3.24%	3.24%	3.24%	3.24%	3.24%

The analysis shows that the IRR is more sensitive to the net electricity supply and total investment, while it is less elastic to O&M cost. The IRR is maintained to be less than the benchmark of 8% while the three parameters fluctuate in the range of -10% to +10%.

Conclusion of Additionality Analysis

The proposed project activity is additional due to its poor IRR without considering CDM revenue, which is lower than the benchmark of 8%. Without CDM, plant owner would have to treat swine manure with existing anaerobic lagoon, which leads to higher GHG emissions compared to proposed project.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

>>

AMS.III.D "*Methane recovery in animal manure management systems*" (Version 14).
AMS.I.D "*Grid connected renewable electricity generation*" (Version 13).
Tool to determine project emissions from flaring gases containing methane;
"Tool to calculate the emission factor for an electricity system" (Version 01.1)
Section 10.4 "*Methane emissions from manure management*" of Chapter 10 "*Emissions from Livestock and Manure Management*" under the Volume 4 "*Agriculture, Forestry and other Land use*" of the *2006 IPCC Guidelines for National Greenhouse Gas Inventories*.

Baseline Emissions

As per AMS.III.D Version 14, 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. Baseline emissions (BE_y) are calculated 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). Baseline emissions are determined as follows:

1. Baseline Emissions

Baseline emissions of the project include baseline emissions from methane and CO_2 emissions from equivalent amount of power generation by Central China Power Grid.

$$BE_y = BE_{CH4,y} + BE_{EL,y} \quad (1.1)$$

Where:

BE_y Baseline emissions in year ***y***
$BE_{CH4,y}$ Baseline emissions from methane in year ***y***
$BE_{EL,y}$ Baseline emissions from power generation by Central China Power Grid in year ***y***

Emission reductions from methane avoidance in year ***y*** will be calculated ex-post based on actual methane recovered. Here in the PDD an ex-ante estimation is performed with IPCC 2006 guidelines as per requirements of AMS.III.D.

1.1 Baseline Emissions of Methane

Ex-ante estimation of methane baseline emissions is performed as per Section 10.4 "*Methane emissions from manure management*" of Chapter 10 "*Emissions from Livestock and Manure Management*" under the Volume 4 "*Agriculture, Forestry and other Land use*" of the *2006 IPCC Guidelines for National Greenhouse Gas Inventories*.

$$BE_{CH4,y} = GWP_{CH4} \times D_{CH4} \times UF_b \times \sum_{j,LT} MCF_j \times B_{0,LT} \times N_{LT,y} \times VS_{LT,y} \times MS\%_{BL,j} \quad (1.2)$$

Where:

GWP_{CH4} Global Warming Potential of methane, 21 by IPCC

D_{CH4} CH4 density (0.00067 t/m at room temperature (20 ºC) and 1 atm pressure)
LT Index for all types of livestock
j Index for animal waste management system
MCF_j Annual methane conversion factor (MCF) for the baseline animal waste management system "j"
$B_{0,LT}$ Maximum methane producing potential of the volatile solid generated for animal type "LT" (m3 CH4/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)

Maximum Methane-producing Capacity of the Manure (*Bo*)
As per AMS.III.D, the maximum methane-producing capacity of the manure (***Bo***) varies by species and diet. The preferred method to obtain ***Bo*** measurement values is to use data from country-specific published sources, measured with a standardised method (***Bo*** shall be based on total as-excreted ***VS***). These values shall be compared to IPCC default values and any significant differences shall be explained. If country specific Bo values are not available, default values provided in tables 10 A-4 to 10 A-9 of *2006 IPCC Guidelines for National Greenhouse Gas Inventories* volume 4 Chapter 10 can be used, provided that the project participants provide an assessment of suitability of those data to the specific situation of the treatment site.

Volatile Solids (*VS*)
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 provided in 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 provide an assessment of 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 formula shall be used:

$$VS_{T,d} = \left(\frac{W_{site}}{W_{default}} \right) \bullet VS_{default} \bullet nd_y / 365 \qquad \textbf{(1.3)}$$

$VS_{T,d}$ Adjusted volatile solid excretion per year on a dry-matter basis for a defined livestock population at the project site in kg dm/animal/day.
W_{site} Average animal weight of a defined population at the project site in kg.
$W_{default}$ Default average animal weight of a defined population in kg from where the data on $VS_{default}$ is sourced.
$VS_{default}$ Default value (IPCC 2006 or US-EPA, which ever is lower) for the volatile solid excretion per day on a dry-matter basis for a defined livestock population in kg-dm/animal/day.
nd_y Number of days in year y where the treatment plant was operational.

Methane Conversion Factors (*MCF*)
Methane Conversion Factors (***MCF***) values are determined for a specific manure management system and represent the degree to which Bo 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.

Annual Average Number of Animals ($NL_{T,y}$)
The annual average number of animals ($NL_{T,y}$) are determined as follows:

$$N_{LT,y} = N_{da,y} \times \left(\frac{N_{p,y}}{365} \right) \quad (1.4)$$

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)

1.2 Baseline Emissions of Power Generation

As per AMS.III.D, if the recovered methane is used for heat or electricity generation, the corresponding category of type I project activities can be applied.

$$BE_{EL,y} = EG_y \times EF_{grid} \quad (1.5)$$

Where:
$BE_{EL,y}$ Baseline emissions from electricity generation in year y, tCO2e
EG_y Electricity generation by proposed project in year y, MWh
EF_{grid} Emission factor of Central China Power Grid, tCO2e/MWh

2. Project Emissions

As per 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) CO2 emissions from use of fossil fuels or electricity for the operation of all the installed facilities ($PE_{power,y}$).

$$PE_y = PE_{PL,y} + PE_{flare,y} + PE_{power,y} \quad (2.1)$$

Physical Leakage
Project emissions due to physical leakage of biogas from the animal manure management systems used to produce, collect and transport the biogas to the point of flaring or gainful use is estimated as 10% of the maximum methane producing potential of the manure fed into the management systems implemented by the project activity, as follows:

$$PE_{PL,y} = 0.10 \times GWP_{CH4} \times D_{CH4} \times \sum_{j,LT} B_{0,LT} \times N_{LT,y} \times VS_{LT,y} \times MS\%_{i,y} \quad (2.2)$$

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

Emissions from Flaring
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*". The proposed project uses internal-combustion engines for power generation; hence the default value of 90% will be used.

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

Where:

$TM_{RG,h}$	Mass flow rate of methane in the residual gas in the hour *h*
$\eta_{flare,h}$	Flare efficiency in hour *h*, 90% for internal combustion engines used in project activity

Emissions from Electricity Consumption

Project emissions from electricity consumption are determined as per the procedures described in AMS I.D. For project emissions from fossil fuel consumption the emission factor for the fossil fuel shall be used (tCO2/tonne). Local values are to be used, if local values are difficult to obtain, IPCC default values may be used. If recovered methane is used to power auxiliary equipment of the project it should be taken into account accordingly, using zero as its emission factor.

$$PE_{power,y} = EC_y \times EF_{grid} \qquad (2.3)$$

Where:

$PE_{power,y}$	Project emissions from electricity consumption in year y, tCO2e
EC_y	Electricity consumption by proposed project in year y, MWh
EF_{grid}	Emission factor of Central China Power Grid, tCO2e/MWh

3. Leakage

No leakage calculation is required.

4. Emission Reductions

The emission reduction achieved by the project activity can be estimated ex-ante in the PDD by:

$$ER_y = BE_y - PE_y \qquad (4.1)$$

5. Emission Factor of Central China Power Grid

Step 1. Identify the relevant electric power system

As per delineation of Chinese national electric system published by *National Development and Reform Commission*, which is also Chinese DNA, the relevant electric power system is *Central China Power Grid*. The Project's electricity generation unit is connected to the *Henan Power Grid* via local grid network, and thus finally to the *Central China Power Grid*. The *Central China Power Grid* is a large regional grid, which consists of six sub-grids: *Henan Power Grid, Hubei Power Grid, Hunan Power Grid, Jiangxi Power Grid, Sichuan Power Grid* and *Chongqing Municipality Power Grid*. There is substantial inter-grid power exchange among the above-mentioned sub-grids of the *Central China Power Grid*. The *Central China Power Grid* can be clearly identified as regional grid and information on the characteristics of this grid is publicly available. [1]

To determine the operating margin emission factor, use the simple operating margin emission rate of the exporting grid, determined as described in step 3 (a) to calculate the CO_2 emission factor(s) for net electricity imports ($EF_{grid,import,y}$) from a connected electricity system within the same host country(ies).

[1] National Development and Reform Commission of China published delineation of the electricity grid of China. Please visit http://cdm.ccchina.gov.cn/web/index.asp for more details.

Step 2. Select an operating margin (OM) method

"Tool to calculate the emission factor for an electricity system" (Version 1) outlines four options for the calculation of the Operating Margin emission factor(s) ($EF_{OM,y}$):

(a) Simple OM, or
(b) Simple adjusted OM, or
(c) Dispatch Data Analysis OM, or
(d) Average OM.

As per *"Tool to calculate the emission factor for an electricity system"* (Version 1), any of the four methods can be used. "Dispatch Data Analysis" method is not selected herein, because dispatch data are not available to the public or to the project participants. For the same reason, the simple adjusted OM methodology cannot be used.

The Simple OM method has been chosen instead. This is possible because low cost/ must run resources account for less than 50% of the power generation in the grid in most recent years. From 2002 to 2006, according to gross annual power generation statistics for the *Central China Power Grid*, the ratio of power generated by hydro-power and other low cost/compulsory resources was: 35.95% in 2002, 34.43% in 2003, 38.37% in 2004, 38.18% in 2005, 36.97% in 2006 respectively, lower than 50%.[1] Thus, the simple OM method is applicable.

The simple OM of the grid for the proposed project is calculated using the 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 to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period.

Step 3. Calculate the operating margin emission factor according to the selected method

The simple Operating Margin (OM) emission factor ($EF_{grid,OMsimple,y}$) is calculated as the generation-weighted average emissions per electricity unit (tCO2/MWh) of all generating sources serving the system, not including low-operating cost and must-run power plants. As per *"Tool to calculate the emission factor for an electricity system"* (Version 1), it may be calculated:

- Based on data on fuel consumption and net electricity generation of each power plant / unit (Option A), or
- Based on data on net electricity generation, the average efficiency of each power unit and the fuel type(s) used in each power unit (Option B), or
- Based on data on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system (option C)

Since neither the data of fuel consumption nor the net electricity generation for every single electricity generation plant/unit is publicly available for *Central China Power Grid*, the proposed project uses Option C for simple OM calculation. The calculation is based on the total net electricity generation and the fuel types and total fuel consumption of each provincial sub-grid of *Central China Power Grid*. Electricity importation from *Northwest China Power Grid* is also counted. A three-year average, based on the most recent fuel consumption statistics available at the time of PDD submission, is used ("ex-ante" approach).

[1] *China Energy Year Book, 2002-2006*

The calculation equation of the Simple OM is as follows:

$$EF_{Grid,OMsimple,y} = \frac{\sum_{i,m} FC_{i,m,y} \cdot NCV_{i,y} \bullet EF_{CO2,i,y}}{\sum_{m} EG_{m,y}} \quad \text{Equation (13)}$$

Where:

$EF_{grid,OMsimple,y}$	Simple operating margin CO2 emission factor in year *y* (tCO2/MWh)
$FC_{i,m,y}$	Amount of fossil fuel type *i* consumed by power plant/unit m in year *y* (mass or volume unit)
$NCV_{i,y}$	Net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ / mass or volume unit)
$EF_{CO2,i,y}$	CO2 emission factor of fossil fuel type *i* in year *y* (tCO2/GJ)
$EG_{m,y}$	Net electricity generated and delivered to the grid by power plant/unit *m* in year *y* (MWh)
m	All power plants/units serving the grid in year *y* except low-cost/must-run power plants/units [1]
i	All fossil fuel types combusted in power plant / unit m 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

The Operating Margin emission factors for 2004, 2005 and 2006 are calculated separately and then the three-year average is calculated as a full-generation-weighted average of the emission factors. For details please refer to Annex 3. The result of the Operation Margin Emission Factor calculation is 1.27834 tCO_2e/MWh.

