CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

CONTENTS

SECTION A. General description of project activity

A.1. Title of the project activity:

Jiangsu Sanpu 50MW Biomass Cogeneration Project

Version 1

dd/mm/yyyy (completed) (**currently incomplete*)

A.2. Description of the project activity:

The proposed Jiangsu Sanpu 50MW Biomass Cogeneration Project (hereafter called as the Project) is located in Sanpu Town, Tongshan County, Jiangsu Province, P.R.China. The project will utilize surplus straws which will be supplied by farmers from local area around 50kms in radius. The implementation of the proposed project will realize biomass comprehensive utilization and provide clean energy.

The project will install three 130t/h biomass boilers, two 25MW steam turbines and two 30MW generators. The total installed capacity is 50MW. It is estimated that the project will deliver 358GWh of electricity to East China Power Grid per year, which consume nearly 420,000tons/year of straws.

The pre-project situation is that the electricity is produced within the East China Power Grid and the straw is dumped or left to decay in uncontrolled manner. Although the project is planning to supply heat to local factories, the baseline scenario of heat supply is “district heating” in which heat is supplied from coal-fired cogeneration plant. In this case, heat supply is unable to be counted as emission reduction. For detailed explanation about baseline scenario, please see B.4.

Thus, when the proposed project is put into operation, it will produce and claim GHG emission reductions from:

- Displacement of electricity that would otherwise be produced to supply the coal dominated power generation of East China Power Grid.
- Avoidance of CH_4 emissions because the straw would otherwise be dumped or left to decay in an uncontrolled manner in the absence of the proposed project.

The estimated annual GHG emission reductions are 274,584tCO_2e.

The project will contribute to the sustainable development in the region from the following aspects:

- By using straw as fuels for power generation, saving the amount of coal use and making straws utilization in high efficiency, which will assist China in stimulating and accelerating the commercialization of grid-connected renewable energy technologies and markets in China.
- The project will provide additional income for farmers who sell straws to the project and also to those who treat, store and transport straw pellets for the project.
- The project will improve livelihood of local people by creating employment opportunities.
- The project will reduce GHG emissions compared to a business-as-usual scenario.

In a word, the proposed project will contribute to the sustainable development in the region by reducing pollution, creating employment opportunities, providing additional income to farmer, and improving the livelihoods of local people.

A.3. Project participants:

Table 1: Project participants

Name of Party involved ((host) indicates a Host Party)	Private and/or pubic 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)	Xuzhou Yifeng Sanpu Environmental Heat and Power Co,Ltd	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

People's Republic of China

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

Jiangsu Province

A.4.1.3. City/Town/Community etc.:

Tongshan County, Sanpu zhen

A.4.1.4. Details of physical location, including information allowing the unique identification of this project activity (maximum one page):

The project site is located in Sanpu Town, Tongshan County, Xuzhou City, Jiangsu Province of China. The proposed project site is located about 10km apart from center of Xuzhou city, which is located in North West edge of Jiangsu Province. Please refer to the map shown below for the detailed location;

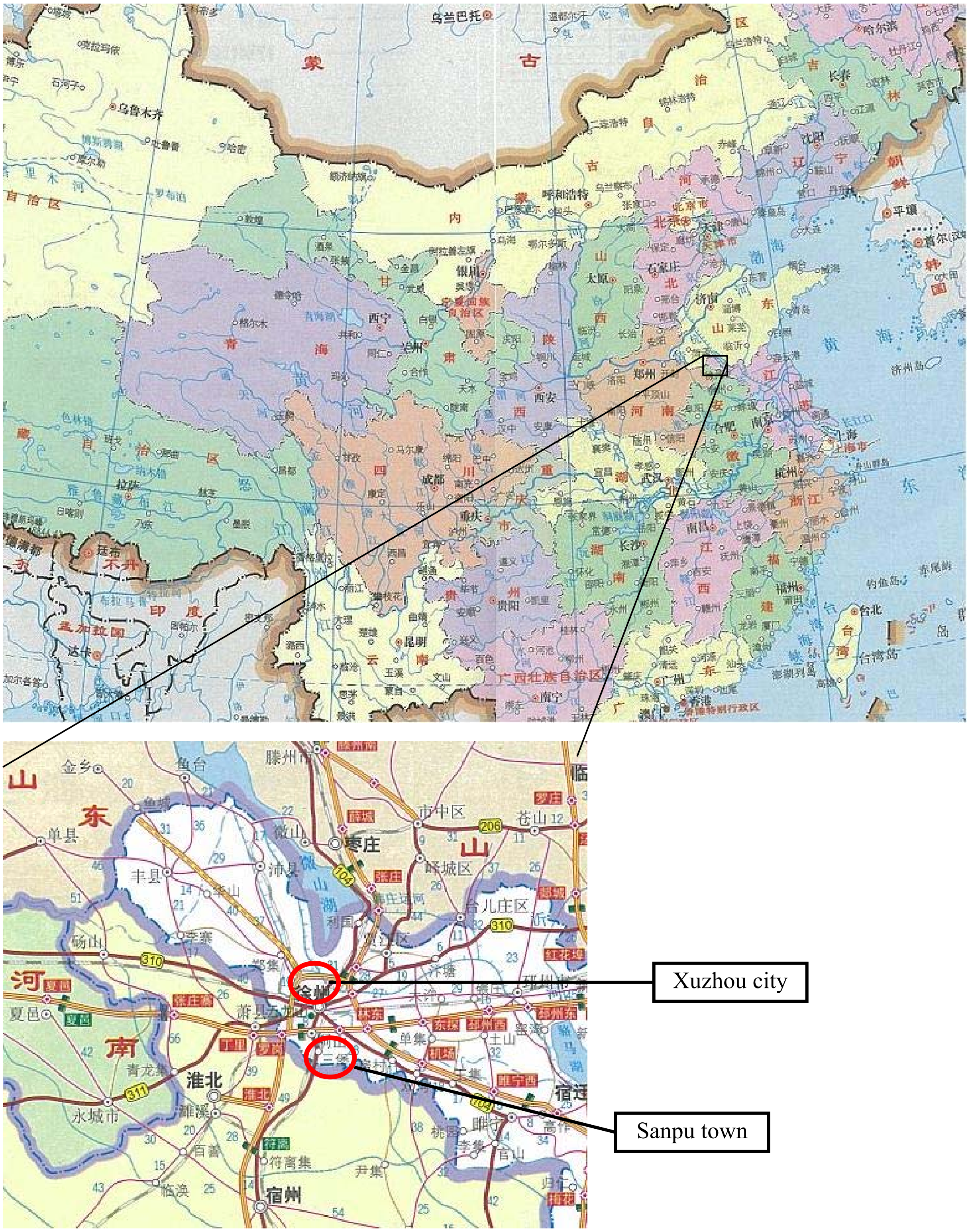

Figure 1: Location of project site

A.4.2. Category (ies) of project activity:

Sectoral scope 1: Energy industries (renewable - / non-renewable sources)

A.4.3. Technology to be employed by the project activity:

The proposed project will install biomass burning boiler of 3 * 130t/h with high temperature and high pressure, 2* 25MW turbine and 2*30MW generator. All equipments are developed by domestic manufacturers. Key technical specifications of boiler, turbine and generator are listed in table 2, table 3 and table 4 respectively.

Table 2 Key Technical specifications of boiler

Parameters	Unit	Value
Type of Boiler	-	Fluidized-bed boiler
Boiler maximum continuous rating	t/h	130
Superheated Steam pressure	MPa	9.81
Superheated Steam temperature	℃	540
Boiler feed-water temperature	℃	215
Boiler efficiency	%	89

Table 3 Key Technical specifications of turbine

Parameters	Unit	Value
Model	-	C25-8.83 / 0.981
Rated Output	MW	25
Rated Rotation Speed	r/min	3000
Steam Inflow Rate	t/h	156
Rated Pressure	MPa	8.83
Steam temperature	℃	535

Table 4 Key Technical specifications of generator

Parameters	Unit	Value
Model	-	QF-30-2
Rated Output	MW	30
Rated Voltage	kV	10.5

Fuel supply system is another important technical system of the project. About 160 pellet production stations will be installed within 50km radius of the project site. The farmers will sell their straws to the nearest stations where straws will be cut and compressed into small piece of pellets. Pellets will be stored at the station for about 3 months before it is transported to the project site.

The project site has large fuel storehouse of 15,000m^3, at which about 80,000tons of pellets can be stored. After pellets are stored at storehouse for about 3 months, they will be transported into biomass boiler for firing by conveyer belt.

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

The project is expected to generate an estimated annual emission reduction of 274,584tCO_2e, and 2,745,840tCO_2e during the 10 years fixed crediting period of the project.

Table 5 Estimated amount of emission reduction over the crediting period

Year	Annual estimation of emission reduction (tCO_2e)
2012	274,584
2013	274,584
2014	274,584
2015	274,584
2016	274,584
2017	274,584
2018	274,584
2019	274,584
2020	274,584
2021	274,584
Total estimated reductions (tCO_2e) during the crediting period	2,745,840
Total number of crediting years	7
Annual average of estimated reductions over the crediting period (tCO_2e)	274,584

A.4.5. Public funding of the project activity:

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

SECTION B. Application of a baseline and monitoring methodology

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

The approved baseline and monitoring methodology applied in the proposed project activity is ACM0006 (Version 09) – "Consolidated methodology for grid-connected electricity generation from biomass residues"

In line with the application of the ACM0006 methodology the project refers to the following tools and methodology:

- Version 02.2 of "Combined tool to identify the baseline scenario and demonstrate additionality."
- Version 1 of "Tool to calculate baseline, project and/or leakage emissions from electricity consumption."
- Version 2 of Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion.
- Version 10 of ACM0002 "Consolidated baseline and monitoring methodology for grid-connected electricity generation from renewable sources."

B.2. Justification of the choice of the methodology and why it is applicable to the project activity:

The approved baseline and monitoring methodology ACM0006 "Consolidated methodology for grid connected electricity generation from biomass residues" is applicable to biomass residue fired electricity generation project activities, including cogeneration plants. The proposed project activity includes the installation of a new power generation plant at a site where currently no power generation occurs. Therefore, it is a "Greenfield power project".

The methodology is applicable under the following conditions:

- No other biomass types than biomass residues, as defined above, are used in the project plant and these biomass residues are the predominant fuel used in the project plant (some fossil fuels may be co-fired);
- For projects that use biomass residues from a production process (e.g. production of sugar or wood panel boards), the implementation of the project shall not result in an increase of the processing capacity of raw input (e.g. sugar, rice, logs, etc.) or in other substantial changes (e.g. product change) in this process;
- The biomass residues used by the project facility should not be stored for more than one year;
- No significant energy quantities, except from transportation or mechanical treatment of the biomass residues, are required to prepare the biomass residues for fuel combustion, i.e. projects that process the biomass residues prior to combustion (e.g. esterification of waste oils) are not eligible under this methodology.

The proposed project meets all above-mentioned applicability conditions of methodology ACM0006 because:

- Predominant fuels used by the proposed project are maize, rice, cotton and wheat straws;
- The straws used by the proposed project are byproducts of agriculture crops, not from a production process;
- The storage time of the straws is not meant to surpass one year. According to the project owner's plan, the stored stalks will be controlled through implementation of the *First-in First-out* regulation, which means that the stalks entered the storage firstly would be preferentially used. Once straws are compressed into pellets at pellet production station, pellets will be stored for maximum 3 months at station. At the project site, pellets will be stored in storehouse for maximum 3 months. Thus the total storage duration will be less than one year;
- Except for mechanical treatment and transportation of straws, the proposed project has no significant consumption of fossil fuels.

Therefore, the approved consolidated baseline methodology, ACM0006 are applicable to the proposed project.

B.3. Description of the sources and gases included in the project boundary:

According to the version 09 of ACM0006, the project boundary encompasses the cogeneration plant at the project site, site where biomass residue would have been left to decay, the means for transportation of biomass to the project site, and all power plants connected physically to East China Power Grid that the proposed project connected to. This in line with the default definition of the boundary given in the baseline methodology ACM002, which is used for determining the emissions associated with grid electricity generation. The proposed project is connected to East China Power Grid (including Shanghai, Zhejiang, Jiangsu, Anhui and Fujian).

