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

CONTENTS

Annexes

SECTION A. General description of project activity

A.1 Title of the project activity:

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Anhui Guzhen Biomass Generation Project
Version number of the document: 2.0
Date: 21/09/2012

A.2. Description of the project activity:

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Anhui Guzhen Biomass Generation Project (hereafter referred to as the Project) is sited within Guzhen County, Anhui Province, P.R.China. The Project is invested, constructed and operated by the National Guzhen Bio Energy Co., Ltd. The Project will install one 130t/h boiler and one 30MW steam turbine generator. Rice straw, maize straw, peanut straw and wood residues are used as fuel for power generation. The annual electricity supply of the Project is expected to be 186,900 MWh, which will be delivered to East China Power Grid.

Prior to the Project, the biomass residues used in the Project are dumped or left to decay under mainly aerobic conditions. The electricity supplied by the Project is supplied by East China Power Grid, which generates CO_2 emissions as it is mainly composed of traditional fossil fuel fired power plants. These are also the baseline scenarios of the Project.

The Project will achieve emission reductions via avoiding CO_2 emissions from the same amount of electricity generation from East China Power Grid, which is mainly composed of traditional fossil fuel fired power plants. It is estimated that the project activity will generate emission reductions of about 132,072 tCO_2e per year.

The Project will not only supply renewable electricity to the grid, but also contribute to sustainable development of the local community, the host country and the world by means of:

- reducing greenhouse gas emissions compared to a business-as-usual scenario;
- helping to stimulate the growth of the biomass power industry in China;
- reducing the emission of other pollutants resulting from the power generation industry in China, compared to a business-as-usual scenario;
- creating 74 local employment opportunities during the construction and operation period of the Project.

A.3. Project participants:

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Project participants to the project activity are the following:

Name of Party involved (*) (host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
P.R.China (host)	National Guzhen Bio Energy Co., Ltd (the project owner)	No
France	EDF Trading Limited	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

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The Host Country is the People's Republic of China.

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

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Anhui Province

A.4.1.3. City/Town/Community etc:

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Bengbu City, Guzhen County, Economic Development Zone

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

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The Project is sited on the Economic Development Zone, 8 km to the downtown of Guzhen County, Anhui Province. The Project has geographical coordinates with east longitude of 117°20′13″ (i.e. 117.3369°) and north latitude of 33°13′08″ (i.e. 33.2189°). Figure 1 shows the location of Guzhen County, Figure 2 shows the location of the Project.

Figure 1. Location of Guzhen County

Figure 2. Location of the Project

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

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The objective of the Project is to utilize biomass residue to generate electricity. It falls into sectoral scope 1: energy industries (Renewable sources).

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

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Prior to the Project, the biomass residues used in the Project are dumped or left to decay under mainly aerobic conditions. The electricity supplied by the Project is supplied by East China Power Grid, which generates CO_2 emissions as it is mainly composed of traditional fossil fuel fired power plants. These are also the baseline scenarios of the Project.

The local farmers will transport directly the biomass residues to the Project plant by trucks. The biomass residues will be mechanically processed and stored at the Project plant site. The Project will install one 130t/h boiler and one 30MW steam turbine generator. The boiler combusts biomass residues to generate steam, which drives the steam turbine generator to generate power. Figure 3 below shows the technical process of the project, and table 1 below shows the key technical specifications of the boiler, turbine and generator. The annual operating hours of the Project are 7,000 hours, and the annual consumption of biomass residues is 310,000 tonnes. The annual net electricity supply of the Project is expected to be 186,900 MWh which will be supplied to East China Power Grid via a 35 kV outlet circuit.

The biomass residue transportation will generate CO_2 emissions from the fossil fuel combusted. The normal operation of the Project plant will consume certain diesel fuels, and thus also generate CO_2 emissions.