The operating margin emission factor of the baseline is calculated as a fixed ex-ante value and will not be renewed within the first crediting period of the project activity.

Step 4. Identify the cohort of power units to be included in the build margin

As per the emission factor tool, the sample group of power units m used to calculate the build margin consists of either:

(a) The set of five power units that have been built most recently, or

(b) The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.

However, in China it is very difficult to obtain the data of the five existing power plants built most recently or the power plants capacity additions in the electricity system that comprise 20% of the system

[1] Here the proposed project uses each provincial sub-grid as an electricity plant/unit in this equation, since total electricity generation and fuels consumption is available for each sub-grid. Electricity imports from a connected electricity system should be considered as one power source j.

generation (in MWh) and that were built most recently. Taking notice of this situation, EB accepts[1] the following deviation in methodology application:

1) Capacity addition from one year to another is used as basis for determining the build margin, i.e. the capacity addition over 1 - 3 years, whichever results in a capacity addition that is closest to 20% of total installed capacity.

2) Proportional weights that correlate to the distribution of installed capacity in place during the selected period above are applied, using plant efficiencies and emission factors of commercially available best practice technology in terms of efficiency. It is suggested to use the efficiency levels of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy.

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

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

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

Project participants have chosen *Option 1* for BM calculation.

Step 5. Calculate the build margin emission factor

As per the method of Chinese NDRC accepted by EB, since there is no way to separate the different generation technology capacities based on coal, oil or gas fuel etc from the generic term "thermal power" in the present energy statistics, the following calculation measures will be taken:

First, according to the energy statistics of the selected period in which approximately 20% capacity has been added to the grid, determine the ratio of CO_2 emissions produced by solid, liquid, and gas fuel consumption for power generation; than multiply this ratio by the respective emission factors based on commercially available best practice technology in terms of efficiency. Finally, this emission factor for

[1] This is in accordance with the „Request for guidance: Application of AM0005 and AMS-I.D in China", a letter from DNV to the Executive Board, dated 07/10/2005, available online at: http://cdm.unfccc.int/UserManagement/FileStorage/6POIAMGYOEDOTKW25TA20EHEKPR4DM.
This approach has been applied by several registered CDM projects using methodology ACM0002 so far.

thermal power is multiplied with the ratio of thermal power identified within the approximation for the latest 20% installed capacity addition to the grid. The result is the BM emission factor of the grid.

Sub-step 1
Calculate the proportion of CO_2 emissions related to consumption of coal, oil and gas fuel used for power generation as compared to total CO_2 emissions from the total fossil fuelled electricity generation (sum of CO_2 emissions from coal, oil and gas).

$$\lambda_{Coal,y} = \frac{\sum_{i \in COAL, j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}} \quad \text{Equation (16)}$$

$$\lambda_{Oil,y} = \frac{\sum_{i \in OIL, j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}} \quad \text{Equation (17)}$$

$$\lambda_{Gas,y} = \frac{\sum_{i \in GAS, j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}} \quad \text{Equation (18)}$$

Where,
$F_{i,j,y}$, is the amount of fuel i (in a mass or volume unit) consumed by power sources j in year(s) y,
$NCV_{i,y}$ is the net calorific value of fuel i in year y (GJ/t for solid and liquid fuels, GJ/m^3 for gas fuels)
$EF_{CO2,i,j,y}$ is the CO_2 emission coefficient of fuel i (tCO_2/GJ)
Coal, Oil and *Gas* stands for solid, liquid and gas fuels respectively.

Sub-step 2: Calculate the operating margin emission factor of fuel-based generation.

$$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y} \quad \text{Equation (19)}$$

Where,
$EF_{Thermal}$ is the weighted emissions factor of thermal power generation with the efficiency level of the best commercially available technology in China in the previous three years.
$EF_{Coal,Adv}, EF_{Oil,Adv}, EF_{Gas,Adv}$ are the emission factors of coal, oil and gas-fired power generation with efficiency levels of the best commercially available technology in China in the previous three years.

A coal-fired power plant with a total installed capacity of 600 MW is assumed to be the best commercially available technology in terms of efficiency, the estimated coal consumption of such a National Sub-critical Power Station with a capacity of 600MW is 329.94 gce/kWh, which corresponds to an efficiency of 37.28% for electricity generation.

For gas and oil power plants a 200MW power plant with a specific fuel consumption of 252 gce/kWh, which corresponds to an efficiency of 48.81% for electricity generation, is selected as the best commercially available technology in terms of efficiency.

The main parameters used for calculation of the thermal power plant emission factors $EF_{Coal,Adv}$, $EF_{Oil,Adv}$, $EF_{Gas,Adv}$ are provided in Annex3.

Sub-step 3: Calculate the Build Margin emission factor

$$EF_{grid,BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \cdot EF_{Thermal} \quad \text{Equation (20)}$$

Where,

CAP_{Total} is the total capacity addition of the selected period in which approximately 20% capacity has been added to the grid,

$CAP_{Thermal}$ is the total thermal power capacity addition of the selected period in which approximately 20% capacity has been added to the grid.

Detailed calculations are provided in Annex 3.

The result of the Build Margin emission factor calculation is 0.66865 tCO_2e/MWh.

As mentioned above, the build margin emission factor of the baseline is calculated as a fixed ex-ante value and will not be renewed within the first crediting period.

The data sources for calculating OM and BM are:

1. Installed capacity, power generation and the rate of internal electricity consumption of thermal power plants for the years 2004 to 2006
   Source: *China Electric Power Yearbook* (2000-2007)
2. Fuel consumption and the net caloric value of thermal power plants the years 2004 to 2006
   Source: *China Energy Statistics Yearbook* (2005-2007)
3. Carbon emission factor and carbon oxidation factor of each fuel
   Source: *Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Workbook*, P1.23 and P1.24 in Chapter one.

Step 6. Calculate the combined margin emissions factor

The Baseline Emission Factor is calculated as a Combined Margin, using the weighted average of the Operating Margin and Build Margin.

$$EF_{grid,CM,y} = w_{OM} \cdot EF_{grid,OM,y} + w_{BM} \cdot EF_{grid,BM,y} \quad \text{Equation (21)}$$

The operating margin emission factor ($EF_{grid,OM,y}$) of Central China Power Grid is 1.27834 tCO_2e/MWh and the build margin emission factor ($EF_{grid,BM,y}$) is 0.66865 tCO_2e/MWh. The defaults weights are used as specified in the emission factor tool: $w_{OM} = 0.5$; $w_{BM} = 0.5$

The result of the Baseline Emission Factor (EF_y) calculation is 0.9735 tCO_2e/MWh.

B.6.2. Data and parameters that are available at validation:

Basic data / statistics of Beixu (location of the project) and the proposed project:

Data / Parameter:	***LT***
Data unit:	-
Description:	Index for all types of livestock of Beixu
Source of data used:	Farm data
Value applied:	Market swine
Justification of the choice of data or description of measurement methods and procedures actually applied :	The only type of livestock of Beixu involved in the AWMS is market swine
Any comment:	-

Data / Parameter:	**Annual average temperature of the project site**
Data unit:	°C
Description:	Annual average temperature of Beixu
Source of data used:	Weather bureau of Luohe, Henan Province, China; FSR of Project
Value applied:	14.6°C
Justification of the choice of data or description of measurement methods and procedures actually applied :	Annual average temperature of Luohe is public available.
Any comment:	-

Data / Parameter:	$W_{site,baseline}$
Data unit:	kg
Description:	Average animal weight of a defined livestock population at the project site (kg) in baseline year 2007
Source of data used:	Farm record
Value applied:	70.4 kg
Justification of the choice of data or description of measurement methods and procedures actually applied :	Mass scale is used for weight measurement of a swine. Mean value of the weights measured is 70.4 kg
Any comment:	-

Data / Parameter:	$MS\%_{BL,j}$
Data unit:	%
Description:	Fraction of manure handled in baseline animal manure management system *"j"*
Source of data used:	-
Value applied:	80%

Justification of the choice of data or description of measurement methods and procedures actually applied :	80% of the manure produced by swine in a baseline year is handled by the anaerobic lagoon. This is a conservative estimation.
Any comment:	-

Data / Parameter:	$N_{da,baseline}$
Data unit:	number
Description:	Number of days a swine is alive in the farm in the baseline year of 2007
Source of data used:	Farm record
Value applied:	155
Justification of the choice of data or description of measurement methods and procedures actually applied :	Farm records the number of days a swine is alive in baseline year. Average value is applied.
Any comment:	-

Data / Parameter:	$N_{p,baseline}$
Data unit:	number
Description:	Number of swine produced annually for the year 2007
Source of data used:	Farm record
Value applied:	240,000
Justification of the choice of data or description of measurement methods and procedures actually applied :	-
Any comment:	-

Default values used in the methodology

Data / Parameter:	GWP_{CH4}
Data unit:	-
Description:	Global Warming Potential (GWP) of CH4
Source of data used:	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*
Value applied:	21
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default value
Any comment:	-

Data / Parameter:	D_{CH4}
Data unit:	t/m3
Description:	CH4 density
Source of data used:	*AMS.III.D Version14*
Value applied:	0.00067 t/m3
Justification of the choice of data or description of measurement methods and procedures actually applied :	This is CH4 density value at room temperature (20 ºC) and 1 atm pressure from AMS.III.D Version 14.
Any comment:	-

Data / Parameter:	UF_b
Data unit:	-
Description:	Model correction factor to account for model uncertainties
Source of data used:	FCCC/SBSTA/2003/10/Add.2, page 25
Value applied:	0.94
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per AMS III.D Version 14, default value from *FCCC/ SBSTA/ 2003/10/Add.2, page 25* is applied
Any comment:	-

Data / Parameter:	MCF_j
Data unit:	-
Description:	Annual methane conversion factor (MCF) for the baseline animal waste management system "*j*"
Source of data used:	*Table 10.17, Chapter 10, Volume 4, 2006 IPCC Guidelines for National Greenhouse Gas Inventories*
Value applied:	74% for uncovered anaerobic lagoon with annual average temperature of 15°C
Justification of the choice of data or description of measurement methods and procedures actually applied :	-
Any comment:	-

Data / Parameter:	$B_{0,LT}$
Data unit:	m^3 CH4/kg dm
Description:	Maximum methane producing potential of the volatile solid generated for animal type *"LT"*
Source of data used:	*Table 10A-7, 2006 IPCC Guidelines for National Greenhouse Gas Inventories*
Value applied:	0.29 m^3 CH4/kg dm
Justification of the	0.29 m^3 CH4/kg dm for market swine in Asia

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

Data / Parameter:	$VS_{default}$
Data unit:	kg dm/animal/day
Description:	Default value for the volatile solid excretion rate per day on a dry-matter basis for a defined livestock population (kg dm/animal/day)
Source of data used:	*Table 10A-7, 2006 IPCC Guidelines for National Greenhouse Gas Inventories*
Value applied:	0.3 kg dm/animal/day
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC 2006 default value for market swine in Asia
Any comment:	-

Data / Parameter:	$W_{default}$
Data unit:	kg
Description:	Default average animal weight of a defined population, this data is sourced from IPCC 2006
Source of data used:	*Table 10A-7, 2006 IPCC Guidelines for National Greenhouse Gas Inventories*
Value applied:	28 kg
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC 2006 default value for market swine in Asia
Any comment:	-