According to ACM0006, the GHGs included or excluded from the project boundary are listed as follows:

	Source	Gas	Included?	Justification/Explanation
Baseline	Electricity generation	CO_2	Yes	Main emission source
		CH_4	No	Excluded for simplification. This is conservative.
		N_2O	No	Excluded for simplification. This is conservative.
	Heat generation	CO_2	Yes	Although heat generation is part of the project activity, the project estimates emission reduction from heat supply as ZERO because the baseline scenario of heat supply is "district heat" which should be conservatively counted as zero according to ACM0006.
		CH_4	No	Excluded for simplification. This is conservative.
		N_2O	No	Excluded for simplification. This is conservative.
	Uncontrolled burning or decay of surplus biomass	CO_2	No	It is assumed that CO_2 emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector.
		CH_4	Yes	Important emission source
		N_2O	No	Excluded for simplification. This is conservative.

Project Activity	On-site fossil fuel and electricity consumption due to the project activity (stationary or mobile)	CO_2	Yes	Included as emission sources by project activity
		CH_4	No	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small.
	Off-site transportation of biomass residues	CO_2	Yes	Included as emission sources by project activity
		CH_4	No	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small.
	Combustion of biomass residues for electricity and / or heat generation	CO_2	No	It is assumed that CO_2 emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector.
		CH_4	Yes	CH_4 emission will be caused during the course of power / heat generation.
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small.
	Biomass storage	CO_2	No	It is assumed that CO_2 emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector.
		CH_4	No	Excluded for simplification. Since biomass residues are stored for not longer than one year, this emission source is assumed to be small.
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small.
	Waste water from the treatment of biomass residues	CO_2	No	It is assumed that CO_2 emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector.
		CH_4	No	This emission source is not included as the waste water is not treated under anaerobic conditions.
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small.

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

According to the description in the approved baseline methodology ACM0006, realistic and credible alternatives should be separately determined regarding:

- how power would be generated in the absence of the CDM project activity;
- what would happen to the biomass residues in the absence of the project activity; and
- in case of cogeneration projects: how the heat would be generated in the absence of the project activity

The reasonable and feasible baseline scenarios of the proposed project are identified below for three parts mentioned above.

1. Power generation

ACM0006 provides following 11 scenarios for power generation:

P1: The proposed project activity not undertaken as a CDM project activity;

P2: The continuation of power generation in an existing biomass residue fired power plant at the project site, in the same configuration, without retrofitting and fired with the same type of biomass residues as (co-) fired in the project activity;

P3: The generation of power in an existing captive power plant , using only fossil fuels;

P4: The generation of power in the grid;

P5: The installation of a new biomass residue fired power plant , fired with the same type and with the same annual amount of biomass residues as the project activity, but with a lower efficiency of electricity generation (e.g. an efficiency that is common practice in the relevant industry sector) than the project plant and therefore with a lower power output than in the project case;

P6: The installation of a new biomass residue fired power plant that is fired with the same type but with a higher annual amount of biomass residues as the project activity and that has a lower efficiency of electricity generation (e.g. an efficiency that is common practice in the relevant industry sector) than the project activity. Therefore, the power output is the same as in the project case;

P7: The retrofitting of an existing biomass residue fired power plant, fired with the same type and with the same annual amount of biomass residues as the project activity, but with a lower efficiency of electricity generation (e.g. an efficiency that is common practice in the relevant industry sector) than the project plant and therefore with a lower power output than in the project case;

P8: The retrofitting of an existing biomass residue fired power plant that is fired with the same type but with a higher annual amount of biomass residues as the project activity and that has a lower efficiency of electricity generation (e.g. an efficiency that is common practice in the relevant industry sector) than the project activity;

P9: The installation of a new fossil fuel fired captive power plant at the project site;

P10: The installation of a new single- (using only biomass residues) or co-fired (using a mix of biomass residues and fossil fuels) cogeneration plant with the same rated power capacity as the project activity power plant, but that is fired with a different type and/or quantity of fuels (biomass residues and/or fossil fuels). The annual amount of biomass residue used in the baseline scenario is lower than that used in the project activity;

P11: The generation of power in an existing fossil fuel fired cogeneration plant co-fired with biomass residues, at the project site.

The plausible baseline scenarios among above options are considered to be P1 and P4. However, according to the barrier analysis in the latter part, the proposed project activity not undertaken as a CDM project activity will prevent the implementation of the proposed project activity. Thus, P1 has to be excluded. The generation of power from East China Grid will meet the requirement of national laws and regulations, also financially viable. Hence, the most plausible baseline scenario for power generation is P4.

2. Heat generation
ACM0006 provides following 10 scenarios for heat generation:

H1: The proposed project activity not undertaken as a CDM project activity;
H2: The proposed project activity (installation of a cogeneration power plant), fired with the same type of biomass residues but with a different efficiency of heat generation (e.g. an efficiency that is common practice in the relevant industry sector;
H3: The generation of heat in an existing captive , cogeneration plant, using only fossil fuels;
H4: The generation of heat in boilers using the same type of biomass residues;
H5: The continuation of heat generation in an existing biomass residue fired cogeneration plant at the project site, in the same configuration, without retrofitting and fired with the same type of biomass residues as in the project activity;
H6: The generation of heat in boilers using fossil fuels;
H7: The use of heat from external sources, such as district heat;
H8: Other heat generation technologies (e.g. heat pumps or solar energy);
H9: The installation of a new single- (using only biomass residues) or co-fired (using a mix of biomass residues and fossil fuels) cogeneration plant with the same rated power capacity as the project activity power plant, but that is fired with a different type and/or quantity of fuels (biomass residues and/or fossil fuels). The annual amount of biomass residue used in the baseline scenario is lower than that used in the project activity;
H10: The generation of power in an existing fossil fuel fired cogeneration plant co-fired with biomass residues, at the project site.

H1, H6 and H7 could be considered as plausible baseline scenarios. However, according to the barrier analysis in the latter part, the proposed project activity not undertaken as a CDM project activity (H1) will be prevented from implementation due to the facing of barriers. Local factories which will use heat supplied from the project had been using coal-fired boilers. However, local government recently banned the use of small-scale coal fired boilers and thus H6 is not considered as legal. The local government is promoting installation of cogeneration plant and the district heating by coal-fired cogeneration plant which is common practice around the project area. Therefore H7 is considered to be the most plausible baseline scenario.

3. Use of biomass
ACM0006 provides following 8 scenarios for use of biomass:

B1: The biomass residues are dumped or left to decay under mainly aerobic conditions. This applies, for example, to dumping and decay of biomass residues on fields;
B2: The biomass residues are dumped or left to decay under clearly anaerobic conditions. This applies, or example, to deep landfills with more than 5 meters. This does not apply to biomass residues that are stock-piled2 or left to decay on fields;
B3: The biomass residues are burnt in an uncontrolled manner without utilizing it for energy purposes;
B4: The biomass residues are used for heat and/or electricity generation at the project site;
B5: The biomass residues are used for power generation, including cogeneration, in other existing or new grid-connected power plants;
B6: The biomass residues are used for heat generation in other existing or new boilers at other sites;
B7: The biomass residues are used for other energy purposes, such as the generation of biofuels;
B8: The biomass residues are used for non-energy purposes, e.g. as fertilizer or as feedstock in processes (e.g. in the pulp and paper industry).

Straws are currently left unused in local area and it is expected to continue in absence of the project. Thus B1 is considered to be the most realistic and credible alternative for biomass use.

In conclusion, the scenario 2 is the most realistic baseline scenario.

Scenario	Baseline Scenario		
	Power generation	Heat generation	Use of biomass
2	P4	H7	B1

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 CDM project activity (assessment and demonstration of additionality):

The project uses the "C*ombined tool to identify the baseline scenario and demonstrate additionality* (version 02.2)".

Step 1. Identification of alternative scenarios

Define realistic and credible alternatives to the project activity(s) that can be (part of) the baseline scenario through the following sub-steps:

Sub-step 1a. Define alternative scenarios to the proposed CDM project activity

In the "Identification of the baseline scenario" of ACM0006, realistic and credible alternatives should be separately determined regarding:

- how power would be generated in the absence of the CDM project activity;
- what would happen to the biomass residues in the absence of the project activity; and
- in case of cogeneration projects: how the heat would be generated in the absence of the project activity.

All alternative scenarios for above-mentioned activities are listed in Section B.4.

Outcome of Step 1a: As it is discussed in Section B.4, there are two plausible alternative scenarios:

(1) The proposed project activity not undertaken as a CDM project activity (P1, H1)
(2) Business-as-usual: the supply of equivalent power generation by the East China Power Grid (P4), the use of heat from external sources, such as district heat (H7), and the biomass residues continuing being dumped or left to decay (B1).

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

All alternative scenarios (P1, P4, H1, H7 and B1) are consistent with related laws and regulations in China.

Outcome of Step 1b: All the alternatives identified in Step 1a are in compliance with applicable legal and regulatory requirements.

Step2. Barrier analysis

Sub-step2a. Identify barrier that would prevent the implementation of alternative scenarios:

Establish that there are barriers that would prevent the implementation of the type of proposed project activity if the project activity was not registered as a CDM activity. Such barriers may include:

- Investment barriers;
- Technological barriers;
- Lack of prevailing practice;
- Other barriers

Outcome of Step 2a: Barrier of lack of prevailing practice and other barriers that may prevent alternative scenarios have been listed in this step 2a.

Sub-step 2b. Eliminate alternative scenarios which are prevented by the identified barriers:

It will be demonstrated in Step 3. "Investment analysis" that P1 and H1 has investment barrier.

However, P4, H7 and B1 are not prevented by any barriers.

Step 3. Investment Analysis

The purpose of investment analysis to determine whether the proposed project activity is economically or financially less attractive than other alternatives without the revenue from the sale of certified emission reductions (CERs).The investment analysis is conducted in the following steps:

Sub-step 3a: Determine appropriate analysis method

There are three options for investment analysis:

- The simple cost analysis – not applicable as the project will produce economic benefit (from electricity and heat sale) other than CDM related income;
- The investment comparison analysis – not applicable as one of the baseline alternatives providing the same electricity output by the East China Power Grid, is not a new investment project.
- The benchmark analysis – applicable

To conclude, the benchmark analysis will be used to identify whether the financial indicators of the project is better than relevant benchmark value.

Sub- step3b: Apply benchmark analysis

According to the *Economical assessment and parameters for construction project, 3rd edition*, a project will be financially acceptable when the Internal Return Rate (IRR) is better than the benchmark IRR.
With reference to *Interim Rules on Economic Assessment of Electric Engineering Retrofit Projects*, the financial benchmark Internal Return Rate on total investment of Chinese power industry is 8%, which has been used widely for the power project investments in China.

Based on the above-mentioned benchmark, the calculation and comparative analysis of financial indicators for the proposed project are carried out in sub-step 3c.

Sub-step 3c: Calculation and comparison of financial indicators.

(1) Basic parameters for calculation of financial indicators
Basic parameters of the project are listed in table 6.

Table 6 Basic parameters of the project

Item	Unit	Value
Capacity	MW	50
Annual electricity supply	MWh	358,000
Annual heat supply	t	640,000
Total investment	10,000RMB/year	38,114
Electricity Tariff（incl. VAT）	RMB/kWh	0.636
Heat Tariff (incl. VAT)	RMB/t	138
Biomass Purchasing Price	RMB/t	490
O&M cost	10,000RMB/year	24,475
VAT (Electricity)	%	17
VAT（Heat）	%	13
City and Construction Tax	%	7
Education Tax	%	3
Income Tax	%	25
Expected CER price	€ /tCO_2	9
Project period	Year	15
Crediting Period	Year	10

(2) Comparison of IRR for the proposed project and the financial benchmark

In accordance with benchmark analysis, if the financial indicators of the proposed project, such as the project IRR, are lower than the benchmark, the proposed project is not considered to be financially attractive.

Table 6 shows the project IRR of the proposed project with and without the sales of CERs. Without the sales of CERs the project IRR is 4.51 percent which is lower than the financial benchmark. Thus the proposed project is not considered to be financially attractive.

However, taking into account the CDM revenues, the project IRR is 12.03 percent, which is higher than the financial benchmark. Therefore the CDM revenues enable the project to overcome the investment barrier and demonstrate the additionality of the proposed project.