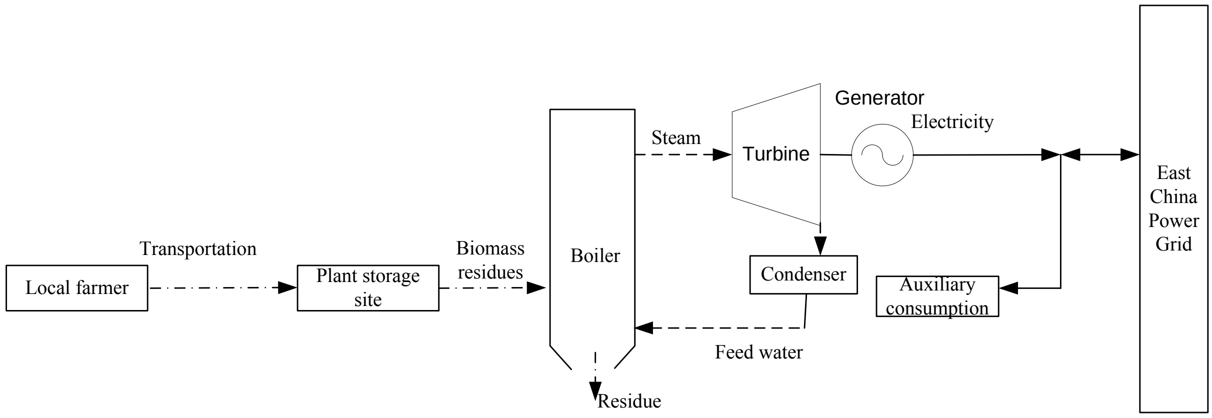

Figure 3 Technical process of the Project

Table 1. Key technical indicators of major equipments employed by the Project

Item	Quantity	Key technical specifications
Boiler	1 set	Type: high temperature and high pressure natural circulation； Rated steam output: 130t/h； Rated steam pressure: 9.2 MPa(a)； Rated steam temperature：540℃； Life time: 20 years
Steam turbine	1 set	Rated output: 30MW； Rated pressure of main steam: 8.83 MPa(a)； Rated temperature of main steam: 535℃； Rated flux of main steam: 130t/h； Life time: 20 years
Generator	1 set	Rated output: 30MW; Rated voltage: 10.5kV; Rated rotating speed: 3,000r/min; Life time: 20 years

The Project employs domestically manufactured turbines and involves no technology transfer from abroad.

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

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Renewable crediting period (7yrs×3) is adopted by the Project. It is expected that the project activity will generate emission reductions of about 924,504 tCO_2e over the first 7-year crediting period from 16/11/2012 to 15/11/2019.

Years	Annual estimation of emission reductions in tonnes of CO_2e
16/11/2012-31/12/2012	16,509
2013	132,072
2014	132,072
2015	132,072
2016	132,072
2017	132,072
2018	132,072
01/01/2019-15/11/2019	115,563
Total estimated reductions (tonnes of CO_2e)	**924,504**
Total number of crediting years	**7**
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	**132,072**

A.4.5. Public funding of the project activity:

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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:

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Approved consolidated baseline and monitoring methodology ACM0018 (ver 2.0.0): "Consolidated methodology for electricity generation from biomass residues in power-only plants".

This methodology also refers to the latest approved version of:

- "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" ver 02;
- "Tool to calculate the emission factor for an electricity system" ver 2.2.1.
- "Project and leakage emissions from road transportation of freight" ver 1.0.0;

For more information regarding these methodologies please refer to http://cdm.unfccc.int/methodologies/approved.

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

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The Project is a greenfield built biomass residue power generation project which the biomass residues used are obtained off-site from the nearby area and satisfies all applicable conditions of the methodology ACM0018 as analysed below.

Applicable conditions of the methodology ACM0018	The Project
No other biomass types than biomass residues, as defined in the methodology, are used in the project plant.	The Project will only use biomass residues, comprising rice straw, maize straw, peanut straw and wood residues.
Fossil fuels may be co-fired in the project plant. However, the amount of fossil fuels co-fired shall not exceed 80% of the total fuel fired on an energy plant.	The Project will not co-fire fossil fuels.
For the 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, longs, etc.) or in other substantial changes.	The project activity will use the by-product and residues from agriculture industry other than from production processes.
The biomass residues used by the project facility should not be stored for more than one year.	The project will consume 310,000t biomass residues to generate electricity per year. The biomass residues storage capacity of the project is about 50,000t, which is 16% of annual biomass residues consumption. Therefore, the biomass residues used by the Project will not be stored for more than one year.