Data / Parameters relate to calculation of emission factor:

Data / Parameter:	$EF_{grid,OM,y}$
Data unit:	tCO2e/MWh
Description:	Operation margin baseline emission factor of Central China Power Grid
Source of data used:	China Electric Power Yearbook (2004-2006) China Energy Statistics Yearbook (figures are for 2004-2006) Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Workbook
Value applied:	1.27834 tCO2e/MWh
Justification of the choice of data or description of measurement methods	Calculated in compliance with the latest version of *"Tool to calculate the emission factor for an electricity system"* (Version 1). Please refer to Section B.6.1 and Annex III for more details.

and procedures actually applied :	
Any comment:	

Data / Parameter:	$EF_{grid,BM,y}$
Data unit:	tCO2e/MWh
Description:	Build margin baseline emission factor of Central China Power Grid
Source of data used:	China Electric Power Yearbook (2004-2006) China Energy Statistics Yearbook (figures are for 2004-2006) Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Workbook
Value applied:	0.66865 tCO2e/MWh
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated in compliance with the latest version of *"Tool to calculate the emission factor for an electricity system"* (Version 1). Please refer to Section B.6.1 and Annex III for more details.
Any comment:	

Data / Parameter:	$EF_{grid,CM,y}$
Data unit:	tCO2e/MWh
Description:	Combined margin baseline emission factor of Central China Power Grid
Source of data used:	China Electric Power Yearbook (2004-2006) China Energy Statistics Yearbook (figures are for 2004-2006) Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Workbook
Value applied:	0.9735 tCO2e/MWh
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated in compliance with the latest version of *"Tool to calculate the emission factor for an electricity system"* (Version 1). Please refer to Section B.6.1 and Annex III for more details.
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

>>

1	Baseline Emissions of Methane	BE_{CH4}	63711.9	*tCO2e/yr*
	Globl Warming Potential of Methane	GWP_{CH4}	21	-
1.1	CH4 Emissions from Manure Management	$CH_{4Manure}$	3033.9	*t CH4/yr*
1.1	CH4 Emissions from Manure Management	$CH_{4Manure}$	3033.9	*t CH4/yr*
1.1.1	CH4 density at room temperature and 1 atm pressure	D_{CH4}	0.00067	*t/m3*
1.1.2	Model correction factor to account for model uncertainties	UF_b	0.94	-

1.1.3	Annual methane conversion factor (MCF) for the baseline animal waste management system "j"	MCF_j	0.74	-
1.1.4	Maximum methane producing potential of the volatile solid generated for animal type "LT"	$B_{0,LT}$	0.29	*m3 CH4/kg dm*
1.1.5	Annual average number of animals of type "LT" in year "y"	$N_{LT,y}$	101917.81	*number*
1.1.6	Volatile solids for livestock "LT" entering the animal manure management system in year "y"	$VS_{LT,y}$	275.31	*kg dm/animal/year*
1.1.7	Fraction of manure handled in baseline animal manure management system "j"	$MS\%_{Bl,j}$	80%	*%*
1.1.6	Volatile solids for livestock "LT" entering the animal manure management system in year "y"	$VS_{LT,y}$	275.31	*kg dm/animal/year*
	Default value (IPCC 2006 or US-EPA, which ever is lower) for the volatile solid excretion per day on a dry-matter basis for a defined livestock population in kg-dm/animal/day	$VS_{default}$	0.3	*kg/animal/day*
	Default average animal weight of a defined population in kg from where the data on VSdefault is sourced (IPCC 2006 or US-EPA, whichever is lower)	$W_{default}$	28	*kg/swine*
	Average animal weight of a defined population at the project site in kg	W_{site}	70.4	*kg/swine*
	Number of days in year y where the treatment plant was operational	nd_y	365	*day*
1.1.5	Annual average number of animals of type "LT" in year "y"	$N_{LT,y}$	101917.81	*number*
	Days alive	$N_{da,y}$	155	*day*
	Number of animals produced annually	$N_{p,y}$	240000	*number*
2	Baseline Emissions from Power Generation	BE_{EL}	9593.8425	*tCO2e*
	Net Power generation in year y	EG_y	9855	*MWh*
	Emission factors of Central China Power Grid	EF_{grid}	0.9735	*tCO2e/MWh*
	Net Power generation in year y	*EGy*	9855	*MWh*
	Installation capacity of power generation	Cap_y	1.25	*MW*
	Operation days of power generation	D_o	365	*day*
3	Project Emissions	PE_y	9159.3	
3.1	Project Emissions from Physical Leakage	$PE_{PL,y}$	9159.3	*tCO2e/yr*

	Fraction of manure handled in system "i" in year "y"	$\%MS_{i,y}$	80%	%
3.2	Emissions from flaring/combustion of the biogas in year "y" (tCOe)	$PE_{flare,y}$	0	tCO2e/yr
	Flareing efficiency in year "y"	$\eta_{flare,y}$	90%	%
3.3	Project Emissions from Electricity Consumption	PE	0	tCO2e
	Auxiliary Electricity Consumption in year y	EC_y	0	MWh
	Emission factors of Central China Power Grid	EF_{grid}	0.9735	tCO2e/MWh
4	Emission Reductions	ER_y	64146.46	tCO2e
	Emission Reductions from Methane Elimination	ER_{CH4}	54552.6185	tCO2e
	Emission Reductions from replacing power generation of Power Grid	ER_{EL}	9593.8425	tCO2e

B.6.4 Summary of the ex-ante estimation of emission reductions:

>>

Year	Estimation of project emissions (tCO2e)	Baseline emissions (tCO2e)	Estimation of leakage (tCO2e)	Estimation of overall emission reductions (t CO2e)
2009	9,159	73,306	0	64,146
2010	9,159	73,306	0	64,146
2011	9,159	73,306	0	64,146
2012	9,159	73,306	0	64,146
2013	9,159	73,306	0	64,146
2014	9,159	73,306	0	64,146
2015	9,159	73,306	0	64,146
2016	9,159	73,306	0	64,146
2017	9,159	73,306	0	64,146
2018	9,159	73,306	0	64,146
Total (tonnes of CO2e)	**91,590**	**733,060**	**0**	**641,460**

B.7 Application of a monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

Data / Parameter:	$Volume_{CH4}$
Data unit:	m^3

Description:	Volume of biogas recovered in year "y"
Source of data to be used:	Monitored with a flow meter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	The calculations of Emission Reductions are not based on the Volume of biogas in Section B.5. Not needed
Description of measurement methods and procedures to be applied:	Volume of biogas will be continuously monitored with a flow meter and reported cumulatively on weekly basis. Temperature and pressure of biogas will be monitored simultaneously to calculate biogas flow in normal conditions (1 ATM, 0°C)
QA/QC procedures to be applied:	Flow meter will be operated following relevant manual and calibrated by qualified entity.
Any comment:	

Data / Parameter:	***[CH4]***
Data unit:	%
Description:	CH4 content in biogas (volume concentration)
Source of data to be used:	Measured and recorded with a portable gas analyzer on daily basis
Value of data applied for the purpose of calculating expected emission reductions in section B.5	The calculations of Emission Reductions are not based on the volume concentration of CH4 in section B.5.
Description of measurement methods and procedures to be applied:	Project participants will install a gas analyzer to measure CH4 content of biogas. CH4 concentration will be monitored and recorded every hour in a day.
QA/QC procedures to be applied:	The monitor will be operated and calibrated in compliance manufacture's instruction.
Any comment:	-

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Net power generation of the project in year "y"
Source of data to be used:	Measured with electricity meters
Value of data applied for the purpose of calculating expected emission reductions in section B.5	9,855 MWh/year
Description of measurement methods and procedures to be applied:	Electricity generated and consumed by the project will be continuously monitored by electricity meters. Once a month, readings from meters will be recorded. The difference between power generation and consumption is the net power generation.

QA/QC procedures to be applied:	Electricity meters are certificated by Central China Power Grid. Meters will be calibrated by the grid annually.
Any comment:	-

Data / Parameter:	$N_{da,y}$
Data unit:	day
Description:	Number of days animal is alive in the farm in the year *"y"* (numbers)
Source of data to be used:	Farm records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	155
Description of measurement methods and procedures to be applied:	The typical number of days is alive in the farm is 155 days. Project participants will record the date each swine is born and the date each swine is sold. The body weight of the adult pigs for sale controlled by the swine farm is about 100kg. The number of days that animal is alive in the farm is the natural result of the controlled body weight of the pigs for sale, affected by the market quotation.
QA/QC procedures to be applied:	
Any comment:	As per the methodology, besides the Emission Reductions calculated according to the actual methane recovered, the project participants should also provide the ex-post number ($N_{LT,y}$), fraction of manure handled in baseline animal manure management system "j" ($MS\%_{i,y}$) and the ex-post monitoring of Volatile Solids for livestock "LT" entering the animal manure management system in year "y" ($VS_{LT,y}$) for the ex-post calculation. The smaller one of the ex-post estimated value and the actual measured Emission Reductions will be taken as the Certified Emission Reductions.

Data / Parameter:	$N_{p,y}$
Data unit:	number
Description:	Number of animals produced annually of type *"LT"* for the year *"y"* (numbers)
Source of data to be used:	Farm records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	240,000/yr
Description of measurement methods and procedures to be applied:	Farm owners will record how many swine are produced in a project year. The designed capacity of the farm is 240,000 per year.
QA/QC procedures to be applied:	-
Any comment:	As per the methodology, besides the Emission Reductions calculated according to the actual methane recovered, the project participants should also provide the

	ex-post number ($N_{LT,y}$), fraction of manure handled in baseline animal manure management system "j" ($MS\%_{i,y}$) and the ex-post monitoring of Volatile Solids for livestock "LT" entering the animal manure management system in year "y" ($VS_{LT,y}$) for the ex-post calculation. The smaller one of the ex-post estimated value and the actual measured Emission Reductions will be taken as the Certified Emission Reductions.

Data / Parameter:	W_{site}
Data unit:	kg
Description:	Average animal weight of a defined livestock population at the project site (kg)
Source of data to be used:	Farm records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	70.4 kg
Description of measurement methods and procedures to be applied:	Farm owners will measure weight of swine with mass scale and calculate the average in a project year. According to a log by farm owner, normal average weight of the swine population is 70.4 kg.
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	$VS_{LT,y}$
Data unit:	*kg dm/animal/year*
Description:	Volatile solids for livestock "LT" entering the animal manure management system in year "y" (on a dry matter weight basis, kg dm/animal/year)
Source of data to be used:	Farm records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	275.31 *kg dm/animal/year*
Description of measurement methods and procedures to be applied:	Calculated with default 2006 IPCC value and adjusted with site average weight.
QA/QC procedures to be applied:	-
Any comment:	As per the methodology, besides the Emission Reductions calculated according to the actual methane recovered, the project participants should also provide the ex-post number ($N_{LT,y}$), fraction of manure handled in baseline animal manure management system "j" ($MS\%_{i,y}$) and the ex-post monitoring of Volatile Solids for livestock "LT" entering the animal manure management system in year "y" ($VS_{LT,y}$) for the ex-post calculation. The smaller one of the ex-post estimated

	value and the actual measured Emission Reductions will be taken as the Certified Emission Reductions.