Table 7 Project IRR of the proposed project

	Project IRR
Without CERs	4.51%
With CERs	12.03%

Sub-step 3d. Sensitivity analysis

The objective of this sub step is to show the conclusion regarding the financial attractiveness is robust to reasonable variation of the critical assumptions.

Four parameters are considered in the following sensitivity analysis:

1) Total investment
2) Biomass fuel cost
3) Electricity Tariff
4) Heat Tariff

The results of sensitivity analysis are shown in Table 8.

Table 8 Sensitivity Analysis of the proposed project (%)

Parameter	-10%	-5%	0%	5%	10%
Total investment	6.09	5.27	4.51	3.81	3.15
Biomass fuel cost	10.41	6.99	4.51	1.79	-3.99
Electricity Tariff	0.61	1.98	4.51	6.85	7.96
Heat Tariff	1.13	2.87	4.51	6.03	7.50

The result shows that project IRR exceed benchmark IRR of 8% when Biomass fuel cost is reduced by 10%.However, considering the biomass fuel price is seeing rapid increase recently, it is hard to expect that the fuel price will decrease by large.

To conclude, the sensitivity analysis shows that without CER revenue, IRR of the project is difficult to reach the benchmark 8%, which supports the conclusion that the proposed project is unlikely to be financially attractive without CER revenue.

Step 4. Common practice analysis

Several projects with similar installed capacity (10-50MW) in Jiangsu Province are summarized as follows:

Table 9 Similar biomass power generation projects in Jiangsu Province

Location	Capacity	Status
Suqian	2×12MW	Registered as CDM project
Jurong	2×12MW	Registered as CDM project
Sheyang	25MW	Registered as CDM project
Donghai	2×12MW	Registered as CDM project
Huaian	2×15MW	Registered as CDM project
Rudong	25MW	Registered as CDM project
Lisen	20MW	Under validation process
Yancheng	30MW	Under validation process

As seen above, all similar biomass power generation projects in Jiangsu Province need support from CDM. And the large-scale grid-connected biomass power generation is by all means a new technology at its early stage of development in China. Therefore, the proposed project activity is not common practice in Jiangsu Province.

In conclusion, the proposed project meets the additionality criteria, and thus is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

According to Section B.4, the baseline scenario applying to the proposed project is shown below:

Table 10 Combination of the baseline scenario for the proposed project

Scenario	Baseline Scenario		
	Power generation	Heat generation	Use of biomass
2	P4	H7	B1

Based on the description of the methodology, the emission reductions by the project activity during a given year y can be calculated as follows:

$$ER_y = ER_{electricity,y} + ER_{heat,y} + BE_{biomass,y} - PE_y - L_y \quad (1)$$

ER_y : Emission reductions of the project activity during the year y (tCO_2/yr)
$ER_{electricity,y}$: Emission reductions due to displacement of electricity during the year y (tCO_2/yr)
$ER_{heat,y}$: Emission reductions due to displacement of heat during the year y (tCO_2/yr)
$BE_{biomass,y}$: Baseline emissions due to natural decay or burning of anthropogenic sources of biomass residues during the year y (tCO_2e/yr)
PE_y : Project emissions during the year y (tCO_2/yr)
L_y : Leakage emissions during year y (tCO_2/yr)

The details of the calculation are elaborated shown below.

Emission reductions due to displacement of electricity ($ER_{electricity,y}$)

Since the capacity of the proposed project plant (50MW) is more than 15MW, the CO_2 emission factor for the electricity displaced can be calculated as a combined margin following the guidance of ACM0002 and the net quantity of electricity generation in the project plant will be adopted.

According to the ACM0002, it is required to estimate the Combined Margin baseline emission factor of the Northeast China Grid based on the "Tool to calculate the emission factor for an electricity system", and the emission reductions due to displacement of electricity can be estimated. The details are shown below.

A. Calculation of Combined Margin baseline emission factor of the East China Power Grid

Step1. Identify the relevant electric power system

According to the Tool to calculate the emission factor for an electricity system (EB 35/Annex 12), if the DNA of the host country has published a delineation of the project electricity system and connected electricity systems, these delineations should be used. Since Chinese DNA has published a delineation of the project electricity system and connected electricity systems[1], these delineations should be applied for the proposed project. According to the delineations, the East China Power Grid is identified as the relevant electric power system of the proposed project, which includes the grids of Shanghai Grid, Jiangsu Grid, Zhejiang Grid, Anhui Grid, and Fujian Grid. Hence, the project belongs to the Jiangsu Grid, which is part of East China Power Grid (ECPG), and the connected electricity system is Yangcheng of Shanxi Grid and Central China Power Grid (CCPG).

Step 2. Select an operating margin (OM) method

The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods:

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

The Simple OM method (a) can only be applied when low operating cost/must run resources[2] constitute less than 50% of total grid generation in average of the five most recent years. According to the data from *China Electric Power Yearbook 2008*, the total electric power generation of the East Power China Grid in

---

1 http://cdm.ccchina.gov.cn/web/NewsInfo.asp?NewsId=1850

2 Low-cost/must-run resources are defined as power plants with low marginal generation costs or power plants that are dispatched independently of the daily or seasonal load of the grid. They typically include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. If coal is obviously used as must-run, it should also be included in this list, i.e. excluded from the set of plants.

2007 is 755.070TWh, in which low cost/must run resources generation is 82.170TWh, accounting for only 10.88%, which is much less than 50% of total amount of power generation. The statistic data from other four years are similar, the generation from low-cost/must run resources are all less than 12% of total generation of the East China Power Grid in last 5 years and this percentage has not changed significantly during that period. Detailed statistic data can be clearly seen from Table 11.Therefore, it is reasonable to select the method (a) to calculate the OM emission factor.

Table 11 Low-cost / must-run generation in East China Power Grid

Year	Total generation (TWh)	Of which low-cost / must run (TWh)	Share
2003	429.127	67.015	10.96%
2004	487.986	47.694	9.77%
2005	572.333	66.670	11.65%
2006	665.470	75.070	11.28%
2007	755.070	82.170	10.88%

The Simple OM can be calculated using either of the two following data vintages for years(s) y:

- 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 emission factor during the crediting period, or

- Ex post option: The year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required calculating the emission factor for year y is usually only available later than six months after the end of year y, alternatively the emission factor of the previous year (y-1) may be used. If the data is usually only available 18 months after the end of year y, the emission factor of the year proceeding the previous year (y-2) may be used. The same data vintage (y, y-1 or y-2) should be used throughout all crediting periods.

Here ex ante option is chosen, and $EF_{grid,OMsimple,y}$ is fixed during the crediting period.

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

According to the tool to calculate the emission factor for an electricity system (Version 01/EB35/Annex12), there are three options to calculating the Simple OM emission factor ($EF_{grid,OMsimple,y}$):

- Based on data on fuel consumption and net electricity generation of each power plant / unit[3] (Option A), or

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

- 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)

Option A and Option B should be preferred and must be used if fuel consumption data or average efficiency and fuel type(s) used are available for each power plant / unit. However, the required data for each power plant / unit is unavailable in China. So option C is applied to calculate the operating margin emission factor.

The formula of $EF_{grid,OMsimple,y}$ calculation is as follows:

$$EF_{grid,OMsimiple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_y} \qquad (2)$$

Where:

$EF_{grid,OMsimple,y}$	:	Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
$FC_{i,y}$	:	Amount of fossil fuel type i consumed in the project electricity system in year y (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)
$EF_{CO2,i,y}$	:	CO_2 emission factor of fossil fuel type i in year y (tCO_2/GJ)
EG_y	:	Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost / must-run power plants / units, in year y (MWh)
i	:	All fossil fuel types combusted in power sources in the project electricity system in year y
y	:	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)

If available, $NCV_{i,y}$ and $EF_{CO2,i,y}$ from the fuel supplier of the power plants in invoices may be used; or, regional or national average default values may be used. In this PDD, $NCV_{i,y}$ of different fuels are obtained from China Energy Statistical Yearbook 2008. With regard to the fuel types where $NCV_{i,y}$ fluctuate in a certain range, the floor values of the fluctuation range are used for conservatism. $EF_{CO2,i,y}$ of fossil fuel comes from 2006 IPCC default values.
The Simple OM Emission Factor ($EF_{grid,OMsimple,y}$) of the proposed project is calculated on the basis of the fuel consumption data for electricity generation of the East China Power Grid, not including those of low-operating cost and must-run power plants, such as wind power, hydropower and nuclear etc. These data are obtained from the China Electric Power Yearbook (2006~2008, published annually) and China Energy Statistical Yearbook (2006~2008). Based on these data, the Simple OM Emission Factor ($EF_{grid,OMsimple,y}$) of the East China Power Grid is calculated as 0.8825 tCO_2e/MWh (see Annex 3 for details).

For the proposed project, the renewable crediting period, i.e. 10 years, is adopted.

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

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

In the East China Power Grid, the information on the five power plants built most recently is not available. According to the EB's guidance on DNV deviation request, the EB accepted the following deviation[4]:

- Use of capacity additions during last 1 - 3 years for estimating the build margin emission factor for grid electricity;
- Use the efficiency level of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy, for each fuel type in estimating the fuel consumption to estimate the build margin (BM).

Step 5. Calculate the build margin emission factor

According to ACM0002, $EF_{grid,BM,y}$ is determined by the formula as follow:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \qquad (3)$$

Where:

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

As stated in step 4, the information on the five power plants built most recently is not available. Therefore, this proposed project uses the alternative method to calculate $EF_{grid,BM,y}$.

ACM0002 allows project participants to choose between two given options for calculating the Build Margin for the project, one is ex-ante calculation, and the other is annual ex-post updating in the first crediting period. For this project the first option is chosen. The Build Margin Emission Factor therefore is based ex-ante on the most recent information available on plants already built at the time of PDD submission. The $EF_{grid,BM,y}$ therefore is fixed for the first crediting period.

[4] http://cdm.unfccc.int/Projects/Deviations

Due to the unavailability of data, some changes have been made and approved by CDM EB. That is to calculate the incremental installed capacity and the mix of power generating techniques first, and then calculate the weight of the incremental installed capacity created by all kinds of power generating techniques and finally calculate emission factors by using the maximized efficiency figures of techniques. Since the figures of the capacity of coal-fired, oil-fired and gas-fired power generation cannot be separated from the statistics of thermal power generation, the following measures will be taken in calculation: first, work out the proportion of CO_2 emission caused by solid, liquid or gas fuels to the total emission based on the available data of energy balance in the recent year; second, taking the proportion as the weight, calculate the emission factor of thermal power generation for each Grid based on the emission factor at the maximized efficiency level of techniques; finally, BM of the grid equals to the emission factor of thermal power generation multiplied the weight of the thermal power installed capacity in the increase of total installed capacity which is close but not exceeding 20% of existing installed capacity.

The calculation steps and formulas are as follows:

Sub-step 5.1 Calculate the proportion of CO_2 emission caused by solid, liquid and gas fuels in the total emission respectively:

$$\lambda_{Coal} = \frac{\sum_{ieCOAL,j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad (4)$$

$$\lambda_{Oil} = \frac{\sum_{ieOIL,j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad (5)$$

$$\lambda_{Gas} = \frac{\sum_{ieGAS,j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad (6)$$

Where :

λ_i	:	Percentage of CO_2 emissions caused by any given type of fuels in total CO_2 emissions
$F_{,i,j,,y}$	:	The amount of fuel i (in a mass or volume unit) consumed by relevant power sources j in year(s) y
$COEF_{i,j,y}$	:	The CO_2 emission coefficient of fuel i (tCO_2e/ mass or volume unit of the fuel), taking into account the carbon content of the fuels (coal, oil and gas) used by relevant power sources j and the percent oxidation of the fuel in year(s) y
COAL, OIL and GAS	:	Set of coal, liquid and gas fuels

Step 5.2 Calculate the emission factor of thermal power generation

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{OIl} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv} \qquad (7)$$

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

Sub-step 5.3 Calculate BM of the grid

$$EF_{BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal} \qquad (8)$$

Where:
$CAP_{Thermal}$: The total amount of incremental installed capacity
CAP_{Total} : The increased installed capacity of thermal power generation

The data on different fuel consumptions for power generation and the net caloric values of the fuels are obtained from the China Energy Statistical Yearbook 2008. With reference to the Notification on Determining Baseline Emission Factor of China's Grid[5], the weighted average fuel consumption for power generation of 30 sets of 600MW sub-critical coal-fired power generators (322.5 gce/kWh equal to Efficiency of 38.10%) and the 200 MW oil/gas based combined cycle power generators (246 gce/kWh equal to Efficiency of 49.99%) are taken as the efficiency level of the best technology commercially available in China.
Referring to the Notification on Determining Baseline Emission Factor of China's Grid, the build margin emission factor ($EF_{grid,BM,y}$) of the East China Power Grid is calculated ex ante as 0.6826 tCO_2e/MWh (see Annex 3 for details).