Projects that chemically process the biomass residues prior to combustion (e.g. by means of esterification, fermentation and gasification) are not eligible under this methodology. The biomass residues can however be processed physically such as by means of drying, pelletization, shredding and briquetting;	Preparation of the biomass residues for fuel combustion includes transportation, mechanical treatment in the project activity. The Project will not chemically process the biomass residues prior to combustion.
No power and heat plant operates at the project site during the crediting period.	No power and heat plant is operating at the project site now or during the crediting period.
If any heat which is used for purposes other than power generation (e.g. heat which is produced in boilers or extracted from the header to feed thermal loads in the process) is generated during the crediting period or was generated prior to the implementation of the project activity, by any on-site or off-site heat generation equipment connected to the project site, the following conditions should apply: a) The implementation of the project activity does not influence directly or indirectly the operation of the heat generation equipment, i.e. the heat generation equipment would operate in the same manner in the absence of the project activity. b) The heat generation equipment does not influence directly or indirectly the operation of the project plant(e.g. no fuels are diverted from the heat generation equipment to the project plant); and c) The amount of fuel used in the heat generation equipment can be monitored and clearly differentiated from any fuel used in the project activity.	There was no heat generated by on site or off-site heat generation equipment connected to the project and used for purposes other than power generation. Also, there will not have heat generated during the crediting period and used for purpose other than power generation
In the case of fuel switch project activities, the use of biomass residues or the increase in the use of biomass residues as compared to the baseline scenario is technically not possible at the project site without a capital investment in : 1. The retrofit or replacement of existing heat generators/boilers; or 2. The installation of new heat generators/boilers; or 3. A new dedicated biomass residues supply chain established for the purpose of the project (e.g. collecting and cleaning contaminated new sources of biomass residues that would otherwise not be used for energy purposes); 4. Equipment for preparation and feeing of biomass residues	The project is not a fuel switch project activity.

As analysis in Section B.4 below, the baseline scenario for power generation is scenario P5, and for biomass use the baseline scenario is scenario B1, either of which is one of the applicability conditions for applying the methodology ACM0018 for the Project.

According to the consolidated baseline methodology ACM0018, the *Tool to calculate the emission factor for an electricity system* is applied to determine the emission factor of the electricity supplied by the Project; the consolidated baseline methodology ACM0018 is used to determined the baseline scenario and demonstrate the additionalitiy of the Project.

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

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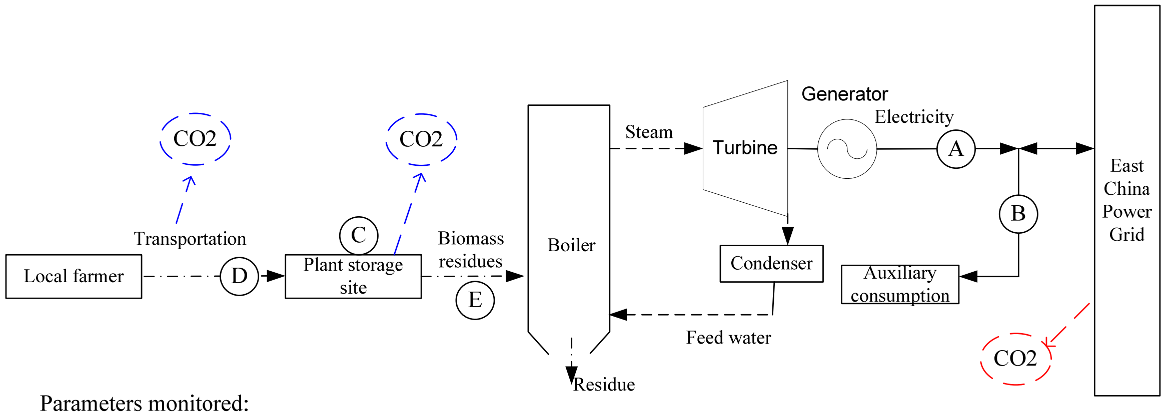
The Project is a Greenfield biomass residue fired power plant. The Project will install one 130t/h boiler and one 30MW steam turbine generator. Rice straw, maize straw, peanut straw and wood residues are used as fuel. Prior to the implementation of the Project, there was no power plant or heat generation equipment operated at the project site. In the absence of the Project, the same electricity generated by the Project will be supplied by the grid which the Project is connected to. The Project Participant will not claim the CH_4 emissions from the decay of biomass residues in baseline scenario. Therefore, according to ACM0018, the spatial extent of the project boundary encompasses:

- The project activity power-only plant. The biomass residues used in the Project will only involve simple physical processing prior to combustion, such as drying or necessary shredding, and these will also be conducted in the project activity power-only plant.
- All power plants connected physically to the East China Power Grid. The Project supplies electricity into Anhui Provincial Grid. According to *2011 Baseline Emission Factors for Regional Power Grid in China*, Anhui Provincial Grid belongs to East China Power Grid, which also includes Shanghai, Jiangsu, Zhejiang and Fujian.
- The trucks which transport biomass residues to the project site.
- The site where the biomass residues would have been left for decay or dumped.

Overview of the emission sources included in or excluded from the project boundary is provided in Table 2.

Table 2: Overview of the emission sources included in or excluded from the project boundary

	Source	Gas	Included?	Justification/Explanation
Baseline	Electricity generation	CO_2	Included	Main emission source.
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
	Uncontrolled burning or decay of surplus biomass residues	CO_2	Excluded	It is assumed that CO2 emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector.
		CH_4	Excluded	The calculation of baseline emissions due to decay of biomass residues are not included.
		N_2O	Excluded	Excluded for simplification. This is conservative.
Project activity	On-site fossil fuel consumption	CO_2	Included	Main emission source.
		CH_4	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification.
	Off-site transportation and processing of biomass residues	CO_2	Included	Main emission source.
		CH_4	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification.
	Combustion of biomass residues for electricity	CO_2	Excluded	It is assumed that CO2 emissions from surplus biomass do not lead to changes of carbon pools in the LULUCF sector.
		CH_4	Excluded	The calculation of baseline emissions due to decay of biomass residues are not included.
		N_2O	Excluded	Excluded for simplification.
	Storage of biomass residues	CO_2	Excluded	It is assumed that CO2 emissions from surplus biomass do not lead to changes of carbon pools in the LULUCF sector.
		CH_4	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification.
	Waste water from the treatment of biomass residues	CO_2	Excluded	It is assumed that CO2 emissions from surplus biomass do not lead to changes of carbon pools in the LULUCF sector.
		CH_4	Excluded	There is no waste water treated under anaerobic condition..
		N_2O	Excluded	Excluded for simplification.



Parameters monitored:
(A) $EG_{PJ,gross,y}$ (B) $EG_{PJ,aux,y}$ (C) $FC_{diesel,Pproject,y}$ (D) $FR_{f,m}$, $D_{f,m}$, Moisture, NCV; (E) Quantity of biomass residues used;

Figure 3 Flow diagram of the project boundary

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

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The procedures in the approved baseline methodology ACM0018 were used to identify the baseline scenario, and the additionality was demonstrated simultaneously.

STEP 1. Identification of alternative scenarios

This step serves to identify all alternative scenarios to the proposed CDM project activity(s) that can be the baseline scenario through the following sub-steps:

Step 1a. Define alternative scenarios to the proposed CDM project activity

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.

1,The possible alternative scenarios for power generation of the Project were as below as per the methodology ACM0018:

P1: The proposed project activity not undertaken as a CDM project activity;
P2: If applicable, the continuation of power generation in existing power-only plants fired with biomass residues, or fossil fuels, or a combination of both, at the project site. The existing power-only plants would operate at the same conditions (e.g. installed capacities, average load factors, or average energy efficiencies, fuel mixes, and equipment configuration) as those observed in the most recent three years prior to the project activity;
P3: If applicable, the continuation of power generation in existing power-only plants fired with biomass residues, or fossil fuels, or a combination of both, at the project site. The existing power-only plants would operate with different conditions from those observed in the most recent three years prior to the project activity;
P4: If applicable, the retrofitting of existing power-only plants fired with biomass residues, or fossil fuels, or a combination of both, at the project site. The retrofitting may or may not include a change in fuel mix;
P5: The generation of power in the grid;

P6: The installation of new power-only plants fired with biomass residues, or fossil fuels, or a combination of both, at the project site, using the same amount or less biomass residues than under scenario P1:;
P7: The installation of new power-only plants fired with biomass residues, or fossil fuels, or a combination of both, at the project site, using more biomass residues than under scenario P1:.