Data / Parameter:	nd_y
Data unit:	day
Description:	Number of days in year *"y"* where the treatment plant was operational.
Source of data to be used:	Farm records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	365 days
Description of measurement methods and procedures to be applied:	Proposed project will be in operation all year long. Plant owners will record each day the AWMS is in operation. Days when the system is shut down will be recorded in operation log.
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	$MS\%_{i,y}$
Data unit:	%
Description:	Fraction of manure handled in system i in project activity
Source of data to be used:	Monitored by plant owner
Value of data applied for the purpose of calculating expected emission reductions in section B.5	In project activity, 80% manure made by the swine farm will be handle by proposed project
Description of measurement methods and procedures to be applied:	According to the information of Beixu Group Ltd., 80% manure from all the swine farms will be treated by the manure management system after the implementation of the project, considering the physical leakage factor.
QA/QC procedures to be applied:	-
Any comment:	As per the methodology, besides the Emission Reductions calculated according to the actual methane recovered, the project participants should also provide the ex-post number ($N_{LT,y}$), fraction of manure handled in baseline animal manure management system "j" ($MS\%_{i,y}$) and the ex-post monitoring of Volatile Solids for livestock "LT" entering the animal manure management system in year "y" ($VS_{LT,y}$) for the ex-post calculation. The smaller one of the ex-post estimated value and the actual measured Emission Reductions will be taken as the Certified Emission Reductions.

B.7.2 Description of the monitoring plan:

>>

1. Monitoring Objectives

As per AMS.III.H, the emission reductions achieved by the project activity will be determined ex-post through direct measurement of the amount of methane fuelled, flared or gainfully used. It is likely that the project activity involves manure treatment steps with higher methane conversion factors (MCF) than the MCF for the manure treatment systems used in the baseline situation, therefore the emission reductions achieved by the project activity is limited to the ex-post calculated baseline emissions minus project emissions using the actual monitored data for the project activity ($N_{LT,y}$, $MS\%_{i,y}$ and in case adjusted values for animal weight are used as defined in paragraph 12: $VS_{LT,y}$). The emission reductions achieved in any year are the lowest value of the following:

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

Where:

$ER_{y,ex\text{-}post}$ Emission reductions achieved by the project activity based on monitored values for year "y" (tCO_2 e)

$BE_{y,ex\text{-}post}$ Baseline emissions calculated using formula 1.2 using ex post monitored values of $N_{LT,y}$ and if applicable $VS_{LT,y}$

$PE_{y,ex\text{-}post}$ Project emissions calculated using formula 2.1 using ex post monitored values of $N_{LT,y}$,$MS\%_{i,y}$ and if applicable $VS_{LT,y}$

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

$PE_{power,y,ex\text{-}post}$ 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)

Hence, project participant shall ensure normal monitoring of following parameters, which will be used for calculation of emission reductions:

- Annual livestock population and weight, which will be used for ex-post calculation of emission reductions with equations in Section B.6.1.
- Biogas flow, which will be used for calculation of actual methane avoidance by proposed project activity, and measuring methane flared in case of emergency or surplus of biogas. Flow meters will undergo maintenance/calibration subject to appropriate industry standards. Recorded hourly and reported cumulatively to the CDM project office on weekly basis.
- Methane fraction of biogas: Methane content will be measured with a portable gas analyser on an hourly basis.
- Temperature and pressure of biogas at the same point with the flow and concentration measurements.
- Electricity generation and electricity imported from the grid for project operation. Electricity generation by the project will be measured continuously with electric meters installed on the power generator. Electricity imported from the grid for project operation will be measured continuously with electric meters installed on the AMWS. The record of this parameter relies on the operator of the AMWS.

2. Monitoring Management

A representative is in charge of overall monitoring and operation of proposed project. He is the authority of project operation, maintenance, monitoring and report. The team will appoint specific mechanical engineer, electric engineer, environmental and safety experts for relevant work of proposed project.

3. Monitors and Installation Positions

Following Figure 4 shows major monitoring equipments and their positions. Number index indicates various positions of monitoring and installation. Letter index indicates various parameters monitored.

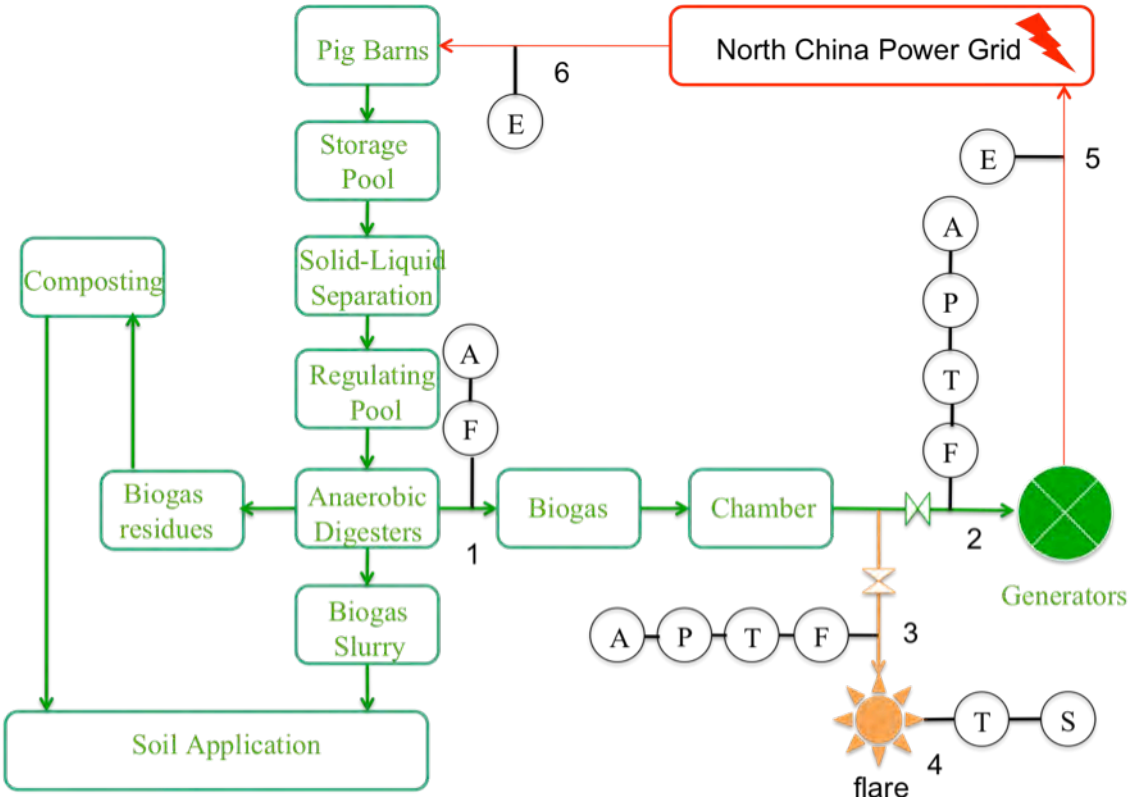


Figure 4 Monitors and their installation positions

Table 6 Installation Positions Index

Number Index	Installation/monitoring Position
1	Biogas pipeline from Anaerobic Digesters.
2	Biogas pipeline from gas chamber and before entrance of power generation system.
3	Biogas pipeline from gas chamber and before entrance of flare system in case of emergency.
4	Flare which starts in case of emergency or surplus of biogas.
5	Electricity meter, which monitors power generation of the project.
6	Electricity meter, which monitors power consumption for operation of the project.

Following table indicates various parameters monitored:

Table 7 Monitored parameters and monitors locations

Index (letters)	Descriptions
F	Flow meter
A	Gas analyser
P	Pressure meter
T	Temperature sensor
S	Status of the flare
E	Electricity meter

4. Quality Assurance and Quality Control

Henan Beixu Group Co., Ltd. is an ISO9001 and ISO14001 certificated company. “Regulation for Normal and Safe Operation of Manure Management and Biogas-to-energy System” will be prepared as guidance. Monitored data will be approved and underwritten by CDM Project Manager before it is accepted and stored. Internal audit will be carried out to check compliance with operational procedures outlined in this monitoring plan. This internal audit will also identify potential possible adjustments for operational procedures to improve monitoring and reporting in future years. If such adjustments are proposed, reports will be made to the DOE. Adjustments will only take into effect after getting approval from the DOE.

5. Data Storage and Filing

Monitoring data will be first recorded on paper by monitoring staff. The date will be migrate into computer on a daily basis. Data in hard copy will be kept in the archives for at least two years after end of the crediting period.

6. Measures to take in case of malfunction in major meters and equipments

Emission reductions are generally calculated based on amount of biogas recovered and power generation. In case of emergency or malfunctions in major meters, following measures will be taken for ER calculation:

- In case of emergency/malfunction in generators, a flare will start working and emission reductions will be calculated on the base of flaring efficiency;
- Ratio between power generation and biogas amount will be used in case of either data (power generation and biogas amount) is not available due to malfunction in meters. Proper conservative approach will be taken.
- Historical data of power generation and emission reductions from biogas recovery will also help for crosscheck in case of malfunction of major meters or even used for emission reductions in a conservative manner.

B.8 Date of completion of the application of the baseline and monitoring methodology and the name of the responsible person(s)/entity(ies)

>>

Name of persons determining the baseline and monitoring methodology:

Mr. Leon Wang, South Pole Carbon Asset Management Ltd.
Technoparkstrasse 1
8005 Zurich, Switzerland
Phone: +41 44 633 78 70
Fax: +41 44 633 14 23
l.wang@southpolecarbon.com

Ms. Jane Duan, South Pole Carbon Asset Management Ltd.
Technoparkstrasse 1
8005 Zurich, Switzerland
Phone: +41 44 633 78 70
Fax: +41 44 633 14 23
j.duan@southpolecarbon.com

Mr. Yong Hanlin, South Pole Carbon Asset Management Ltd.
Technoparkstrasse 1
8005 Zurich, Switzerland
Phone: +41 44 633 78 70
Fax: +41 44 633 14 23
h.yong@southpolecarbon.com

Mr. Marco Hirsbrunner, South Pole Carbon Asset Management Ltd.
Technoparkstrasse 1
8005 Zurich, Switzerland
Phone: +41 44 633 78 70
Fax: +41 44 633 14 23
m.hirsbrunner@southpolecarbon.com

Mr. Patrick Bürgi, South Pole Carbon Asset Management Ltd.
Technoparkstrasse 1
8005 Zurich, Switzerland
Phone: +41 44 633 78 70
Fax: +41 44 633 14 23
p.burgi@southpolecarbon.com

Please refer to Annex 1 for detailed contact information.
Date of completion of baseline study and monitoring plan: 3rd June 2008
South Pole Carbon Asset Management Ltd. is a project participant listed in Annex 1.

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>>
04/01/2008

C.1.2. Expected operational lifetime of the project activity:

>>
15 years 0 months

C.2 Choice of the crediting period and related information:

C.2.1. Renewable crediting period

C.2.1.1. Starting date of the first crediting period:

>>
N/A

C.2.1.2. Length of the first crediting period:

>>
N/A

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
01/01/2009 or the day of registration, which ever comes later.

C.2.2.2. Length:

>>
Ten years 0 months

SECTION D. Environmental impacts

>>

D.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

>>

In compliance with Chinese Environment Protection Law and other relevant environmental laws and regulations, the Environmental Impact Assessment Form has been prepared in June 2007, which has been approved by the Luohe EPA on 17th July 2007. The main assessment conclusions are provided below:

Air Pollution: Other than the products from combustion of biogas (which mainly contains carbon dioxide), there are no hazardous, toxic or noxious substances released by the Project to the atmosphere. The release of carbon dioxide is however a vast improvement in comparison with the current situation since significant amounts of methane gas (a greenhouse gas 21 times more harmful than carbon dioxide) is released through a series of lagoons. Meanwhile, the project activity will minimize the release of odors related to swine manure management, because organic matter is stabilized inside a closed reactor. This has a major positive environmental impact and is one of the key reasons why the current Project is implemented.

Wastewater Impacts: In project activity, only the terminal drainage needs to be treated. Wastewater from the Project will be utilized as irrigation water, since there is only low content of organic and chemical matter in the terminal drainage, which does not have potential risk of groundwater and river contamination.