Step 6. Calculate the combined margin emission factor

Based on the *tool to calculate the emission factor for an electricity system* (Version 02/EB 50/Annex 14) the combined margin emissions factor $EF_{grid,CM,y}$ is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \qquad (9)$$

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

[5] http://www.ccchina.gov.cn/WebSite/CCChina/UpFile/File477.pdf

The combined margin emissions factor $EF_{grid,CM,y}$ should be calculated as the weighted average of the Operating Margin emission factor ($EF_{grid,OM,y}$) and the Build Margin emission factor ($EF_{grid,BM,y}$), where w_{OM} = 0.5 and w_{BM} = 0.5 for wind project (owing to their intermittent and non-dispatchable nature) for the first crediting period.

B. Calculation of baseline emissions (*$ER_{electricity,y}$*)

Therefore, emission reduction due to displacement of grid electricity can be calculated as below:

$$ER_{electricity,y} = EG_y * EF_{electricity,y} \quad (10)$$

Where:

$ER_{electricity,y}$	:	Emission reductions due to displacement of electricity during the year *y* (tCO_2/yr)
EG_y	:	Net quantity of increased electricity generation as a result of the project activity incremental to baseline generation) during the year *y* (MWh)
$EF_{electricity,y}$	:	CO_2 emission factor for the electricity displaced due to the project activity during the year *y* (tCO_2/MWh)

The emission factor for displacement of electricity corresponds to the grid emission factor calculated as a combined margin (CM): $EF_{electricity,y} = EF_{grid,CM,y}$

Emission reductions due to displacement of heat (*$ER_{heat,y}$*)

According to ACM0006, when baseline scenario H7 or H8 was selected for heat generation, baseline emission from heat generation should be assumed conservatively to be zero.

Baseline emissions due to natural decay or burning of anthropogenic sources of biomass residues (*$BE_{biomass,y}$*)

According to ACM0006, for the scenario 2, Baseline emissions due to natural decay or burning of anthropogenic sources of biomass residues ($BE_{biomass,y}$) should be determined consistent with the most plausible baseline scenario for the use of the biomass. In details the $BE_{biomass,y}$ is determined in two steps:

Step 1 Determination of the quantity of biomass residues used as a result of the project activity.

As per methodology ACM0006 (version 09), in case of scenarios 2, the total quantity of biomass residues used in the project plant ($\Sigma BF_{k,y}$) is attributable to the project activity and hence $BF_{PJ,k,y} = BF_{k,y}$.

Step 2 Estimation of methane emissions, consistent with the baseline scenario for the use of biomass residues.

As the baseline scenario for biomass residue use has been identified as B1, then the methane emissions can be calculated by multiplying the quantity of biomass that would not be use in the absence of the project activity with the net calorific value and an appropriate emission factor:

$$BE_{biomass,y} = GWP_{CH4} \times \sum_k BF_{PJ,k,y} \times NCV_k \times EF_{burning,CH4,k,y} \quad (11)$$

Where:

GWP_{CH4} : The Global Warming Potential for methane valid for the relevant commitment period which is equal to 21 in this PDD.

$BF_{PJ,k,y}$: The incremental quantity of biomass residue type k used as fuel in the project plant during the year y in tons.

NCV_k : Net calorific value of the biomass residues type *k* (TJ / tons).

$EF_{burning,CH4,k,y}$: The CH_4 emission factor for uncontrolled burning of the biomass residue type *k* during the year y (tCH_4/TJ)

<u>Project Emissions</u>

As described in ACM0006, the project emissions include:

- CO_2 emissions from transportation of straw pellets to the project site (PET_y);
- CO_2 emissions from on-site consumption of fossil fuels due to the project activity ($PEFF_y$);
- CO_2 emissions from consumption of electricity ($PE_{EC,y}$);
- CH_4 emission from the controlled combustion of biomass residues ($PE_{biomass,CH4,y}$).

Thus the project emission can be calculated as:

$$PEy = PET_y + PEFF_y + PE_{EC,y} + GWP_{CH4} * PE_{biomass,CH4,y} \quad (12)$$

1. CO_2 emissions from transportation of biomass residues (*PETy*)

There are two approaches to determine the CO_2 emissions from transportation of the biomass: an approach based on distance and vehicle type (option 1) or on fuel consumption (option 2).

<u>Option 1</u>: Emissions are calculated on the basis of distance and the number of trips (or the average truck load):

$$PET_y = N_y \times AVD_y \times EF_{km,CO2,y} \quad (13)$$

or

$$PET_y = \frac{\sum_k BF_{T,k,y}}{TL_y} \times AVD_y \times EF_{km,CO2,y} \quad (14)$$

Where:

PET_y : CO_2 emissions during the year y due to transport of the biomass residues to the project plant (tCO_2e/yr)

N_y : Number of truck trips during the year y

AVD_y	:	Average round trip distance (from and to) between the biomass residue fuel supply sites and the site of the project plant during the year y (km)
$EF_{km,CO2,y}$	:	Average CO_2 emission factor for the trucks measured during the year y, IPCC default value (tCO_2/km)
$BF_{T,k,y}$	:	Quantity of biomass residue type k combusted in the project plant during the year y (tons of dry matter or liter)
TL_y	:	Average truck load of the trucks used (ton) during the year *y*. For the proposed project the average truck load will be 5 tons.
K	:	Types of biomass residues used in the project plant and that have been transported to the project plant in year y

Option 2: Emissions are calculated based on the actual quantity of fossil fuels consumed for transportation.

$$PET_y = \sum FC_{TR,i,y} \times NCV_y \times EF_{CO2,FC,y} \qquad (15)$$

Where:

PET_y	:	CO_2 emissions during the year y due to transport of the biomass residues to the project plant (tCO_2e/yr)
$FC_{TR,i,y}$	:	Fuel consumption of fuel type i in trucks for transportation of biomass residues during the year y (mass or volume unit per year)
NCV_i	:	CO_2 emission factor for fossil fuel type i (tCO_2e/GJ)
$EF_{CO2,FF,i}$	:	Average CO_2 emission factor for the trucks measured during the year y, IPCC default value (tCO_2/km)
i	:	Fossil fuel types used for transportation of the biomass residues to the project plant in year y

Equation (14) (option 1) is chosen to calculate PET_y in the project activity.

2. CO_2 emissions from on-site consumption of fossil fuels (*$PEFF_y$*)

As per methodology ACM0006 (version 09), CO_2 emissions from on-site combustion of fossil fuels ($PEFF_y$) should be calculated using the latest approved version of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion". The CO_2 emissions from on-site consumption of fossil fuels are calculated as follows. Since the necessary data is not available for Option A to calculate $COEF_{i,y}$, Option B was selected.

$$PE_{FC,j,y} = \sum_i FC_{i,j,y} \times COEF_{i,y} \qquad (16)$$

Where:

$FC_{i,j,y}$	:	The quantity of fuel type *i* combusted in process *j* during the year *y* (mass or volume unit/yr)
$COEF_{i,y}$	:	CO_2 emission coefficient of fuel type *i* in year *y* (tCO_2/mass or volume unit)
i	:	The fuel types combusted in process *j* during the year *y*, which is diesel for this project

The CO_2 emission coefficient COEFi,y can be calculated following two procedures, depending on the available data on diesel consumed in the project activity, as follows:

Option A: The CO_2 emission coefficient is calculated based on the chemical composition of diesel, using the following approach:

$$COEF_{i,y} = w_{C,diesel,y} \times \rho_{diesel,y} \times 44/12 \quad (17)$$

Where:

$COEF_{i,y}$: the CO_2 emission factor for diesel in year y (tCO_2/GJ)
$w_{C,diesel,y}$: the mass fraction of carbon in diesel in year y (tC / mass unit of diesel)
$\rho_{diesel,y}$: the density of diesel in year y (mass unit / volume unit of diesel)

Option B: The CO_2 emission coefficient is calculated based on net calorific value and CO_2 emission factor of diesel, as follows:

$$COEF_{i,y} = NCV_{i,y,} \times EF_{CO2,i,y} \quad (18)$$

Where:

$COEF_{i,y}$: the CO_2 emission factor for diesel in year y (tCO_2/GJ)
$NCV_{i,y}$: the net calorific value of diesel in year y (GJ/mass or volume unit)
$EF_{CO2,i,y}$: the CO_2 emission factor of diesel in year y (tCO_2/GJ)

Since the necessary data is not available for option A, option B is chosen for the project.

Equation (16) and (18) can be summarized as follows:

$$PE_{FC,j,y} = \sum_i FC_{i,j,y} \times NCV_{i,y,} \times EF_{CO2,i,y} \quad (19)$$

3. CO_2 emissions from electricity consumption (*$PE_{EC,y}$*)

As per methodology ACM0006 (version 09), CO_2 emissions from on-site electricity consumption ($PE_{EC,y}$) should be calculated using the latest approved version of the “Tool to calculate project emissions from electricity consumption”. Since all the electricity consumed by the project activity is purchased from the East China Power Grid, it belongs to case A, as defined in the tool.

$$PE_{EC,y} = \sum_j EC_{PJ,j,y} \times EF_{EL,j,y} \times \left(1 + TDL_{j,y}\right) \quad (20)$$

Where:

$PE_{EC,y}$: CO_2 emissions from on-site electricity consumption attributable to the project activity. (tCO_2e/yr)
$EC_{PJ,j,y}$: On-site electricity consumption attributable to the project activity during the year y (MWh)
$FE_{EL,j,y}$: CO_2 emission factor for grid electricity during the year y (tCO_2/MWh)

$TDL_{j,y}$	:	the average technical transmission and distribution losses in the East China Power Grid in year y for the voltage level at which electricity is obtained from the East China Power Grid at the project site
j	:	Sources of electricity consumption in the project

4. Methane emissions from combustion of biomass residues ($PE_{biomass,CH4,y}$)

Methane emissions from combustion of straws can be calculated as follows:

$$PE_{biomass,CH4,y} = EF_{CH4,BF} \times \sum_k BF_{k,y} \times NCV_k \quad (21)$$

Where:

$EF_{CH4,BF}$	:	CH_4 emission factor for the combustion of biomass residues in the project plant (tCH_4/GJ)
$BF_{,k,y}$	:	Quantity of biomass residue type *k* combusted in the project plant during the year y (tons of dry matter or liter)
NCV_k	:	Net calorific value of the biomass residue type *k* (GJ/ton of dry matter or GJ/liter).

5. Methane emissions from waste water treatment ($PE_{WW,CH4,y}$)

No treatment of waste water originating from the treatment of the biomass residues is involved in the proposed project activity. As a result, the emissions are zero.

Leakage

An important aspect of the leakage issue relates to whether the proposed project displaces current use of biomass as a fuel. If this occurs and drives current users of biomass to resort to more carbon intensive fuels, the amount of such fuel switch must be deducted from the project's emission reduction benefits.

As described before, baseline scenario 2 is applied for the proposed project, therefore project participants shall demonstrate that the use of the biomass residues does not result in increased fossil fuel consumption elsewhere by applying the option 2 (L_2) by the methodology ACM0006 as follows:

L_2: Demonstrate that there is an abundant surplus of the biomass residue in the region of the project activity which is not utilized. For this purpose, demonstrate that the quantity of available biomass residue of type k in the region is at least 25% larger than the quantity of biomass residues of type k that are utilized (e.g. for energy generation or as feedstock), including the project plant.

Survey on available biomass within 20km in radius of the project site was carried out by Sanpu town government and the results[6] are shown in Table 12

[6] "关于宜丰三堡环保热电项目生物质燃料资源的报告 (Biomass Fuel Report for Yifeng Sanpu Environmental Cogeneration Project)"

Table 12 The amount of available biomass within 20km in radius of the project site

Biomass type	Wood	Straw	Total
Available amount (t/y)	50,000	1,500,000	2,000,000

Currently, biomass residues are not utilized by household or industry in this area. The implementation of the project needs a supply of 424,614 tons of the biomass per year, therefore the amount of available biomass is sufficient. It can be proved that the project will not result in increase of fossil fuel consumption and thus the leakage emission is assumed to be zero.