As the project activity is the establishment of a greenfield power plant and supplies electricity only to the grid, then the alternatives considered for power generation should include only the scenarios P1 and P5.

2, Define alternative scenarios for biomass residues utilization

According to ACM0018, the analysis of which biomass residues categories are used in the project activity should be taken, which has been shown in Table 3 below:

Table 3. Categories of biomass residue

No.	Biomass residue type	Biomass residues source	Biomass residues fate in the absence of the project activity	Biomass residues use in project scenario	Biomass residues quantity (Adjusted for the moisture, 10^4 tonnes on dry-basis)
1	Rice straw	Offsite from local farmer	Dumped (B1)	Electricity generation on-site (biomass-only boiler)	4.80
2	Peanut straw	Offsite from local farmer	Dumped (B1)	Electricity generation on-site (biomass-only boiler)	2.56
3	Maize straw	Offsite from local farmer	Dumped (B1)	Electricity generation on-site (biomass-only boiler)	3.45
4	Wood residues	Offsite from local farmer	Dumped (B1)	Electricity generation on-site (biomass-only boiler)	8.86

For the use of biomass residues, the alternative scenarios for biomass residues should include, *inter alia*:
B1: The biomass residues are dumped or left to decay mainly under aerobic conditions.
B2: The biomass residues are dumped or left to decay under clearly anaerobic conditions. This applies, for example, to landfills which are deeper than 5 meters. This does not apply to biomass residues that are stock-piled 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 electricity generation in power-only plant configuration at the project site in new and/or existing power plants;
B5: The biomass residues are used for power and/or heat generation in other existing or new power plants at other sites;
B6: The biomass residues are used for other energy purposes, such as the generation of bio-fuels;
B7: 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);
B8: The primary source of the biomass residues and/or their fate in the absence of the project activity cannot be clearly identified

The realistic and credible alternatives for biomass residues use of the project will be shown in Table B.4 below:

Table 4. Identifying the most plausible alternative scenarios for use of biomass residue

Series	Alternative	Feasbile?	Justification/Explanation
B1	The biomass residues are dumped or left to decay mainly under aerobic conditions.	Yes	This alternative is the common practice treatment of biomass residue in the absence of the Project at present.
B2	The biomass residues are dumped or left to decay under clearly anaerobic conditions. This applies, for example, to landfills which are deeper than 5 meters. This does not apply to biomass residues that are stock-piled or left to decay on fields;	No	There is no infrastructure for biomass residue collecting and landfill treatment on-site or nearby the project site. B2 is unrealistic and excluded.
B3	The biomass residues are burnt in an uncontrolled manner without utilizing it for energy purposes.	Yes	This alternative may be considered as an alternative scenario.
B4	The biomass residues are used for electricity generation in power-only plant configuration at the project site in new and/or existing power plants;	Yes	The proposed project activity not undertaken as a CDM project activity.
B5	The biomass residues are used for power and/or heat generation in other existing or new power plants at other sites;	No	There is no power or heat generation project using biomass residues as fuel close to proposed project. Considering the cost of biomass collection, transportation and storage, these surplus biomass residues will not be used in other existing or new grid-connected power plants. Therefore, B5 is excluded.
B6	The biomass residues are used for other energy purposes, such as the generation of bio-fuels;	No	The raw materials for generation of bio-fuels in China now are mainly food crops, wasted cooking oil/fat and oil plants, and the technology of utilizing the biomass residues used in the Project to generate bio-fuels is not mature and of high cost[1]. There is no project that produces or uses biomass for other energy purposes at the project site. Therefore, these surplus biomass residues will not be used for other energy purposes. Therefore, B6 is