Noise: The major noise sources are the operating equipments, pumps and generators. In this project, low-noise pumps are adopted and outdoor noise would not exceed 65dB; muffler will be installed on the generator, noise would not exceed 85dB, all are in compliance with Standard of noise at boundary of industrial enterprises (GB 12348-90).

Solid Waste: Filthy mud discharged by project activity could be dried and subsequently utilized as fertilizer; few waste solids in swine manure and big pieces of stones, which are useless, could be separated by precipitation and then transported to specific sites.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

>>

Environmental impacts are considered to be insignificant. Enough consideration has been given to possible impacts on the environment of the Project. The project participants have an environment friendly plan for the implementation of the Project.

SECTION E. Stakeholders' comments

>>

E.1. Brief description how comments by local stakeholders have been invited and compiled:

>>

In concern of the interests of the local stakeholders, the project owner collected opinions from them in various occasions and forms.

Initial Stakeholder Consultation for CDM

The initial stakeholder consultation was started on 7th Mar. 2008. South Pole Carbon Asset Management Co., Ltd. invited international stakeholders through emails. Recipients of invitation included Gold Standard, local supporters of Gold Standard, Greenpeace and WWF in China. Meanwhile, plant owner invited local policy makers, journalists from local media, and local residents near plant site, future power consumers, and representatives of plant staff. Public hearing was held on 19th Mar. 2008, introduction of the project was made and comments were collected.

Internet Stakeholder Consultation

Simultaneously, the invitation together with all documents were uploaded to the website of South Pole Carbon Asset Management Ltd, at address of:
http://www.southpolecarbon.com/goldstandard_consultations.htm

Telephone and E-mail Consultation

Besides the documents uploaded to the Internet, the consulted individuals and organizations could also comment or inquiry for more details of the project via phone or e-mail.
South Pole Carbon Asset Management Ltd. (+86 10 8454 9953) email: l.wang@southpolecarbon.com.
Henan Beixu Group, Ltd.'s contact: Mr. Hu Donghai 13903958766

E.2. Summary of the comments received:

>>

Hearing of the initial stakeholder consultation for the project applying for a CDM project was conducted on 19th Mar. 2008. 15 pieces of questionnaires were collected and no negative comments and opinions were found from them.
Mr. Xu is a resident in Beixiu Village. He said that Beixu Village used to be a poor place. It is Mr. Xu Dequan, the "class monitor" of Beixu Village, who led the farmers out of poverty. Xu initiated food-handling workshops in Beixu Village and united the village into Beiu Group. Now he supported the biogas project very much. He expected to see the village roads being lighted up by power generated with the project.
Another swine farmer said that conventional way of lagoon handling of manure needs a lot of lands. Furthermore, lagoons in summer produce throngs of mosquitoes. Local residents used to complain a lot. Treated wastewater from the manure management system can be used for irrigation directly. He welcomed the project.
Mr. Yang from Luohe Daily said that the "Rural Construction" plan in Henan Province needed for budget of more than RMB 50 billions in 2008. By funding the project by Beixu Group itself, the project will contribute in the "Rural Construction" plan without increasing financial burden of the government. Government officers inquired about the installation capacity and expected the project can generate as much power as possible.

E.3. Report on how due account was taken of any comments received:

>>

No negative comment was received via the public hearing, Internet, email or telephone. The project will be implemented following the original design and plan.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Host Participant

Organization:	Henan Beixu Group Ltd.
Street/P.O.Box:	Beixu Village
Building:	-
City:	Li Ying County, Luohe City
State/Region:	Henan Province
Postfix/ZIP:	462600
Country:	P. R. China
Telephone:	+86 13903958766
FAX:	+86 0395 8166053
E-Mail:	beixujt@163.com
URL:	www.beixujt.cn
Represented by:	Mr. Hu Donghai
Title:	Vice Chief
Salutation:	Mr.
Last Name:	Hu
Middle Name:	-
First Name:	Donghai
Department:	-
Mobile:	+86 13903958766
Direct FAX:	+86 0395 8166053
Direct tel:	+86 0395 8166053
Personal E-Mail:	beixujt@163.com

CERs Buyer

Organization:	South Pole Carbon Asset Management Ltd.
Street/P.O.Box:	Technoparkstr. 1
Building:	/
City:	Zurich
State/Region:	Zurich
Postfix/ZIP:	8005
Country:	Switzerland
Telephone:	+41 44 633 78 70
FAX:	+41 44 633 14 23
E-Mail:	info@southpolecarbon.com
URL:	www.southpolecarbon.com
Represented by:	Renat Heuberger
Title:	/
Salutation:	Mr.
Last Name:	Heuberger
Middle Name:	/
First Name:	Renat
Department:	/
Mobile:	/
Direct FAX:	+41 44 633 14 23
Direct tel:	+41 44 633 78 70
Personal E-Mail:	r.heuberger@southpolecarbon.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding involved in proposed project activity.

Annex 3

BASELINE INFORMATION

1. Calculation of EF_{OM}

Calculation of the Operating Margin emission factor of CCPG in 2006

Table1 CO_2 emission of CCPG in 2006[1]

Type of fuel	unit	F	NCV (MJ/t, kJ/m^3)	CEF (tC/TJ)	OXID (%)	$C_{C\text{-}CO2}$	COEF (tCO_2/t, $kgCO_2/m^3$)	F×COEF (tCO_2)
Raw coal	10^4ton	20127.82	20,908	25.8	100	3.667	1.978	398,107,508
Cleaned refined coal	10^4ton	5.79	26,344	25.8	100	3.667	2.492	144,295
Other cleaned coal	10^4ton	196.43	8,363	25.8	100	3.667	0.791	1,554,036
Brown Coal Briquette	10^4ton	0.01	20,908	26.6	100	3.667	2.039	204
Coke	10^4ton	17.55	28,435	29.2	100	3.667	2.690	534,299
Coke oven gas	10^8m^3	6.22	16,726	12.1	100	3.667	0.742	461,572
Other coal gas	10^8m^3	22.71	5,227	12.1	100	3.667	0.232	526,655
Crude oil	10^4ton	0.49	41,816	20	100	3.667	3.067	15,026
Gasoline	10^4ton	0.01	43,070	18.9	100	3.667	2.985	298
Diesel	10^4ton	7.29	42,652	20.2	100	3.667	3.159	230,298
Fuel oil	10^4ton	7.94	41,816	21.1	100	3.667	3.235	256,872
Liquified petroleum gas	10^4ton	0	50,179	17.2	100	3.667	3.165	0
Refinery Off -gas	10^4ton	10.93	46,055	15.7	100	3.667	3.074	289,780
Natural gas	10^8m^3	19.07	38,931	15.3	100	3.667	2.184	4,164,943
Other petroleum products	10^4ton	0	38,369	20	100	3.667	2.814	0
Other coke products	10^4ton	0.01	28,435	25.8	100	3.667	2.690	269
Other sources of energy	10^4ton standard coal	134	0	0	100	3.667	0	0
Total ∑F×COEF:								406,286,055

Table 2 Composition of the supplied onto-grid thermal power in CCPG in 2006[2]

Name of provinces	Quantity of year electricity generation (10^8kWh)	Quantity of year electricity generation (MWh)	Rate of power plant's self electricity consumption（%）	Quantity of year electricity supply （MWh）
Jiangxi Province	344.49	34449000	6.17	32,323,497
Henan Province	1512.35	151235000	7.06	140,557,809
Hubei Province	548.41	54841000	2.75	53,332,873
Hunan Province	464.08	46408000	4.95	44,110,804
Chongqing Municipality	234.87	23487000	8.45	21,502,349
Sichuan Province	441.93	44193000	4.51	42,199,896
Total ∑GEN				334,027,226

[1] China Energy Statistic Yearbook 2007
[2] China Electric Power Yearbook 2007

Calculation involving the net electricity imported from the Northwest China Power Grid
$EF_{OM, 2006}$= (∑F×COEF)/∑GEN=1.212784 (tCO_2/MWh)

Calculation of the Operating Margin emission factor of CCPG in 2005

Table3 CO_2 emission of CCPG in 2005[1]

Type of fuel	unit	F	NCV (MJ/t, kJ/m^3)	CEF (tC/TJ)	OXID (%)	C_{C-CO2}	COEF (tCO_2/t, $kgCO_2/m^3$)	F×COEF (tCO_2)
Raw coal	10^4ton	17827.75	20,908	25.8	100	3.667	1.978	352,614,496.76
Cleaned refined coal	10^4ton	0.02	26,344	25.8	100	3.667	2.492	498.43
Other cleaned coal	10^4ton	228.11	8,363	25.8	100	3.667	0.791	1,804,669.00
Coke	10^4ton	130.95	28,435	29.2	100	3.667	3.044	3,986,695
Coke oven gas	10^8m^3	1.51	16,726	12.1	100	3.667	0.742	112,053.61
Other coal gas	10^8m^3	13.32	5,227	12.1	100	3.667	0.232	308,896.88
Crude oil	10^4ton	1.18	41,816	20	100	3.667	3.067	36,184.78
Gasoline	10^4ton	0.04	43,070	18.9	100	3.667	2.985	1,193.90
Diesel	10^4ton	9.49	42,652	20.2	100	3.667	3.159	299,797.78
Fuel oil	10^4ton	8.87	41,816	21.1	100	3.667	3.235	286,959.09
Liquified petroleum gas	10^4ton	0	50,179	17.2	100	3.667	3.165	0.00
Refinery Off -gas	10^4ton	6.66	46,055	15.7	100	3.667	2.651	176,572
Natural gas	10^8m^3	3	38,931	15.3	100	3.667	2.184	655,208.73
Other petroleum products	10^4ton	0	38,369	20	100	3.667	2.814	0.00
Other coke products	10^4ton	1.5	28,435	25.8	100	3.667	2.690	40,349.27
Other sources of energy	10^4ton standard coal	37.42	0	0	100	3.667	0	0.00
Total ∑F×COEF:								360,323,575

Table 4 Composition of the supplied onto-grid thermal power in CCPG in 2005[2]

Name of provinces	Quantity of year electricity generation (10^8kWh)	Quantity of year electricity generation (MWh)	Rate of power plant's self electricity consumption（%）	Quantity of year electricity supply （MWh)
Jiangxi Province	300	30000000	6.48	28,056,000
Henan Province	1315.9	131590000	7.32	121,957,612
Hubei Province	477	47700000	2.51	46,502,730
Hunan Province	399	39900000	5	37,905,000
Chongqing Municipality	175.84	17584000	8.05	16,168,488
Sichuan Province	372.02	37202000	4.27	35,613,475
Total ∑GEN				286,203,305

$EF_{OM, 2005}$= (∑F×COEF)/∑GEN=1.25898 (tCO_2/MWh)

[1] China Energy Statistic Yearbook 2006
[2] China Electric Power Yearbook 2006

Calculation of the Operating Margin emission factor of CCPG in 2004

Tables 3 CO_2 emission of CCPG in 2004[1]

Type of fuel	unit	F	NCV (MJ/t, kJ/m^3)	CEF (tC/TJ)	OXID (%)	C_{C-CO2}	COEF (tCO_2/t, $kgCO_2/m^3$)	F×COEF (tCO_2)
Raw coal	10^4ton	17144.1	20,908	25.8	100	3.667	1.939	339,092,605.29
Cleaned refined coal	10^4ton	2.34	26,344	25.8	100	3.667	2.443	58,316.13
Other cleaned coal	10^4ton	242.87	8,363	25.8	100	3.667	0.775	1,921,441.23
Coke	10^4ton	109.61	28,435	29.2	100	3.667	3.044	3,337,011
Coke oven gas	10^8m^3	2.02	16,726	12.1	100	3.667	0.793	149,899.53
Other coal gas	10^8m^3	2.61	5,227	12.1	100	3.667	0.248	60,527.09
Crude oil	10^4ton	1.08	41,816	20	100	3.667	3.036	33,118.27
Gasoline	10^4ton	0.07	43,070	18.9	100	3.667	2.955	2,089.33
Diesel	10^4ton	8.44	42,652	20.2	100	3.667	3.128	266,627.32
Fuel oil	10^4ton	14.37	41,816	21.1	100	3.667	3.203	464,893.14
Liquefied petroleum gas	10^4ton	0	50,179	17.2	100	3.667	3.149	0.00
Refinery Off -gas	10^4ton	5.79	46,055	15.7	100	3.667	2.651	153,506
Natural gas	10^8m^3	2.27	38,931	15.3	100	3.667	2.173	495,774.61
Other petroleum products	10^4ton	0	38,369	20	100	3.667	2.786	0.00
Other coke products	10^4ton	0	28,435	25.8	100	3.667	2.636	0.00
Other sources of energy	10^4ton standard coal	53.07	0	0	100	3.667	0	0.00
Total ∑F×COEF:								346,035,810