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

Data / Parameter:	GWP_{CH4}
Data unit:	tCO_2e/tCH_4
Description:	Global Warming Potential for CH_4
Source of data used:	IPCC default value
Value applied:	21 for the first commitment period.
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	Shall be updated according to any future COP/MOP decisions.

Data / Parameter:	NCV_i
Data unit:	TJ/tonne
Description:	Net Calorific Value of straw pellet in the proposed project
Source of data used:	Feasibility Study Report
Value applied:	0.0177
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	$EF_{km,CO2,y}$
Data unit:	tCO_2/km
Description:	Average CO_2 emission factor for transportation of biomass with trucks
Source of data used:	IPCC 2006 default value from the Moderate Control index for the US Heavy Duty Diesel Vehicle
Value applied:	0.001011
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	IPCC value from the latest version published will be utilized

Data / Parameter:	Net Calorific Value (NCV) of the diesel
Data unit:	GJ/tonne
Description:	Net Calorific Value (NCV) of diesel combusted in the proposed project
Source of data used:	China Energy Statistical Yearbook 2008
Value applied:	42.652
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	$COEF_i$
Data unit:	tCO_2/ GJ
Description:	CO_2 emission factor for the diesel (tCO_2/ GJ)
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	0.0748
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	$FC_{i,y}$
Data unit:	10^4tons, 10^8m^3
Description:	Amount of fossil fuel type *i* consumed in the project electricity system in year *y*
Source of data used:	China Energy Statistical Yearbook（2006-2008）
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistical data
Any comment:	

Data / Parameter:	$NCV_{i,y}$
Data unit:	MJ/ mass or volume unit of a fuel
Description:	Net calorific value (energy content) of fossil fuel type *i* in year *y*
Source of data used:	China Energy Statistical Yearbook 2008
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Local values
Any comment:	

Data / Parameter:	$EF_{CO2,i}$
Data unit:	kgCO_2/TJ
Description:	CO_2 emission factor
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default value
Any comment:	

Data / Parameter:	CAP *fire-y*
Data unit:	MW
Description:	Installed capacity of fuel-fired power in year y within the East China Power Grid
Source of data used:	China Electric Power Yearbook
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistical data
Any comment:	

Data / Parameter:	CAP_y
Data unit:	MW
Description:	Total installed capacity of various power in year y within the East China Power Grid
Source of data used:	China Electric Power Yearbook
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistical data
Any comment:	

B.6.3. Ex-ante calculation of emission reductions:

The emission reductions by the proposed project are calculated as follows:

$ER_y = ER_{electricity,y} + ER_{heat,y} + BE_{biomass,y} - PE_y - L_y$

Emission reductions due to displacement of electricity ($ER_{electricity,y}$)

The raw data and calculation of OM and BM emission factors of the East China Power Grid are detailed in Annex 3. As shown, the average simple OM in the most recent three years is 0.8825 tCO_2/MWh, and the BM of the base year (2007) is 0.6826tCO_2/MWh.

As per equation (9), the baseline emission factor is calculated as the weighted average of OM and BM emission factors:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}$$

$$= 0.8825 * 0.5 + 0.6826 * 0.5 = 0.78255\ tCO_2/MWh$$

According to the feasibility study report, its net power generation delivered to the East China Power Grid is 358,000MWh/yr. Thus, the emission reductions due to displacement of electricity are calculated as the product of the baseline emission factor (EF_y in tCO_2/MWh) and the electricity supplied by the project activity to the East China Power Grid (EG_y in MWh):

$$ER_{electricity,y} = EG_y \times EF_{electricity,y} = 358{,}000 * 0.78255 = 280{,}153 tCO_2e/yr$$

Emission reductions due to displacement of heat ($ER_{heat,y}$)

Emission reductions due to displacement of heat ($ER_{heat,y}$) is assumed to be zero which is conservative. Therefore, $ER_{heat,y} = 0$ tCO_2e.

Baseline emissions due to natural decay or burning of anthropogenic sources of biomass residues ($BE_{biomass,y}$)

It is recommended in methodology ACM0006 to use 0.0027 tCH4/t of biomass as default value for the product of NCV_k and $EF_{burning,CH4,k,y}$, and the uncertainty can be deemed to be greater than 100%, resulting in a conservativeness factor of 0.73. Thus, in this case an emission factor of 0.001971 tCH_4/t biomass should be used. The quantity of biomass residues consumed by the project activity per year is 424,614 tons. Thus, as per equation (11), the corresponding baseline emissions are:

$$BE_{biomass,y} = GWP_{CH4} \times \sum_k BF_{PJ,k,y} \times NCV_k \times EF_{burning,CH4,k,y}$$

$$= 21 * 424{,}614 * 0.001971$$

$$= 17{,}575 tCO_2e/yr$$

Project emissions

1. CO_2 emissions from combustion of fossil fuels for transportation of straw pellets (PET_y)

It is estimated that the average round trip between the biomass residue supply sites and the project plant is 60 km, the average truck load of the trucks used is 5 tons, the quantity of biomass residue transported per year is approximately 424,614 tons, and the carbon emission factors for large heavy load transportation truck of IPCC default value is 0.001011tCO_2/km, which is selected from the Moderate Control Index for the US Heavy Duty Diesel Vehicles. Therefore, the emissions from biomass transportation are calculated as follows:

$$PET_y = \frac{\sum_k BF_{T,k,y}}{TL_y} \times AVD_y \times EF_{km,CO2,y} = 424{,}614 / 5 * 60 * 0.001011 = 5{,}151 tCO_2e/yr$$

2. CO_2 emissions from on-site consumption of fossil fuels ($PEFF_y$)

Light diesel oil will be used for start-up of boiler, and the amount of consumption is estimated to be 80tons/yr.The GHG emissions from on-site consumption of fossil fuels will be calculated according to "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" as follows. Since the necessary data is not available for Option A to calculate $COEF_{i,y}$, Option B was selected.

The on-site consumption of fossil fuels is from the start-up diesel whose annual consumption is estimated to be 80 tons. The NCV and the emission factor of diesel are 42.652 GJ/t and 0.0748tCO_2/GJ, respectively. As per equation (19), the corresponding emissions will be:

$$PE_{FC,j,y} = \sum_i FC_{i,j,y} \times NCV_{i,y,} \times EF_{CO2,i,y} = 80 * 42.652 * 0.0748 = 255 \text{ tCO}_2\text{e/yr}$$

3. CO_2 emissions from electricity consumption ($PE_{EC,y}$)

The electricity consumption at the pellet production stations is estimated 26kW/h. It is estimated that there will be 160 pellet production stations within the project boundary, and the total electricity consumption is conservatively calculated as 11,981MWh/yr (assuming that each station operate 2,880hours/year). The corresponding emissions are:

$$PE_{EC,y} = \sum_j EC_{PJ,j,y} \times EF_{EL,j,y} \times \left(1 + TDL_{j,y}\right)$$

= 11,981 * 0.78255 * (1+20%)

= 11,251tCO_2/yr

4. Methane emissions from combustion of biomass residues ($PE_{biomass,CH4,y}$)

According to the IPCC default value provided in table 4 of ACM0006, the default CH_4 emission factor for combustion of biomass residues is 0.03tCH_4/TJ. Considering a conservativeness factor of 1.37, the CH_4 emission factor in this PDD is taken as 0.0411tCH_4/TJ. The total quantity of biomass residues consumed by the project activity per year is 153,450 tons. The NCVs of straw pellet is 0.0177TJ/ton. The corresponding emissions are:

$PE_{biomass,CH4,y} = EF_{CH4,BF} * BF_{,k,y} * NCV_k$ = 0.0411 * 424,614 * 0.0177 = 308.89tCH_4/yr

Conclusively, according to equation (12), the total project emissions are:

$PEy = PET_y + PEFF_y + PE_{EC,y} + GWP_{CH4} * PE_{biomass,CH4,y}$

= 5,151 + 255 + 11,251 + 21 * 308.89 = 23,144tCO_2e/yr

Leakage

As demonstrated in the analysis in section B6.1, the leakage of the proposed project activity is zero.

Emission Reductions

As per equation (1), emission reductions of the project activity are calculated as follows:

$ER_y = ER_{electricity,y} + ER_{heat,y} + BE_{biomass,y} - PE_y - L_y$

$= 280,153 + 0 + 17,575 – 23,144 – 0 = 274,584$ tCO_2e/yr

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

Table 13 GHG emission reduction during crediting period (tCO_2)

Year	Emission reductions due to displacement of electricity	Emission reductions due to displacement of heat	Baseline Emissions due to natural decay of biomass residues	Project Emission	Leakage	Overall Emission Reduction
2012	280,153	0	17,575	23,144	0	274,584
2013	280,153	0	17,575	23,144	0	274,584
2014	280,153	0	17,575	23,144	0	274,584
2015	280,153	0	17,575	23,144	0	274,584
2016	280,153	0	17,575	23,144	0	274,584
2017	280,153	0	17,575	23,144	0	274,584
2018	280,153	0	17,575	23,144	0	274,584
2019	280,153	0	17,575	23,144	0	274,584
2020	280,153	0	17,575	23,144	0	274,584
2021	280,153	0	17,575	23,144	0	274,584
Total	2,801,530	0	175,750	231,440	0	274,5840

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

B.7.1 Data and parameters monitored:

Data / Parameter:	EG_y $(EG_{project\ plant,y})$
Data unit:	MWh
Description:	Electricity delivered to grid in year y
Source of data to be used:	Measured by electricity meters
Value of data applied for the purpose of calculating expected emission reductions in section B.5	358,000MWh
Description of measurement methods and procedures to be applied:	Continuous on-site measurements and monthly recording by the project owner.
QA/QC procedures to be applied:	Meters will be calibrated periodically. Data measured by meters will be cross checked by the electricity sales documents.
Any comment:	

Data / Parameter:	$BF_{k,y}$
Data unit:	tons of dry matter
Description:	Quantity of biomass residues combusted in the project plant during the year y
Source of data to be used:	Continuous on-site measurement
Value of data applied for the purpose of calculating expected emission reductions in section B.5	424,614t
Description of measurement methods and procedures to be applied:	Use automatic weighting system. The quantity shall be crosschecked with the quantity of electricity generated and fuel purchase receipts (if available).
QA/QC procedures to be applied:	Monitoring equipment of the feeding system at the project plant shall undergo maintenance subject to national standard. Any direct measurement with weight meters at the project plant shall be crosschecked with an annual energy balance which is based on quantities of biomass residues consumed and stock changes.
Any comment:	

Data / Parameter:	$BF_{T,k,y}$
Data unit:	tons of dry matter
Description:	Quantity of biomass residue type k that has been transported to the project site during the year y where k are the types of biomass residues used in the project plant in year y
Source of data to be used:	Continuous on-site measurement
Value of data applied for the purpose of calculating expected emission reductions in section B.5	424,614t
Description of measurement methods and procedures to be applied:	Use weight meters. The quantity shall be crosschecked with any fuel purchase receipts (if available).
QA/QC procedures to be applied:	Crosscheck the measurements with an annual energy balance that is based on purchased quantities and stock changes
Any comment:	

Data / Parameter:	Moisture content of the biomass residues
Data unit:	%
Description:	Moisture content of each biomass residue type k
Source of data to be used:	Continuous on-site measurement
Value of data applied for the purpose of calculating expected emission reductions in section B.5	6.1
Description of measurement methods and procedures to be applied:	Continuously monitored by moisture analyzer. Moisture content of the biomass residues will be both measured in collection point and in power plant.
QA/QC procedures to be applied:	
Any comment:	In case of dry biomass, monitoring of this parameter is not necessary. The instrument will be regularly calibrated as per related technical standard.