[1]Yan Qiang, Progress on Bio-fuels Research, Journal of Anhui Agriculture Science, 2009

			excluded.
B7	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).	No	Prior to the Project, only small quantity of biomass residues are used, leaving the large number of biomass residues dumped to decay , so the abandoned biomass residues utilized in the Project will not be used for non-energy purposes in the absence of this project. Therefore, B7 is excluded.
B8	The primary source of the biomass residues and/or their fate in the absence of the project activity cannot be clearly identified	No	Only a little biomass residues will be used as fertilizer or feed stock, and the rest will be dumped or left to decay. The biomass residues used in the Project are those which will be dumped or left to decay. The primary source of the biomass residues and/or their fate in the absence of the project activity can be clearly identified. Therefore, B8 is excluded.

For biomass residues categories for which scenarios B1, B2, B3 is deemed a plausible baseline alternative, project participants shall demonstrate that this is a realistic and credible alternative scenario. Towards this end, for each biomass residues category, one of the following procedures should be applied:
(a) Demonstrate that there is an abundant surplus of the type of biomass residue in the region of the project activity which is not utilized. For this purpose, demonstrate that the quantity of that type of biomass residues available in the region in at least 25% larger than the quantity of biomass residues of that type which is utilized in the region;
(b) Demonstrate for the sites from where biomass residues are sourced that the biomass residues have not been collected or utilized but dumped and left to decay, land-filled or burnt without energy generation prior to their use under the project activity this approach is only applicable to biomass residues categories for which project participants can clearly identify the site from where the biomass residues are sourced.

The Project takes procedure (a) to demonstrate. The utilizations of all the biomass residues from the area covering a radius of 50km around the project site are given as show below:

Biomass residue type	Annual available amount (10^4 tonnes)	Other use, excluding the Project (10^4 tonnes)	The Project use (10^4 tonnes)	Annual available amount/Total annual use
Rice straw	55.3	16.8	6.4	=55.3/(16.8+6.4)=238%
Peanut straw	35.7	12.0	3.2	=35.7/(12.0+3.2)=235%
Maize straw	55.1	16.4	5.3	=55.1/(16.4+5.3)=254%
Wood residues	92.1	20.8	16.1	=92.1/(20.8+16.1)=250%

Therefore, the scenarios B1:, B3: or B4: could be a plausible baseline alternative for biomass residues categories.

Outcome of Step 1a:
The reasonable and feasible alternative scenarios of the Project for power generation are:
P1：The proposed project activity not undertaken as a CDM project activity;
P5：The generation of power in the grid;

The reasonable and feasible alternative scenarios of the Project for use of biomass residues are:
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.
B3: The biomass residues are burnt in an uncontrolled manner without utilizing it for energy purposes.
B4: The biomass residues are used for electricity generation in power-only plant configuration at the project site in new power plants i.e. the proposed project activity not undertaken as a CDM project activity;

Sub-step 1b. Consistency with mandatory applicable laws and regulations:
According to the *Notice about Prohibiting to Burn Agricultural Straw in an Uncontrolled Manner was issued by Ministry of Agriculture of the People's Republic of China on 14/06/2007*, Scenario B3 isn't consistent with mandatory applicable laws and regulations. Therefore, the alternative scenario B3 is excluded.
The rest alternatives are in compliance with applicable legal and regulatory requirements.

Outcome of sub-step 1b:
After the discussion of sub-step 1b, there are two combined baseline scenarios plausible for the project activity:

Combined scenario	Electricity generation	Biomass residue
1	P1	B4
2	P5	B1

Step 2. Barrier analysis
There are no barriers identified that would prevent the implementation of either of the alternative scenarios above.
Outcome of Step 2
All remaining alternatives, P1, P5, B1 and B4 go through this step.

Step 3. Investment analysis
This step serves to determine which of the alternative scenarios in the short list remaining after step 2 is the most economically or financially attractive.

The remaining scenarios for power generation are P1 (The proposed project activity not undertaken as a CDM project activity) and P5 (Supply of equivalent power generation by the East China Power Grid). Since the P5 is not a comparable specific new project, the investment analysis of the P1 has to be conducted to compare with the appropriate investment benchmark.