Table 4 Composition of the supplied onto-grid thermal power in CCPG in 2004[2]

Name of provinces	Quantity of year electricity generation (10^8kWh)	Quantity of year electricity generation (MWh)	Rate of power plant's self electricity consumption（%）	Quantity of year electricity supply （MWh）
Jiangxi Province	301.27	30,127,000	7.04	28,006,059.2
Henan Province	1,093.52	109,352,000	8.19	100,396,071
Hubei Province	430.34	43,034,000	6.58	40,202,362.8
Hunan Province	371.86	37,186,000	7.47	34,408,205.8
Chongqing Municipality	165.2	16,520,000	11.06	14,692,888
Sichuan Province	346.27	34,627,000	9.41	31,368,599
Total ∑GEN				249,074,186

$EF_{OM,\ 2004}$= (∑F×COEF)/∑GEN=1.38929 (tCO_2/MWh)

Calculation of Weighted Average EF_{OM}

EF_{OM} =(∑F×$COEF_{2006}$ + ∑F×$COEF_{2005}$ +∑F×$COEF_{2004}$)/ (∑GEN_{2006} +∑GEN_{2005} +∑GEN_{2004})

=1.27834 tCO_2/MWh

[1] China Energy Statistic Yearbook 2005

[2] China Electric Power Yearbook 2005

2. Calculation of EF_{BM}

The generic term "thermal power" represents three generation technologies: coal-fired, oil-fired and gas-fired generation sets. However, in the present energy statistics, it is not able to separate the new capacity additions of thermal power plants into that representing the three technologies respectively. So the following calculation measures are taken to calculate the emission factor of the commercially available best practice technology of thermal power plant $EF_{t,b}$:

First, according to the energy statistics of the most recent year, determine the ratios of CO_2 emissions produced by solid, liquid, and gas fuel consumption for power generation and them as the ratios of the new capacity additions; then use the commercially available best practice technology in terms of efficiency as the respective emission factors; and finally calculate the $EF_{t,b}$ as a weighted average value.

Table 7 Ratio of CO_2 emissions produced by combusting different types of fuels in CCPG in 2006[1]

Type of fuel	Unit	F	COEF (tCO_2/t, $kgCO_2/m^3$)	F×COEF (tCO_2)	Type of fuels	Quantity of CO_2 emission (tCO_2)	Percentages of CO_2 emission (%)
Raw coal	10^4ton	20127.82	1.978	398,107,508	solid	400,340,342	98.54
Cleaned refined coal	10^4ton	5.79	2.492	144,295			
Other cleaned coal	10^4ton	196.43	0.791	1,554,036			
Brown Coal Briquette	10^4ton	0.01	2.039	204			
Coke	10^4ton	17.55	2.690	534,299			
Crude oil	10^4ton	0.49	3.067	15,026	liquid	502,763	0.12
Gasoline	10^4ton	0.01	2.985	298			
Kerosene	10^4ton	0	0	0			
Diesel	10^4ton	7.29	3.159	230,298			
Fuel oil	10^4ton	7.94	3.235	256,872			
Other petroleum products	10^4ton	0	2.814	0			
Other coke products	10^4ton	0.01	2.690	269			
Natural gas	10^8m^3	190.7	2.184	4,164,943	gas	5,442,950	1.34
Coke oven gas	10^8m^3	62.2	0.742	461,572			
Other coal gas	10^8m^3	227.1	0.232	526,655			
Liquefied petroleum gas	10^4ton	0	3.165	0			
Refinery Off -gas	10^4ton	10.93	3.074	289,780			
Total:				406,286,055		406,286,055	100

The coal-fired power plant with a total installed capacity of 600 MW is assumed to be the commercially available best practice technology in terms of efficiency. The estimated coal consumption of such a National Sub-critical Power Station with a capacity of 600 MW is 329.94 gce/kWh, which corresponds to a coal consumption efficiency of 37.28% for electricity generation[2].

For gas and oil power plants, the 200 MW power plant with a specific fuel consumption of 252 gce/kWh, which corresponds to an efficiency of 48.81% for electricity generation, is selected as commercially available best practice technology in terms of efficiency.

[1] China Energy Statistic Yearbook 2007

[2] China Power Grid Baseline Emission Factors, Annex II: China Power Grid Baseline Emission BM Calculation Process http://cdm.ccchina.gov.cn/web/index.asp

Table 8 Emission factors of different types of thermal power plants with commercially available best practice

	CEFi(tC/TJ)	*ηi, b(%)*	*EFj, b(tCO_2 /MWh)*
Coal-fired power plant	*25.8*	*37.28*	*0.9135*
Oil-fired power plant	*21.1*	*48.81*	*0.5706*
Gas-fired power plant	*15.3*	*48.81*	*0.4138*

The CO_2 emission factor of thermal power plant with commercially available best practice is calculated as a weighted average value:
$EF_{t,b}$ =0.9064 (tCO_2 /MWh)

Table 9 The power plant capacity additions in CCPG 2004-2006

	installed capacity in 2004 (MW)	*Installed capacity in 2005 (MW)*	*Installed capacity in 2006 (MW)*	*installed capacity additions 2006-2004(MW)*	*Fraction (%)*
Thermal power	*53825.7*	*60167.2*	*76658*	*22832.3*	*73.77*
Hydropower	*34642*	*38405.2*	*42719*	*8077*	*26.10*
Nuclear-power	*0*	*0*	*0*	*0*	*0.00*
Wind-power	*0*	*24*	*41*	*41*	*0.13*
Total	*88467.7*	*98596.4*	*119418*	*30950.3*	*100.00*

$EF_{BM}=CAP_{Thermal,y}/CAP_{Total,y}\times EF_{t,b}$= 73.77%×0.9064=0.66865 (tCO_2 /MWh)

3. Calculation of EF_{CM}
$EF_{CM}= (EF_{OM} +EF_{BM})/2$ = 0.9735(tCO_2 /MWh)

Annex 4

MONITORING INFORMATION

Please refer to relative information in section B7.2.

Annex 5

GOLD STANDARD INFORMATION

See next page.

Beixu Group Methane to Energy Project

Additional PDD Annex as required for Gold Standard validation

GS Annex Version 1.0, July 17th 2008
Contact person: Jane Duan, South Pole Carbon Asset Management Ltd., j.duan@southpolecarbon.com, +41 44 633 78 76

Introductory Notes
This document contains the PDD Annex to validate the Beixu Group Methane to Energy Project against the Gold Standard. Gold Standard validation shall be carried out in parallel with regular CDM validation.

The project activity comprises the installation of anaerobic digestion based manure treatment system with methane recovery equipments at Beixu Group Co., Ltd., Linying County, Henan Province. Methane collected will be used for electricity generation with internal combustion engines and generators, displacing power generation from fossil fuels based Central China Power Grid. The project activity implies a series of sustainable development aspects including environmental and social benefits.

By replacing anaerobic lagoons with anaerobic digestion and methane recovery systems, the project activity will eliminate bad odour, occupy less land and improve the water quality, thus making a great contribution to the environmental improvement. The treated wastewater from the manure management system can be used for irrigation directly. The effluent and slurry are good organic fertilizers, so demand of inorganic fertilizers will be decreased and pollutions from those fertilizer plants will also be reduced indirectly. By replacing power generation from fossil fuels based Central China Power Grid with renewable source of biogas, the proposed project will improve the living conditions of the farmers by lighting up the village roads. The project also generates direct jobs during the operation and construction of the project. By funding the project by Beixu Group itself, the project will contribute in the "Rural Construction" plan without increasing financial burden of the government.

Project Type Eligibility Screen

GS Manual for CDM Project Developers: **Section 3.2**

The project activity falls under category "A.1. Renewable Energy (Electricity, Heat)", sub-category "A.1.1.2. Biogas", "A.1.1.2.2 Agro-processing and other residues", which applies to methane recovery in agricultural and agro industrial activities, as specified in Appendix A of the Gold Standard Manual for CDM Project Developers.

The project activity fulfils the eligibility requirements of the Gold Standard for biogas projects as follows:

- Biomass resources used for the project are carbon neutral since the organic content of the manure is derived from the swine farm of Beixu Group. The organic content in the wastewater is the residue from the anaerobic treatment processes.
- There are no competing uses for the biomass resources used in the project.
- No genetically modified biomass is used
- No emission reduction credits derived from carbon sequestration due to changes in land use patterns are taken into account
- Only ecologically sound biomass from the category "agro-processing and other residues" is used
- The project uses the recovered biogas for electricity generation with internal combustion engines and generators, which will replace power generation from fossil fuels based Central China Power Grid with renewable source of biogas.

Gold Standard Additionality Screen

Previously announced projects screen

GS Manual for CDM Project Developers: **Section 3.3.1**

There has been no public announcement of the project going ahead without the CDM, prior to any payment being made for the implementation of the project.

Prior to the implementation of the project activity, the project developer has taken CDM funds into account at its feasibility study stage. Please refer to the brief history of the project for detail. Project participants have all supporting documents ready to be shown to DOE for validation.

Brief History of Project

UNFCCC Additionality Tool Version 05 (EB 39)

GS Manual for CDM Project Developers: **Section 3.3.2**
Tool for the demonstration and assessment of additionality (Version 4) was used.