Data / Parameter:	NCV_k
Data unit:	TJ/tonne
Description:	Net Calorific Value of biomass residues
Source of data to be used:	Measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.0177
Description of measurement methods and procedures to be applied:	Measurements shall be carried out at reputed laboratories and according to relevant international standards. Measure the NCV based on dry biomass. Measurements shall be carried out at least every six months, taking at least three samples for each measurement.
QA/QC procedures to be applied:	Check the consistency of the measurements by comparing the measurement results with measurements from previous years, relevant data sources (e.g. values in the literature, values used in the national GHG inventory) and default values by the IPCC. If the measurement results differ significantly from previous measurements or other relevant data sources, conduct additional measurements. Ensure that the NCV is determined on the basis of dry biomass.
Any comment:	

Data / Parameter:	$FC_{i,j,y}$
Data unit:	Tonne/year
Description:	Quantity of diesel combusted at the project site and collection stations for other purposes that are attributable to the project activity during the year y.
Source of data to be used:	Continuous on-site measurement
Value of data applied for the purpose of calculating expected emission reductions in section B.5	80
Description of measurement methods and procedures to be applied:	It will be continuously monitored and recorded.
QA/QC procedures to be applied:	The consistency of metered fuel consumption quantities should be crosschecked by an annual energy balance that is based on purchased quantities and stock changes. Where the purchased fuel invoices can be identified specifically for the CDM project, the metered fuel consumption quantities should also be cross-checked with available purchase invoices from the financial records.

	If there were the difference among the values from above sources, the conservative value will be used.
Any comment:	

Data / Parameter:	AVD_y
Data unit:	km
Description:	Average return trip distance between biomass fuel supply sites and the project site
Source of data to be used:	Continuous on-site measurement
Value of data applied for the purpose of calculating expected emission reductions in section B.5	60
Description of measurement methods and procedures to be applied:	Distance travelled by trucks will be continuously monitored and recorded. Data will be archived 2 years following the end of the crediting period.
QA/QC procedures to be applied:	Check consistency of distance records provided by the truckers by comparing recorded distances with information from other sources (e.g. maps).
Any comment:	If biomass is supplied from different sites, this parameter should correspond to the mean value of km travelled by trucks that supply the biomass plant

Data / Parameter:	TL_y
Data unit:	tonne
Description:	Average load of the trucks used for transportation of biomass
Source of data to be used:	On-site measurement
Value of data applied for the purpose of calculating expected emission reductions in section B.5	5
Description of measurement methods and procedures to be applied:	All the trucks will be weighed by a weigh bridge. Therefore, TL_y can be determined by averaging the weights of each truck carrying biomass to the project plant. Data will be archived 2 years following the end of the crediting period.
QA/QC procedures to be applied:	As per the methodology no QA/QC procedures are specified for this parameter.
Any comment:	

Data / Parameter:	$EF_{km,CO2,y}$
Data unit:	tCO_2/km
Description:	Average CO_2 Emission Factor for transportation of biomass with trucks
Source of data to be used:	IPCC 2006 default value from the Moderate Control index for the US heavy Duty Diesel Vehicle
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.001011
Description of measurement methods and procedures to be applied:	Shall be updated according to IPCC latest version annually.
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	$EF_{CO2,FF,i}$
Data unit:	tCO_2/GJ
Description:	CO_2 Emission Factor for diesel
Source of data to be used:	Accurate and reliable local or national data where available. Where such data is not available, use IPCC default values.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.0741
Description of measurement methods and procedures to be applied:	The available default values are used, but will be reviewed for the appropriateness of the data annually
QA/QC procedures to be applied:	Check the default values used with IPCC values.
Any comment:	

Data / Parameter:	NCV_i
Data unit:	GJ/mass or volume unit
Description:	Net Calorific Value of fossil fuels combusted at the project site and the collection stations forother purposes that are attributable to the project activity during the year y
Source of data to be used:	China Energy Statistical Yearbook
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.042652
Description of measurement methods and procedures to be applied:	The Values for the fossil fuels are utilized from the China Energy Statistical Yearbook, which Shall be updated according to China Energy Statistical Yearbook new version.
QA/QC procedures to be applied:	Check consistency of data from the different resources. If the values differ significantly, the most conservative will be used.
Any comment:	

Data / Parameter:	$EF_{burning,CH4,k,y}$
Data unit:	tCH_4/GJ
Description:	CH_4 emission factor for uncontrolled burning of the biomass residue type k during the year y
Source of data to be used:	use referenced and reliable default value
Value of data applied for the purpose of calculating expected emission reductions in section B.5	In the baseline methodology, $NCV_k * EF_{burning,CH4,k,y}$= 0.001971 tCH_4/ton is applied.
Description of measurement methods and procedures to be applied:	Review of default values: annually
QA/QC procedures to be applied:	Cross-check the results of any measurements with IPCC default values. If there is a significant difference, check the measurement method and increase the number of measurements in order to verify the results.
Any comment:	Monitoring of this parameter for project emissions is only required if CH_4, emissions from biomass combustion are included in the project boundary. A conservative factor shall be applied, as specified in the baseline methodology.

Data / Parameter:	$EF_{CH4,BF}$
Data unit:	tCH_4/GJ
Description:	CH_4 emission factor for the combustion of biomass residues in the project plant
Source of data to be used:	default values, as provided in Table 4 of the baseline methodology
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.0411
Description of measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	
Any comment:	Monitoring of this parameter for project emissions is only required if CH_4, emissions from biomass combustion are included in the project boundary. The conservative factor shall be applied, as specified in the baseline methodology.

Data / Parameter:	$EC_{PJ,y}$
Data unit:	MWh
Description:	On-site electricity consumption attributable to the project activity during the year y
Source of data to be used:	Measured by meters with the accuracy consisted with the request of the grid company
Value of data applied for the purpose of calculating expected emission reductions in section B.5	11,981
Description of measurement methods and procedures to be applied:	Continuous on-site measurements and monthly recording by the project owner.
QA/QC procedures to be applied:	Meters will be calibrated periodically. Data measured by meters will be cross checked by the electricity invoices.
Any comment:	

Data / Parameter:	$BF_{utilized,k,y}$
Data unit:	Tons
Description:	Quantity of biomass residues of type k that are utilized in the region
Source of data to be used:	Surveys or statistics from local agricultural bureau if national statistics is not available
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	Annually
QA/QC procedures to be applied:	
Any comment:	This parameter is applicable since approach L2 is utilized to rule out leakage.

Data / Parameter:	$BF_{available,k,y}$
Data unit:	Tons
Description:	Quantity of available biomass residues of type k in the region
Source of data to be used:	Surveys or statistics from local agricultural bureau if national statistics is not available
Value of data applied for the purpose of calculating expected emission reductions in section B.5	2,000,000
Description of measurement methods and procedures to be applied:	Annually
QA/QC procedures to be applied:	
Any comment:	This parameter is applicable since approach L2 is utilized to rule out leakage.

B.7.2. Description of the monitoring plan:

Under investigation

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

The application of the methodology has been completed on *dd/mm/yyyy. (currently incomplete)*
The name of the responsible person and contact address are shown below.

JAPAN NUS CO.,LTD
9-15 Kaigan 3-chome, Minato-ku,
Tokyo 108-0022, JAPAN

Note: JAPAN NUS CO.,LTD is not a project participant.

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:

dd/mm/2010 (Signing date of equipments contract)

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

15 years

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:

This section is left intentionally blank.

C.2.1.2. Length of the first crediting period:

This section is left intentionally blank.

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

dd/mm/2012

C.2.2.2. Length:

10 years

SECTION D. Environmental impacts

>>

D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

Environmental Impact Assessment of the project has been carried out in 2006. Following is a brief summary of the environmental impacts of the project.

Air

The major pollutants produced during construction phase are dusts from construction works and car exhaust from transport of materials. For the place where dust can easily spread, water will be sprinkled and covered.

Air pollutants produced during operation are SO_2, NOx and dust emitted from boiler. Sulfur content of biomass fuel is much lower than coal, however the project will install fluidized-bed boiler with sulphur removal efficiency o f 35% which could minimize SO2 emission. Flue gases from boiler will be sent to dust-removing system with removal efficiency of 99% before gases are emitted to the air through stack with 120m in height. Under the normal operating conditions, the emissions of air pollutants will meet the requirements of *Emission Standard of Air Pollutants for Thermal Power Plants (GB13223-2003)* and *Ambient Air Quality Standard (GB3095-96).*

Waste Water

The waste water generated from the project includes cooling water, boiler water, acid-alkali waste water, cleaning water, municipal water. Waste water from cooling tower will be cleaned and discharged to river. Other industrial waste waters will be treated and reused. Municipal waste water will be treated and used for aspersion of road and project site.

Noise

Major noise sources expected during construction are construction work with bulldozer and excavator. However in the vicinity of the project plant there are farmland, river and factory but no residential area. Thus no negative impact to the surrounding area is expected. Noise standard during night time however is stricter and thus the works which requires heavy machine and transport will be limited. The project plant will comply with *Standard of Noise at Boundary of Industrial Enterprises （GB12348-90）*for operation phase and *Noise Limit for Construction Site （GB12523-90）*

Solid Waste

Construction waste which is recyclable will be collected and other non-recyclable wastes are buried. Construction materials such as cement, gravel, caustic lime are stored and disposed in a lump. Major waste produced during operation is ash generated from the boiler and municipal wastes. Ash will be used as fertilizer for forest. Municipal wastes will be disposed by the environmental sanitation agencies.

All above environmental impacts will be monitored at an environmental monitoring station installed within the project site.

The result of environmental impact assessment shows the project will have little impact to the environment.

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:

>>

SECTION E. Stakeholders' comments

>>

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

Under investigation

E.2. Summary of the comments received:

Under investigation

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

Under investigation

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Xuzhou Yifeng Sanpu Environmental Heat and Power Co,Ltd
Street/P.O.Box:	
Building:	
City:	
State/Region:	
Postcode/ZIP:	
Country:	
Telephone:	
FAX:	
E-Mail:	
URL:	
Represented by:	
Title:	
Salutation:	
Last name:	
Middle name:	
First name:	
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal e-mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

THIS SECTION IS NOT RELEVANT, AS NO PUBLIC FUNDS ARE INVOLVED IN THE PROJECT.

Annex 3

BASELINE INFORMATION

Table A3.1 Electricity generation in each province of the ECPG in the most recent 5 years

Province	Generation in 2003			Generation in 2004			Generation in 2005		
	Thermal	Hydro	Other	Thermal	Hydro	Other	Thermal	Hydro	Other
Shanghai	69,444			71,127		7	74,606		20
Jiangsu	133,277	400		163,545	327	29	211,429	314	257
Zhejiang	83,089	11,123	15,009	95,255	8,545	22,084	108,110	13,517	22,156
Anhui	54,156	1,560		59,875	1,227		62,918	1,306	
Fujian	42,146	18,899	24	50,490	15,457	19	48,600	29,100	
Total	382,112	31,982	15,033	440,292	25,556	22,138	505,663	44,237	22,433

Province	Generation in 2006			Generation in 2007		
	Thermal	Hydro	Other	Thermal	Hydro	Other
Shanghai	71,100		1,600	72,600		1,590
Jiangsu	251,300	300	720	270,900	300	11,290
Zhejiang	140,300	14,000	22,290	172,300	13,000	22,750
Anhui	72,100	1,300		84,800	2,000	
Fujian	55,600	34,700	160	72,300	31,200	40
Total	590,400	50,300	24,770	672,900	46,500	35,670

Data Source:
China Electric Power Yearbook 2004, p.671.
China Electric Power Yearbook 2005, p.474.
China Electric Power Yearbook 2006, p.568.
China Electric Power Yearbook 2008, p.733.