According to the *Interim Rules on Economic Assessment of Electric Power Engineering Retrofit Projects*[2],

[2] In accordance with the *Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects* issued by former State Power Corporation of China, there is not yet such a financial internal rate of return (IRR) as

the benchmark IRR of total investment employed by the Project is 8%.

(1) Parameters needed for calculation of key financial indicators

According to the Feasibility Study Report (FSR), the basic data for calculation of financial indicators of the Project are summarized in Table 5.

Table 5. Basic parameters for calculation of financial indicators

Installed capacity	30	MW
Annual feed-in electricity	186,900	MWh
Lifetime	21	Year (including 12 months of construction period)
Total investment	29,284.64	10000RMB
Bus-bar tariff (including VAT)	621	RMB/MWh
Annual average O&M cost	9,983.6	10000RMB
Biomass residue consumption	31	10000t/year
Biomass residue price	270	RMB/t (excluding VAT)
Water fee	39.99	10000RMB/year
Material fee	12	RMB/MWh
Miscellaneous cost	16	RMB/MWh
Wage	2.5	10000RMB/person, yr
Welfare rate	50	%
personnel	74	Person
VAT	17	%
income tax	25	%
urban maintenance and construction tax	7	%
surtax for education	3	%
Crediting period	7×3	yrs

(2) Comparison of the IRR of the benchmark and the Project

In accordance with the benchmark analysis, if the IRR of a project is lower than that of the benchmark, the project is not considered as financially attractive. Based on the above data, without CERs sales revenues, the total investment IRR of the Project is -7.52%, which is lower than that of the benchmark (8%). Therefore, the Project is not financially attractive.

(3) Sensitivity analysis

As per GUIDELINES ON THE ASSESSMENT OF INVESTMENT ANALYSIS, only variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation; if a variable which constitute less than 20% has a material impact on the analysis, this variable can be included in the sensitivity analysis. According to the above criteria, the following financial parameters were taken as uncertain factors for sensitive analysis of financial attractiveness:

- Total investment
- Annual O&M expenses
- Feed-in electricity

benchmark in China's power generation industry to date. In addition, it rules the benchmark of both electrical engineering retrofit projects and new projects.

- Bus-bar tariff
- Biomass residue price

The results of sensitive analysis of 5 indicators of the Project are shown in Table 6 and Figure 4.

Table 6. the IRR sensitivity to different financial indicators of the Project
(without CERs sales revenues)

Range / Indicator	-10%	0	+10%
Total investment (%)	-6.34%	-7.52%	-8.58%
Annual O&M expenses (%)	0.09%	-7.52%	-
Feed-in electricity (%)	-	-7.72%	0.28%
Bus-bar tariff (%)	-	-7.52%	0.28%
Biomass residue price (%)	-0.84%	-7.52%	-

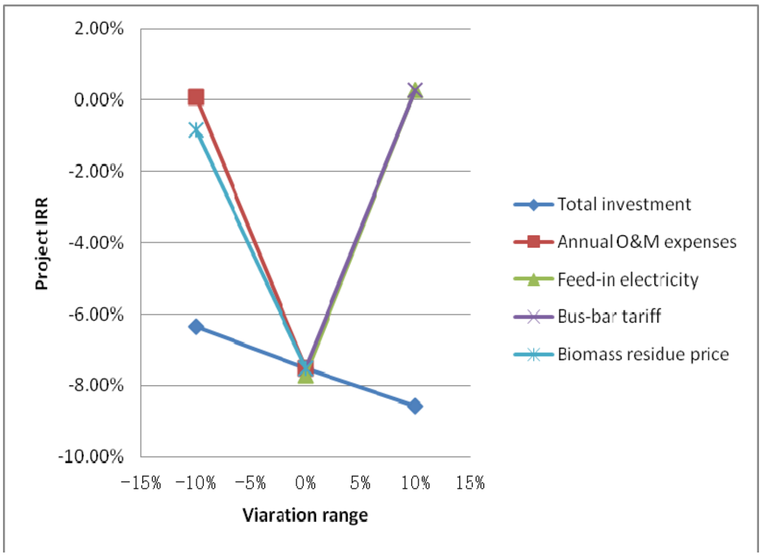

Figure 4. the IRR sensitivity to different financial indicators of the Project
(without CERs sales revenues)

As shown in the sensitivity analysis, the variation range of the uncertain factors could not increase the IRR of the Project to reach the benchmark.