Step 1: Identification of alternatives to the project activity consistent with current laws and regulations
Sub-step 1a. Define alternatives to the project activity:
Following alternative scenarios have been identified as realistic and credible alternatives that are available either to the project participants or to other potential project developers for managing the manure and for access to electricity power. These alternative scenarios include:

Alternatives for manure management

	Alternatives Description	Justification of Project Situations	Credible? Yes/No
M1	Aanaerobic Digester-	This is the proposed project activity not undertaken as a CDM	Y

	Aerobic Treatment manure treatment method with methane recovery and utilization.	project activity	
M2	Direct discharge without treatment	This scenario represents the common practice in large-scale confined animal farms in China. According to "Discharge standard of pollutants for livestock and poultry breeding"(GB18596-2001) and "Technical standard of preventing pollution for livestock and poultry breeding"(HJ/T 81-2001), direct discharge without any treatment is not legal practice. Thus this alternative should be excluded.	N
M3	Pasture/Range/Paddock	The swine in Beixu is farmed in confined barns rather than pasture/range/paddock.	N
M4	Daily spread	Manure in Beixu has low solid content; swine waste in this project is liquid due to the fact that the farms are using washing and flushing system for manure cleaning. A huge storage system would also be required. Therefore, this alternative is not realistic.	N
M5	Dry lot	This is not compatible with Beixu's flushing system. Furthermore, it would be highly labor intensive.	N
M5	Liquid/Slurry	Considering that the amount of discharged manure is quite huge, storing the liquid manure in the tank to distribute them to the farmland will require a lot of labor input.	N
M6	Uncovered anaerobic lagoon	This is current situation of Beixu. The "Discharge standard of pollutants for livestock and poultry breeding (GB18596)" requires the livestock farms to meet wastewater discharge standards before discharging the wastewater into the natural water resources. Beixu had built anaerobic lagoons for wastewater treatment to meet this regulation. There is no regulation regarding restrictions on GHG emissions in China.	Y
M7	Pit Storage below animal confinements	Beixu is a large-scale livestock farm and the manure quantity produced is too large to implement pit storage structure under the barns.	N
M8	Burned for fuel	Beixu is a large-scale swine farm, the manure is flushed to the anaerobic digester, the dung and urine generated from the farm is too large even on a daily basis, so it is unlikely to dry the dung before using as fuel.	N
M9	Deep bedding	Practically not feasible. The concentration of nocuous gas in the bedding is high enough to poison pigs if it is disposed inappropriately, and it is favorable for the survival and breeding of vermin and microorganisms due to its high temperature and humidity.	N
M10	Composting	Composting systems are not adapted to manure possessing large volume of water, or moisture contents. The swine manure in Beixu is collected using flushing system, so it has large volumes of water.	N
M11	Aerobic treatment	Manure and wastewater from Beixu contains a lot of organic matter; aerobic treatment itself is not efficient enough to handle this kind of manure. Hence M11 is not feasible.	N

Alternatives for Power Generation

ID	Alternatives	Justification/Explanation	Plausible/N

			ot
P1	Proposed project activity not undertaken as a CDM project activity;	The proposed project activity not undertaken as a CDM project is not against any laws or regulations of China. According to the *Feasibility Study Report*, the project activity is technically feasible (although poses poor economical factors). Hence, P1 is a plausible alternative.	Y
P2	On-site or off-site existing/new fossil fuel based existing captive or identified plant	There is no existing fossil fuel based captive plant or identified plant that can directly provide electricity to plant owner; According to Chinese regulations, coal-fired power plants with capacity less than 135MW are prohibited for construction in the areas covered by the large grids such as provincial grids, and the fossil fuel power units with less than 100MW is strictly regulated for installation[1]. Considering that the capacity of the proposed project activity is only 12 MW, a new fossil fuel based captive plant with equivalent amount of capacity is now allowed in China. As a conclusion, P2 is not plausible.	N
P3	On-site or off-site existing/new renewable energy based existing captive or identified plant	There is no renewable energy resource available at the site of the proposed project other than biogas recovered from project activity. P3 is not plausible.	N
P4	Sourced Grid-connected power plants	This is current situation and common practice of access to electricity at site of the project. The grid is Central China Power Grid. P6 is plausible.	Y

Based on analysis above, the plausible baseline alternatives are:
M1: This is the proposed project activity not undertaken as a CDM project activity
M6: Uncovered anaerobic lagoon, which is also current situation of the project
P1: Proposed project activity not undertaken as a CDM project activity
P4: Power is supplied from Central China Power Grid

Plausible Combinations of Baseline Options

	Manure Management	Power Generation	Short Description
B1	M1	P1	Proposed project activity not undertaken as a CDM project activity, which is manure is managed with anaerobic-aerobic process while biogas recovered is used for electricity generation.
B2	M6	P4	Current situation of manure management with anaerobic lagoon while electricity is supplied from Central China Power Grid.

From the above analysis it can be conclude that scenario B1 (combination of M1 and P1), say the project activity not undertaken as a CDM project, and scenario B2 (combination of M6 and P4), say "current situation of manure management with anaerobic lagoon" and "electricity is supplied by Central China Power Grid", are the realistic and credible alternatives.

Sub-step 1b. Consistency with mandatory laws and regulations:

[1] This regulation has been valid since 2002, the notification is available on the Internet: http://www.gov.cn/gongbao/content/2002/content_61480.htm.

Scenario B1, the proposed project activity undertaken without registered as a CDM project is in compliance with mandatory legislation and regulations. The plant owner has performed EIA and FSR for the proposed project.
Scenario B2, current operation of the plant is in compliance with mandatory legislation and regulations applicable in Henan Province and China. Beixu has valid business license and tax registrations for operation of the plant; the company performed EIA and FSR prior to construction of farms; the emission of the farm is in line with relevant environmental regulations.
All relevant documents and evidence are available to be shown to DOE by time of validation.

Outcome of Step 1b
Alternative scenarios B1 and B2 both are in compliance with mandatory legislation and regulations applicable in Henan Province and China. Neither of them is against any EB decisions on national and/or sectoral policies and regulations.

Step 2. Investment analysis
Sub-step 2a. Determine appropriate analysis method
The "Tool for the Demonstration and Assessment of Additionality" provides three investment analysis methods for selection, which are simple cost analysis (Option I), investment comparison analysis (Option II) and benchmark analysis (Option III).
Besides the revenue from the CDM, the project activity does generate financial and economic benefits through electricity generation. Therefore Option I "simple cost analysis" is not appropriate. Currently the plant owner does not have any investment options other than the proposed project activity, hence Option II "investment comparison analysis" is not preferable; the PDD here applies Option III "benchmark analysis" to perform the investment analysis and demonstrate that the proposed project activity is not likely to be the most financially attractive option.

Sub-step 2b – Option III. Apply benchmark analysis
The proposed project uses project IRR as the financial indicator. The official IRR benchmarks are publicly available. According to *"The Economic Assessment Method and Parameters for Construction Projects (version 03)*[1]", the project benchmark IRR is 9% for agriculture in China.

Sub-step 2c. Calculation and comparison of financial indicators:
The key figures and project IRR with and without revenue from CERs are listed in the following Tables 5. Without CERs revenue, the project IRR of the proposed project is only 6.7%, lower than the benchmark IRR. While considering CERs revenue, the IRR of the proposed project is 19%, higher than the benchmark.

Table 5 Key Financial Figures and Projet IRR with/without CERs Revenue

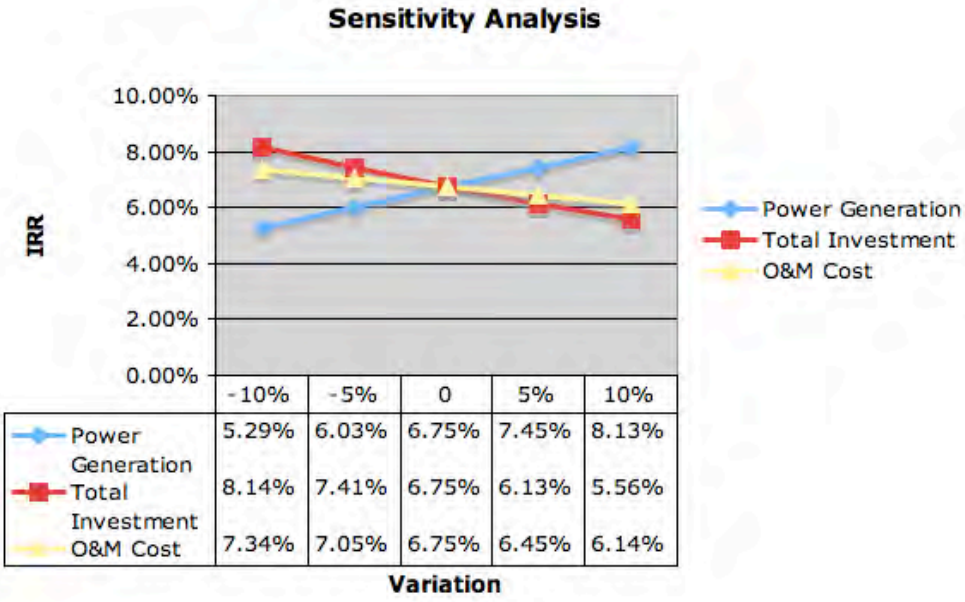
Parameter	Unit	Value	Source
Total Investment	10,000 RMB	2,200	FSR
Annual Operation Cost	10,000 RMB	160	FSR
Installation Capacity	MW	1.25	FSR
Annual Net Power Supply	MWh	9,855	FSR
Electricity Teriff	RMB/ kWh	0.5	FSR
Annual CERs	tonnes/ Yr	64,146	Estimation
CERs Price	EUR/ tonne	9.1	Equipment purchase agreement
Project Lifetime	Yr	15	FSR
IRR without CERs Revenue	%	6.7%	/
IRR with CERs Revenue	%	19%	/

Sub-step 2d. Sensitivity analysis:

[1] Issued by the National Development and Reform Commission and the Ministry of Construction, published by China Planning Publishing House.

Purpose of sensitivity analysis is to show whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions. The variables chosen for sensitivity analysis are cost of operation and maintenance (O&M), total investment and sales from electricity, for which the variation is basically from fluctuation in power generation.
Variations in IRR driven from fluctuation of O&M cost, total investment and sales of electricity are summarized in Figure 3 as following:

Fig.3 Sensitivity Analysis



	-10%	-5%	0	5%	10%
Power Generation	5.29%	6.03%	6.75%	7.45%	8.13%
Total Investment	8.14%	7.41%	6.75%	6.13%	5.56%
O&M Cost	7.34%	7.05%	6.75%	6.45%	6.14%

The analysis shows that the IRR is more sensitive to the net electricity supply and total investment, while it is less elastic to O&M cost. The IRR is maintained to be less than the benchmark of 9% while the three parameters fluctuate in the range of -10% to +10%.

Step 4. Common practice analysis
Agriculture in China is quite less developed. Farming activities in China normally are carried out in unit of individual farmer families due to the large rural population, which results in little average farm landowning. There is hardly any regulation regarding manure management and methane emissions. Utilization of methane from agricultural activities is still at its initial stage. Being one the major farm provinces, Henan is one of the few provinces that have united large-scale farms, which is feasible of methane recovery and utilization for power generation.

Sub-step 4a. Analyze other activities similar to the proposed project activity
This section provides an analysis of any other activities implemented previously or currently underway that are similar to the proposed project activity. As per *Tool for the demonstration and assessment of additionality (Version 04)*, projects are considered similar if they are in the same country/region and/or rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc. Other CDM project activities are not to be included in this analysis.

As a conclusion from investigation, there are three similar projects identified in China. These three projects are all applying for CDM projects. Hence, proposed project is not of common practice.

Sub-step 4b. Discuss any similar options that are occurring
N/A

Conclusion of Additionality Analysis
The proposed project activity is additional due to its poor IRR without considering CDM revenue, which is lower than the benchmark of 9%. Without CDM, plant owner would have to treat swine manure with existing anaerobic lagoon.

ODA Additionality Screen

GS Manual for CDM Project Developers: **Section 3.3.3**

Project financing for this project activity will not use any public funding nor Official Development Assistance (ODA) Funds as defined in the Gold Standard Manual for Project Developers. There are no loans or grants being provided by International Finance Institutions, which include ODA.

Conservative Approach

GS Manual for CDM Project Developers: **Section 3.3.4**

The baseline scenario selection and the calculation of green house gas emission reductions have been carried out in a conservative manner:

- Project proponents have used approved methodologies by CDM Executive Board (AMS.III.D – Methane recovery in animal manure management systems, Version 14, and AMS.I.D – Grid connected renewable electricity generation, Version 13) in order to determine the baseline scenario and calculate emission reductions.
- Likely baseline scenarios have been developed and assessed using guidance provided by the methodology AMS.III.D and the "Tool for the demonstration and assessment of additionality". A set of quantified scenarios has been described and the most conservative baseline scenario has been selected.
- Calculations have been done in a transparent manner providing full documentation and references to data sources to the DOE.

Please refer to the PDD Sections B.3, B.4, B.5 and B.6 for more details on project boundary definition, baseline scenario selection and emission reductions calculation.

Sustainable Development

Sustainable Development Assessment

GS Manual for CDM Project Developers: **Section 3.4.1**

The matrix below is based on a comparison of the project activity versus an anaerobic lagoon as baseline scenario. Results from the initial stakeholder consultation have been considered when defining the scores for the indicators below.