Table A3.2. Total CO_2 Emissions of the ECPG in 2005

Fuel Type	Unit	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	Subtotal	Emission Factor	OXID	Fuel Emission Factor	Average NCV	CO2 Emission (tCO2e)
								(tc/TJ)	(%)	(kgCO_2/TJ)	(MJ/t,km^3)	K=F*I*J/100000 (Mass Unit)
		A	B	C	D	E	F=A+B+C+D+E	G	H	I	J	K=F*I*J/10000 (Volume Unit)
Raw Coal	10^4t	2847.31	9888.06	4801.52	3082.9	2107.69	**22727.48**	25.8	100	87,300	20,908	414,837,511
Cleaned Coal	10^4t						**0**	25.8	100	87,300	26,344	0
Other Washed Coal	10^4t						**0**	25.8	100	87,300	8,363	0
Coke	10^4t			0.03			**0.03**	29.2	100	95,700	28,435	816
COG	10^8m^3	1.68	1.38		1.71		**4.77**	12.1	100	37,300	16,726	297,591
Other Gas	10^8m^3	83.72	24.97	0.06	30		**138.75**	12.1	100	37,300	5,227	2,705,169
Crude Oil	10^4t			27.01			**27.01**	20	100	71,100	41,816	803,039
Gasoline	10^4t						**0**	18.9	100	67,500	43,070	0
Diesel	10^4t	1.25	16	4.52		1.67	**23.44**	20.2	100	72,600	42,652	725,828
Fuel Oil	10^4t	59.39	13.22	153.22		7.45	**233.28**	21.1	100	75,500	41,816	7,364,902
LPG	10^4t						**0**	17.2	100	61,600	50,179	0
Refinery Gas	10^4t	0.57	0.83				**1.4**	15.7	100	48,200	46,055	31,078
NG	10^8m^3	1.09	1.85	0.62			**3.56**	15.3	100	54,300	38,931	752,567
Other Petroleum Products	10^4t	21	8.38	34.8			**64.18**	20	100	75,500	41,816	2,026,232
Other Coking Products	10^4t						**0**	25.8	100	95,700	28,435	0
Other Energy	10^4tce	12.36		15.29			**27.65**	0	0	0	0	0
Total												429,544,732

Data Source: China Energy Statistical Yearbook 2006

Table A3.3. Total CO_2 Emissions of the ECPG in 2006

Fuel Type	Unit	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	Subtotal	Emission Factor	OXID	Fuel Emission Factor	Average NCV	CO2 Emission (tCO2e)
								(tc/TJ)	(%)	($kgCO_2$/TJ)	($MJ/t,km^3$)	K=F*I*J/100000 (Mass Unit)
		A	B	C	D	E	F=A+B+C+D+E	G	H	I	J	K=F*I*J/10000 (Volume Unit)
Raw Coal	10^4t	2744.45	10945.42	6065	3455.2	2369.63	**25579.7**	25.8	100	87,300	20,908	466,898,181
Cleaned Coal	10^4t						**0**	25.8	100	87,300	26,344	0
Other Washed Coal	10^4t		150.54		23.06		**173.6**	25.8	100	87,300	8,363	1,267,436
Coke	10^4t			39.07			**39.07**	29.2	100	95,700	28,435	1,063,184
COG	10^8m^3	1.71	3.13	0.23	0.71		**5.78**	12.1	100	37,300	16,726	360,603
Other Gas	10^8m^3	84.64	106.54	3.28	25.12		**219.58**	12.1	100	37,300	5,227	4,281,088
Crude Oil	10^4t			20.3			**20.3**	20	100	71,100	41,816	603,543
Gasoline	10^4t						**0**	18.9	100	67,500	43,070	0
Diesel	10^4t	2.13	3.7	4.11	1.21	1.11	**12.26**	20.2	100	72,600	42,652	379,635
Fuel Oil	10^4t	44.51	3.77	71.98	0.02	4.5	**124.78**	21.1	100	75,500	41,816	3,939,439
LPG	10^4t						**0**	17.2	100	61,600	50,179	0
Refinery Gas	10^4t	0.29	0.4		2.95		**3.64**	15.7	100	48,200	46,055	80,803
NG	10^8m^3	3.2	13.5	9.18			**25.88**	15.3	100	54,300	38,931	5,470,911
Other Petroleum Products	10^4t	18.82	3.57				**22.39**	20	100	75,500	41,816	706,876
Other Coking Products	10^4t						**0**	25.8	100	95,700	28,435	0
Other Energy	10^4tce	6.66	2.8	27.45	3.21		**40.12**	0	0	0	0	0
Total												485,051,699

Data Source: China Energy Statistical Yearbook 2007

Table A3.4. Total CO_2 Emissions of the ECPG in 2007

Fuel Type	Unit	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	Subtotal	Emission Factor	OXID	Fuel Emission Factor	Average NCV	CO2 Emission (tCO2e)
								(tc/TJ)	(%)	($kgCO_2/TJ$)	($MJ/t,km^3$)	K=F*I*J/100000 (Mass Unit)
		A	B	C	D	E	F=A+B+C+D+E	G	H	I	J	K=F*I*J/10000 (Volume Unit)
Raw Coal	10^4t	2754.04	11060.78	7350	3929.9	3097.87	**28192.59**	25.8	100	87,300	20,908	514,590,436
Cleaned Coal	10^4t						**0**	25.8	100	87,300	26,344	0
Other Washed Coal	10^4t		459.17		29.32		**488.49**	25.8	100	87,300	8,363	3,566,416
Coke	10^4t			35.06			**35.06**	29.2	100	95,700	28,435	954,063
COG	10^8m^3	0.89	9.73	0.22	1.56	0.75	**13.15**	12.1	100	37,300	16,726	820,402
Other Gas	10^8m^3	98.92	70.45	3.41	36.3	1.71	**210.79**	12.1	100	37,300	5,227	4,109,712
Crude Oil	10^4t			15.15			**15.15**	20	100	71,100	41,816	450,427
Gasoline	10^4t						**0**	18.9	100	67,500	43,070	0
Diesel	10^4t	1.23	5.37	2.76		1.01	**10.37**	20.2	100	72,600	42,652	321,111
Fuel Oil	10^4t	40.76	1.55	29.52		2.04	**73.87**	21.1	100	75,500	41,816	2,332,156
LPG	10^4t						**0**	17.2	100	61,600	50,179	0
Refinery Gas	10^4t	0.2	0.63		2.55		**3.38**	15.7	100	48,200	46,055	75,031
NG	10^8m^3	4.61	19.17	11.01			**34.79**	15.3	100	54,300	38,931	7,354,444
Other Petroleum Products	10^4t	20.39	2.78				**23.17**	20	100	75,500	41,816	731,502
Other Coking Products	10^4t						**0**	25.8	100	95,700	28,435	0
Other Energy	10^4tce	6.89	28.88	44.93	7.52	9.43	**97.65**	0	0	0	0	0
Total												535,305,699

Data Source: China Energy Statistical Yearbook 2008

Table A3.5. Thermal Power Generation of the ECPG in 2005-2007

Province	2005			2006			2007		
	Generation (MWh)	Aux. Rate (%)	Net Gen. (MWh)	Generation (MWh)	Aux. Rate (%)	Net Gen. (MWh)	Generation (MWh)	Aux. Rate (%)	Net Gen. (MWh)
Shanghai	74,606,000	5.05	70,838,397	71,033,000	5.06	68,388,130	72,600,000	4.72	69,173,280
Jiangsu	211,429,000	5.96	198,827,832	251,258,000	5.69	236,961,420	270,900,000	5.55	255,865,050
Zhejiang	108,110,000	5.59	102,066,651	140,349,000	5.62	132,461,386	172,300,000	5.83	162,254,910
Anhui	62,918,000	5.90	59,205,838	71,867,000	6.05	67,519,047	84,800,000	5.92	79,779,840
Fujian	48,600,000	4.57	46,378,980	55,580,000	4.51	53,073,342	72,300,000	5.59	68,258,430
Total			477,317,698			558,403,325			635,331,510

Data Source:
China Electric Power Yearbook 2006
China Electric Power Yearbook 2007
China Electric Power Yearbook 2008

Table A3.6. Total Power Generation of the CCPG in 2005

Province	Thermal Generation (MWh)	Hydro Generation (MWh)	Other (MWh)	Total Generation (MWh)	Thermal Aux. Rate (%)	Net Thermal Generation (MWh)
Jiangxi	30,000,000	5,000,000		35,000,000	6.48	28,056,000
Henan	131,590,000	6,700,000	10,000	138,300,000	7.32	121,957,612
Hubei	47,700,000	81,400,000		129,100,000	2.51	46,502,730
Hunan	39,900,000	24,100,000		64,000,000	5	37,905,000
Chongqing	17,584,000	6,036,000		23,620,000	8.05	16,168,488
Sichuan	37,202,000	64,498,000		101,700,000	4.27	35,613,475
Total						286,203,305

Data Source: *China Electric Power Yearbook 2006*, p.559-560, p568.

Table A3.7. Total Power Generation of the CCPG in 2006

Province	Thermal Generation	Hydro Generation	Other	Total Generation	Thermal Aux. Rate	Net Thermal Generation
	(MWh)	(MWh)	(MWh)	(MWh)	(%)	(MWh)
Jiangxi	34,700,000	8,800,000		43,600,000	6.17	32559010
Henan	150,200,000	8,000,000		158,300,000	7.06	139,595,880
Hubei	56,300,000	75,000,000		131,300,000	2.75	54,751,750
Hunan	47,200,000	27,600,000	10,000	74,800,000	4.95	44,863,600
Chongqing	23,400,000	5,300,000	100,000	28,900,000	8.45	21,422,700
Sichuan	44,000,000	69,000,000		113,000,000	4.51	42,015,600
Total						335,208,540

Data Source:
China Electric Power Yearbook 2007, p.627
China Electric Power Yearbook 2008, p.733

Table A3.8. Total Power Generation of the CCPG in 2007

Province	Thermal Generation	Hydro Generation	Other	Total Generation	Thermal Aux. Rate	Net Thermal Generation
	(MWh)	(MWh)	(MWh)	(MWh)	(%)	(MWh)
Jiangxi	42,100,000	7,300,000		49,400,000	7.72	38,849,880
Henan	177,300,000	9,100,000	90,000	186,400,000	7.55	163,913,850
Hubei	60,900,000	93,300,000		154,100,000	6.69	56,825,790
Hunan	54,200,000	29,400,000		83,700,000	7.18	50,308,440
Chongqing	28,800,000	7,700,000	110,000	36,600,000	9.20	26,150,400
Sichuan	45,100,000	77,500,000		122,600,000	8.68	41,185,320
Total						377,233,680

Data Source: *China Electric Power Yearbook 2008,* p.733-734

Table A3.9. Total CO_2 Emissions of the CCPG in 2005

Fuel Type	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Subtotal	Emission Factor	OXID	Fuel Emission Factor	Average NCV	CO2 Emission (tCO2e)
									(tc/TJ)	(%)	($kgCO_2/TJ$)	($MJ/t,km^3$)	L=G*J*K/100,000 (Mass Unit)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	K	L=G*J*K/10,000 (Volume Unit)
Raw Coal	10^4t	1869.29	7638.87	2732.15	1712.27	875.4	2999.77	**17827.75**	25.8	100	87,300	20,908	325,404,287
Cleaned Coal	10^4t	0.02						**0.02**	25.8	100	87,300	26,344	460
Other Washed Coal	10^4t		138.12			89.99		**228.11**	25.8	100	87,300	8,363	1,665,408
Coke	10^4t		25.95		105			**130.95**	29.2	100	95,700	28,435	3,563,450
COG	10^8m^3			1.15		0.36		**1.51**	12.1	100	37,300	16,726	94,206
Other Gas	10^8m^3		10.2			3.12		**13.32**	12.1	100	37,300	5,227	259,696
Crude Oil	10^4t		0.82	0.36				**1.18**	20	100	71,100	41,816	35,083
Gasoline	10^4t		0.02			0.02		**0.04**	18.9	100	67,500	43,070	1,163
Diesel	10^4t	1.3	3.03	2.39	1.39	1.38		**9.49**	20.2	100	72,600	42,652	293,861
Fuel Oil	10^4t	0.64	0.29	3.15	1.68	0.89	2.22	**8.87**	21.1	100	75,500	41,816	280,035
LPG	10^4t							**0**	17.2	100	61,600	50,179	0
Refinery Gas	10^4t	0.71	3.41	1.76	0.78			**6.66**	15.7	100	48,200	46,055	147,842
NG	10^8m^3						3	**3**	15.3	100	54,300	38,931	634,186
Other Petroleum Products	10^4t							**0**	20	100	75,500	41,816	0
Other Coking Products	10^4t				1.5			**1.5**	25.8	100	95,700	28,435	40,818
Other Energy	10^4tce		2.88		1.74	32.8		**37.42**	0	0	0	0	0
Total													332,420,496

Data Source: *China Energy Statistical Yearbook 2006*

Table A3.10. Total CO_2 Emissions of the CCPG in 2006

Fuel Type	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Subtotal	Emission Factor	OXID	Fuel Emission Factor	Average NCV	CO2 Emission (tCO2e)
									(tc/TJ)	(%)	($kgCO_2$/TJ)	(MJ/t,km^3)	L=G*J*K/100,000 (Mass Unit)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	K	L=G*J*K/10,000 (Volume Unit)
Raw Coal	10^4t	1926.02	8098.01	3179.79	2454.48	1184.3	3285.22	**20127.82**	25.8	100	87,300	20,908	367,386,738
Cleaned Coal	10^4t					5.79		**5.79**	25.8	100	87,300	26,344	133,160
Other Washed Coal	10^4t	4.51	104.12		8.59	79.21		**196.43**	25.8	100	87,300	8,363	1,434,116
Briquette	10^4t						0.01	**0.01**	26.6	100	87,300	20,908	183
Coke	10^4t		17.23		0.32			**17.55**	29.2	100	95,700	28,435	477,576
COG	10^8m^3		0.52	1.07	4.24	0.38	0.01	**6.22**	12.1	100	37,300	16,726	388,053
Other Gas	10^8m^3	12.69	3.95		1.7	4.36	0.01	**22.71**	12.1	100	37,300	5,227	442,770
Crude Oil	10^4t		0.49					**0.49**	20	100	71,100	41,816	14,568
Gasoline	10^4t		0.01					**0.01**	18.9	100	67,500	43,070	291
Diesel	10^4t	0.91	2.23	1.41	1.78	0.96		**7.29**	20.2	100	72,600	42,652	225,737
Fuel Oil	10^4t	0.51	1.26	1.31	0.8	0.57	3.49	**7.94**	21.1	100	75,500	41,816	250,674
LPG	10^4t							**0**	17.2	100	61,600	50,179	0
Refinery Gas	10^4t	0.86	8.1	1	0.97			**10.93**	15.7	100	48,200	46,055	242,630
NG	10^8m^3			0.28		0.16	18.63	**19.07**	15.3	100	54,300	38,931	4,031,309
Other Petroleum Products	10^4t							**0**	20	100	75,500	41,816	0
Other Coking Products	10^4t						0.01	**0.01**	25.8	100	95,700	28,435	272
Other Energy	10^4tce	17.45	37.36	31.55	18.29	29.35		**134**	0	0	0	0	0
Total													375,028,077

Data Source: *China Energy Statistical Yearbook 2007*

Table A3.11. Total CO_2 Emissions of the CCPG in 2007

Fuel Type	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Subtotal	Emission Factor	OXID	Fuel Emission Factor	Average NCV	CO2 Emission (tCO2e)
									(tc/TJ)	(%)	($kgCO_2$/TJ)	(MJ/t,km^3)	L=G*J*K/100,000 (Mass Unit)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	K	L=G*J*K/10,000 (Volume Unit)
Raw Coal	10^4t	2200.57	9357	3479.81	2683.81	1547.7	3239	**22507.89**	25.8	100	87,300	20,908	410,829,404
Cleaned Coal	10^4t		3.07			3.8		**6.87**	25.8	100	87,300	26,344	157,998
Other Washed Coal	10^4t	0.04	87.16		2.06	96.42		**185.68**	25.8	100	87,300	8,363	1,355,631
Briquette	10^4t						0.01	**0.01**	26.6	100	87,300	20,908	183
Coke	10^4t							**0**	29.2	100	95,700	28,435	0
COG	10^8m^3	0.08	2.61	0.25	0.31	0.91		**4.16**	12.1	100	37,300	16,726	259,534
Other Gas	10^8m^3	29.17	25.79		24.69		23.98	**103.63**	12.1	100	37,300	5,227	2,020,444
Crude Oil	10^4t		0.43					**0.43**	20	100	71,100	41,816	12,784
Gasoline	10^4t				0.04	0.01		**0.05**	18.9	100	67,500	43,070	1,454
Diesel	10^4t	0.98	3.21	2.51	2.83	1.93		**11.46**	20.2	100	72,600	42,652	354,863
Fuel Oil	10^4t	0.42	1.25	1.33	0.63	0.64	1.74	**6.01**	21.1	100	75,500	41,816	189,742
LPG	10^4t							**0**	17.2	100	61,600	50,179	0
Refinery Gas	10^4t	1.43	10.01	0.97	0.7			**13.11**	15.7	100	48,200	46,055	291,022
NG	10^8m^3		0.12	0.18		0.2	1.87	**2.37**	15.3	100	54,300	38,931	501,007
Other Petroleum Products	10^4t							**0**	20	100	75,500	41,816	0
Other Coking Products	10^4t							**0**	25.8	100	95,700	28,435	0
Other Energy	10^4tce	23.43	63.65	35.95	29.46	23.21		**175.7**	0	0	0	0	0
Total													415,974,066

Data Source: *China Energy Statistical Yearbook 2008*

Table A3.12. CO_2 Emission Factor of Yangcheng Thermal Power Plant (YTPP)

Year	CO_2 Emission Factor (tCO_2/MWh)
2005	1.06604
2006	0.99702
2007	0.97254

Data Source: http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2331.xls

Table A3.13. Net Imports to the ECPG in the most recent three years

Year	From CCPG	Average Emission Rate of the CCPG	From the YTPP	Emission Factor of the YIPP
	(MWh)	(tCO_2/MWh)	(MWh)	(tCO_2/MWh)
2005	27,039,000	1.16148	11,282,000	1.06604
2006	24,029,150	1.12157	11,150,820	0.99702
2007	31,823,310	1.10197	12,773,620	0.97254

Data Source: http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2331.xls

Table A3.14. Calculation of OM Emission Factor of the ECPG

Source		Unit	Year 2005	Year 2006	Year 2007
ECPG	Generation	(MWh)	477,317,698	558,403,325	635,331,510
	CO_2 Emission	(tCO_2)	429,544,732	485,051,699	535,305,699
CCPG	Import	(MWh)	27,039,000	24,029,150	31,823,310
	CO_2 Emission	(tCO_2)	31,405,258	26,950,312	35,068,333
YTPP	Import	(MWh)	11,282,000	11,150,820	12,773,620
	CO_2 Emission	(tCO_2)	12,027,087	11,117,588	12,422,903
Total	Generation	(MWh)	515,638,698	593,583,295	679,928,440
	CO_2 Emission	(tCO_2)	472,977,077	523,119,600	582,796,935
OM		(tCO_2/MWh)	0.91726	0.88129	0.85714
Average OM		(tCO_2/MWh)	0.88248		

Data Source: http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2331.xls

Table A3.15. Emission factors for the best commercially available thermal power-generating technology in China.

	Power Supply Efficiency (%)	Fuel Emission Factor ($kgCO_2/TJ$)	OXID (%)	CO_2 Emission Factor (tCO_2/MWh)
	A	B	C	D=3.6/A/1,000,000×B×C
$EF_{Coal,Adv,y}$	38.10	87,300	100	0.8249
$EF_{Oil,Adv,y}$	49.99	75,500	100	0.5437
$EF_{Gas,Adv,y}$	49.99	54,300	100	0.3910

Data Source: http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2332.doc

Table A3.16. Total CO_2 Emissions of the ECPG in 2007

Fuel Type	Unit	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	Subtotal	Emission Factor	OXID	Fuel Emission Factor	Average NCV	CO2 Emission (tCO2e)
								(tc/TJ)	(%)	($kgCO_2$/TJ)	(MJ/t,km^3)	K=F*I*J/100000 (Mass Unit)
		A	B	C	D	E	F=A+B+C +D+E	G	H	I	J	K=F*I*J/10000 (Volume Unit)
Raw Coal	10^4t	2754.04	11060.78	7350	3929.9	3097.87	**28192.59**	25.8	100	87,300	20,908	514,590,436
Cleaned Coal	10^4t						**0**	25.8	100	87,300	26,344	0
Other Washed Coal	10^4t		459.17		29.32		**488.49**	25.8	100	87,300	8,363	3,566,416
Coke	10^4t			35.06			**35.06**	29.2	100	95,700	28,435	954,063
Other Energy	10^4tce	0	0	0	0	0	**0**	0	0	0	0	0
Subtotal												**519,110,916**
Crude Oil	10^4t			15.15			**15.15**	20	100	71,100	41,816	450,427
Gasoline	10^4t						**0**	18.9	100	67,500	43,070	0
Diesel	10^4t	1.23	5.37	2.76		1.01	**10.37**	20.2	100	72,600	42,652	321,111
Fuel Oil	10^4t	40.76	1.55	29.52		2.04	**73.87**	21.1	100	75,500	41,816	2,332,156
Other Petroleum Products	10^4t	20.39	2.78				**23.17**	20	100	75,500	41,816	731,502
Subtotal												**3,835,196**
NG	10^8m^3	4.61	19.17	11.01	0	0	**34.79**	15.3	100	54,300	38,931	7,354,444
COG	10^8m^3	0.89	9.73	0.22	1.56	0.75	**13.15**	12.1	100	37,300	16,726	820,402
Other Gas	10^8m^3	98.92	70.45	3.41	36.3	1.71	**210.79**	12.1	100	37,300	5,227	4,109,712
LPG	10^4t							0	17.2	100	61,600	0
Refinery Gas	10^4t	0.2	0.63	0	2.55	0	**3.38**	15.7	100	48,200	46,055	75,031
Subtotal												**12,359,588**
Total												**535,305,699**

λ_{coal} =96.98%, λ_{oil} =0.72%, λ_{gas} =2.31%。

$EF_{Thermal} = \lambda_{coal} \times EF_{coal,Adv} + \lambda_{gas} \times EF_{gas,Adv} + \lambda_{oil} \times EF_{oil,Adv} = 0.8129tCO_2/MWh$

Data Source: *China Energy Statistical Yearbook 2008*

Table A3.17. Installed Capacity of the ECPG in 2005

Capacity	Unit	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	Total
Thermal	(MW)	13,113.5	42,506.4	27,688.1	11,423.2	9,345.4	104,076.6
Hydro	(MW)	0	142.6	6,952.1	749.8	8,224.9	16,069.4
Nuclear	(MW)	0	0	3,066	0	0	3,066
Wind and others	(MW)	253.3	58.8	37.2	0	52	401.3
Total	(MW)	13,366.8	42,707.8	37,743.4	12,173.0	17,622.3	123,613.3

Data Source: *China Energy Statistical Yearbook 2006*

Table A3.18. Installed Capacity of the ECPG in 2006

Capacity	Unit	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	Total
Thermal	(MW)	14,526	51,776	35,391	14,134	13,001	128,828
Hydro	(MW)	0	136	8,369	1,001	8,957	18,463
Nuclear	(MW)	0	0	3,066	0	0	3,066
Wind and others	(MW)	253	162	43	0	89	547
Total	(MW)	14,779.0	52,074.0	46,869.0	15,135.0	22,047.0	150,904.0

Data Source: *China Energy Statistical Yearbook 2007*

Table A3.19. Installed Capacity of the ECPG in 2007

Capacity	Unit	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	Total
Thermal	(MW)	14,150	53,340	39,490	17,760	13,910	138,650
Hydro	(MW)	0	140	8,520	1,510	9,800	19,970
Nuclear	(MW)	0	2,000	3,070	0	0	5,070
Wind and others	(MW)	268.8	517.8	40	0	269	1,095.6
Total	(MW)	14,418.8	55,997.8	51,120.0	19,270.0	23,979.0	164,785.6

Data Source: *China Energy Statistical Yearbook 2008*

Table A3.20. Calculation of BM Emission Factor of the ECPG

	Installed Capacity in 2005	Installed Capacity in 2006	Installed Capacity in 2007	New Capacity Addition from 2005-2007	Share of New Capacity Addition
	A	B	C	D=C-A	
Thermal Power (MW)	104,076.6	128,828	138,650	34,573.4	83.97%
Hydro Power (MW)	16,069.4	18,463	19,970	3,900.6	9.47%
Nuclear Power (MW)	3,066	3,066	5,070	2,004	4.87%
Wind Power (MW)	401.3	547	1,095.6	694.3	1.69%
Total (MW)	123,613.3	150,904	164,785.6	41,172.3	100%
Out of Installed Capacity in 2007	75.01%	91.58%	100%		
$EF_{BM,y} = 0.8129 \times 83.97\% = 0.6826$ tCO_2/MWh					

Annex 4

MONITORING INFORMATION

- - - - -