Component • Indicators	**Score** (-2 to +2)	**Rational**
Local / Regional / Global Environment		
• Water quality and quantity	+2	Implementation of the proposed project includes replacing original anaerobic lagoon with modern manure processing system, in which COD will be greatly reduced. Hence discharged water from the new system is in much better quality in comparison with baseline practice.

• Air quality (emissions other than GHG)	+1	Bad odour will be eliminated in the project scenario.
• Other pollutants (including, where relevant, toxicity, radioactivity, POPs, stratospheric ozone layer depleting gases)	0	No significant change comparing with baseline.
• Soil condition (quality and quantity)	+2	Soil pollution from current manure system will be prevented. Solid and liquid emissions from the project activity will be used as organic fertilizer. Soil quality will be improved.
• Biodiversity (species and habitat conservation)	0	As compared to the baseline, no significant change in biodiversity is expected since the project only takes place within the farm boundary.
Sub Total	**+5**	
Social Sustainability and Development		
• Employment (including job quality, fulfilment of labour standards)	+2	The project leads to employment generation in the power plant itself and in the implementation as a GS CDM project. These jobs do have a significant impact on job quality, mainly because it is the first time the advanced concept of *clean development* and *recycling economy* is introduced to local farmers involved.
• Livelihood of the poor (including poverty alleviation, distributional equity, and access to essential services)	+1	The project will generate additional income to farmers involved.
• Access to energy services	+1	The project activity adds renewable capacity to grid and helps improving electricity availability.
• Human and institutional capacity (including empowerment, education, involvement, gender)	+1	People involved are trained with skills for operation of the power generation facility and knowledge of Kyoto Protocol. This is the first time local farmers are organised to work on a project under the Kyoto Protocol.
Sub Total	**+5**	
Economic and Technological Development		
• Employment (numbers)	+2	The project activity generates employment opportunities during the project's construction and operation period.
• Balance of payments (sustainability)	0	No significant impact since the project does not involve technology imports.
• Technological self reliance (including project replicability, hard currency liability, institutional capacity, technology transfer)	+1	The project showcases an innovative way of manure management and use biogas from manure system for power generation in swine farms of China.
Sub Total	**+3**	
Total	**+13**	

As can be seen from the matrix above the project activity shows a very positive performance in all sustainable development components. The project activity fulfils all Gold Standard criteria since none of the indicators above have a score of -2, there is no negative sub-total, and the total score is positive.

EIA requirements

GS Manual for CDM Project Developers: **Section 3.4.2**

EIA Gold Standard Requirements according to section 3.4.2 in the Gold Standard Manual apply to the project activity as follows:

1. Host country legislation or the EB EIA requirements
   According to *Law of Environmental Impacts Assessment* of China (put into effect since October 1st 2003), three levels of environment assessment are required based on type and scale of a construction project: EIA report, EIA form and EIA registration. The proposed project in such scale does not need to do EIA in form of EIA Report. The project owner prepared EIA Reporting Form instead, in compliance with the law. The Environmental Impact Assessment Form has been prepared in June 2007, which has been approved by the Luohe EPA (Environment Protection Agency) on 17th July 2007. The main conclusions of the EIA are summarized in Section D of the PDD.

2. Gold Standard Initial Stakeholder Consultation
   The Gold Standard Initial Stakeholder Consultation was held at meeting office of Beixu Group Ltd. on 19th March 2008 and 11 January 2006 respectively. The results of the Gold Standard Initial Stakeholders Consultation did not show any significant environmental and/or social impact (see Initial Stakeholder Consultation report below).

3. None of the indicators in the Sustainable Development Assessment Matrix scores -1.

A description of environmental impacts of the project activity is featured under Section D in the PDD and will be validated by the DOE throughout the regular CDM validation process.

Public consultation procedures

GS Manual for CDM Project Developers: **Section 3.4.3**

Initial Stakeholder Consultation

The initial stakeholder consultation was held at meeting office of Beixu Group Ltd., on 19th March 2008. The meeting was attended by local policy makers, journalists from local media, local residents near plant site, future power consumers, and representatives of plant staff. In addition to the local meetings, Gold Standard supporting organizations in China have been invited by email.

The overall response to the project, from all invited stakeholders, was encouraging and positive. The project participants do not need to take further actions other than those addressed in EIA. No major concerns were raised during the entire initial stakeholder consultation process, which was not necessary to make any changes to the Project Design.

In all, no adverse reaction/comments/clarifications have been sought/received during the Initial Stakeholder Consultation process.

A detailed report on the Initial Stakeholder Consultation is available in **Attachment 1** to this document.

Gold Standard Monitoring Criteria

GS Manual for CDM Project Developers: **Section 3.5.1**

According to the Gold Standard Manual for CDM Project Developers, Gold Standard monitoring requirements in addition to regular CDM monitoring procedures are defined based on the outcomes of the stakeholder consultation meeting and the Sustainable Development Assessment conducted above. The Sustainable Development Assessment Matrix shows that there are no indicators, which would be critical for a positive contribution of the project to Sustainable Development or that are particularly sensitive. Further, the initial stakeholder consultation has not demonstrated any concerns, which would require special monitoring.

Therefore, no additional Gold Standard specific monitoring criteria have been added to the regular CDM monitoring plan.

Attachment 1 - Initial Stakeholder Consultation Report

Beixu Group Methane to Energy Project
Linying, Henan, China

INITIAL STAKEHOLDER CONSULTATION REPORT

Procedure followed to invite stakeholder comments

A. Oral hearing for local stakeholders:

Invitation procedure
The Gold Standard Initial Stakeholder Consultation has been conducted by Henan Beixu Group, Ltd. (the project owner) and South Pole Carbon Asset Management Ltd. (Switzerland-based company responsible for CDM project development).

Stakeholder groups as defined in the Gold Standard procedures have been identified and informed through oral and written means about the meetings.

Place and date of the meetings
The initial stakeholder consultation was held at meeting office of Beixu Group Ltd. on 19th March 2008.

Meeting Participants
The above mentioned meetings were attended by community representatives from the following stakeholder categories:

1. Local policy makers
2. Journalists from local media
3. Local residents near plant site
4. Future power consumers
5. Representatives of plant staff

Following persons have attended the meetings:

PARTICIPANTS	ORGANISATION / FIRM	FUNCTION	CONTACT
Mr. Gui Songtao	Beixu Group	-	13569673797
Mr. Wang Xinmin	Beixu Village	Resident	13839598695
Mr. Gui Fushun	Beixu Group	-	13783096139
Mr. Xu Fulong	Beixu Village	Swine Farmer	13623959702
Mr. Beixu Qingfeng	Beixu Village	Swine Farmer	13783050906
Mr. Xu Wende	Beixu Village	Resident	13461592158
Mr. Yang Zhiyou	Luohe Daily	Journalist	13939527000
Mr. Ivan Huang	South Pole	Project Manager	13678973137
Mr. Leon Wang	South Pole	Project Manager	13911091230
Mr. Wang Linwei	Linying DRC	Officer	13938038657
Mr. Zhao Zhimin	Linying EPA	Officer	13903958070
Mr. Zhao Xinfa	Linying Agriculture Bureau	Officer	13938023825
Mr. Zhang Zhiqiang	Linying Agriculture Bureau	Officer	13939582585
Mr. Hu Donghai	Beixu Group	Director	13903958766

Language
Documentation prepared and meeting held in Mandarin (Chinese official language)

Meetings procedure

- Getting Seated and Free Talk (15 min)
- Introduction of Henan Beixu Group, Ltd and South Pole Carbon Asset Management Ltd. (15 min)
- Purpose of the consultation (5 min)
- Description of the project (15 min)
- Completing checklists (40 min)
- Description of the non-technical Environmental Impact Assessment of the project (15 min)
- Answering of questions and inviting for comments (60 min)
- Completing checklists, answering related questions and inviting for comments (30 min)
- General feedback and closing (20 min)

Meeting protocols
On completion of the various meetings, the following documentation was collected:

1. Presence list with name, organization and occupation/position (attested by the signatures of the stakeholders that were present)
2. Filled out Appendix E of Gold Standard (checklist) (attested by the signatures of the stakeholders that were present)
3. Chinese (local language) version of non-technical project description, including the Gold Standard SD Matrix (attested by the signatures of the stakeholders that were present)
4. Chinese (local language) version of non-technical description of EIA of the proposed project (attested by the signatures of the stakeholders that were present)
5. Photographs of the meeting

These documents are available as hardcopies and will be handed over to the Designated Operational Entity (DOE) conducting the Gold Standard validation process.

B. Email consultation for Gold Standard supporting organizations in China:

Invitation procedure
South Pole Carbon sent invitations via email on 7th March 2008, to Gold Standard supporting organizations in China, with a copy to the Gold Standard.

Period of email consultation
19th March 2008 to 19th April 2008.

Consulted individuals
The recipients' list of the email invitation is summarized in the following table:

Organization Invited	Email address
Gold Standard	info@cdmgoldstandard.org
WWF	liam@wwfthai.org
WWF	mark.kenber@btopenworld.com
Greenpeace China	greenpeace.china@hk.greenpeace.org

GEI, local GS supporter	spchen@geichina.org
Gold Standard	denise@cdmgoldstandard.org

Simultaneously, the invitation together with all documents were uploaded to the website of South Pole Carbon Asset Management Ltd, at address of:
http://www.southpolecarbon.com/goldstandard_consultations.htm

Besides the documents uploaded to the Internet, the consulted individuals and organizations could also inquiry for more details of the project via phone (+86 10 8454 9953) or email: l.wang@southpolecarbon.com. Henan Beixu Group, Ltd.'s contact: Mr. Hu Donghai 13903958766

Compilation of comments received

A. Oral hearing for local stakeholders:

15 pieces of questionnaires were sent out and collected during the meeting. The questionnaires are all prepared in compliance with Appendix E of Gold Standard CER Manual. The questions all have been translated into Chinese. From questionnaires collected in the meeting, no negative rating was found.

Mr. Xu is a resident in Beixiu Village. He said that Beixu Village used to be a poor place. It is Mr. Xu Dequan, the "class monitor" of Beixu Village, who led the farmers out of poverty. Xu initiated food handling workshops in Beixu Village and united the village into Beiu Group. Now he supported the biogas project very much. He expected to see the village roads being lighted up by power generated with the project.

A swine farmer said that conventional way of lagoon handling of manure needs a lot of lands. Furthermore, lagoons in summer produce throngs of mosquitoes. Local residents used to complain a lot. Treated wastewater from the manure management system can be used for irrigation directly. He said that the project owner promised to charge only RMB 0.3 per kWh, less than half of the price from grid. He welcomed the project.

Mr Yang from Luohe Daily said that the "Rural Construction" plan in Henan Province needs for budget of more than RMB 50 billions in 2008. By funding the project by Beixu Group itself, the project will contribute in the "Rural Construction" plan without increasing financial burden of the government.

Government officers inquired about the installation capacity and expected the project can generate as much power as possible.

To sum up the sustainability of the project, the various benefits (as reported by local stakeholders) are listed below.

1. Eliminate bad odor by recovering the biogas, which greatly improves the living environment of the local residents.
2. Improve the living conditions of the farmers by lighting up the village roads.
3. Use of biogas represents a sustainable way for generating energy.
4. The treated wastewater from the manure management system can be used for irrigation, which will improve the water quality of the local environment.
5. Contribute to the "Rural Construction" plan without increasing financial burden of the government.

In all, no adverse reaction/comments/clarifications have been sought/received during the oral hearing. The participants of the meetings have not raised any significant concerns related to potential impacts of the Project.

B. Email consultation for Gold Standard supporting organizations in China:

No comments were received.

Changes to Project design based on comments received

As no major concerns were raised during the entire initial stakeholder consultation process, it was not necessary to make any changes to the Project Design.