For further consideration, the IRR of the Project could reach the benchmark 8% if one of the following conditions is achieved:

- The Total investment decreases by at least 70.91%;
- The Annual O&M Cost decreases by at least 25.94%;
- The Feed-in electricity increases by at least 25.15%;
- The Bus-bar tariff increases by at least 25.15%;
- The Biomass residue price decreases by at least 30.75%.

However, none of these conditions can be achieved due to the following reasons:

• **Regarding the Total investment**

The actual total investment is about 297.59 million RMB, which is more than the total project cost estimated in the FSR (292.8464 Million RMB), therefor it is impossible to decrease the total project cost by 70.91%.

- **Regarding the Biomass residue price and O&M Cost**

The Biomass residue price in the FSR was 270 RMB/t (excluding VAT) and was 305 RMB/t (including VAT), however the actual purchase price is 330~375 RMB/t[3], much higher than the estimated price in the FSR. Considering that the biomass price is based on the labor cost, collection cost, transportation cost and pre-treatment cost, it is reasonable that the price of biomass fuel increases now and will keep increasing in the future, as the Chinese economy is experiencing a relatively high inflation in recent years, both Producer Price Index (PPI) and employee payrolls increase fast[45]. Therefore it is impossible for the biomass residue price to decrease by 30.75%.

The O&M Cost consists of biomass residue cost, salary and welfare of employees, material cost, water cost, maintenance cost, and miscellaneous cost. As analyzed above, the biomass residue price is increasing. For the other part of O&M cost, according to *China Statistical Yearbook 2011*, the trends of *Purchasing Price Index for Raw Material, Fuel and Power* and *Average Annual Salary and Welfare* keep increasing in recent years. Therefore, it is impossible to decrease the O&M cost of the Project by 25.94%.

- **Regarding Feed-in electricity**

The project IRR could reach 8% when the feed-in electricity would increase by 25.15%, which means the operating hours would increase by 25.15%, that is 8,760.5 hours. It's unrealistic. Therefore, it is impossible to increase the feed-in electricity by 25.15%.

- **Regarding the Tariff**

During the FSR preparation period, the policies and documents for renewable energy were referred to. According to *Trial Measures for the Administration of Renewable Energy Power Price and Cost-sharing (Fagaijiage[2006]No.7)*, the tariff of renewable energy project would be 0.25RMB/kWh (including VAT) higher than the standard tariff for thermal power projects, and the standard tariff for thermal power projects in Anhui Province was 0.371RMB/kWh (including VAT). Given above, the tariff of the Project was estimated as 0.621RMB/kWh in the FSR.

As analyzed above, the biomass residue price is increasing as the Chinese economy is experiencing a relatively high inflation in recent years, bringing more and more pressure on the already heavily burdened biomass residue fired power plants. The National Development and Reform Commission on 18/07/2010 issued the Notice regarding On-grid Tariff of Electricity Generation from Agroforestry Biomass Residues, regulating that the on-grid tariff of generation from agroforestry biomass residues is fixed to be 0.75RMB/kWh (including VAT)[6], in order to cover certain cost of the increasing purchasing price of the biomass residue for the biomass residue fired power plants, and in the reverse more important angle it is to increase the income of the local farmer. The tariff is increased as the biomass residue price is increased, so the increased tariff has little impact on the Project IRR. What's more, if the tariff of 0.75 RMB/kWh

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[3] The biomass residue purchase receipts have been provided to DOE.

[4] *Data source: A news article titled:"PPI Increase by 4.6% in November, New High in 2007"* http://www.zjol.com.cn/05biz/system/2007/12/12/009048527.shtml

[5] *Data source: A news article titled:" In 2007, Rising Rate of The Average Wage of On-duty Staff and Workers in Urban Areas is The Highest in Past 6 Years." http://finance.people.com.cn/GB/1037/7072896.html*

[6] http://www.sdpc.gov.cn/xwfb/t20100723_362409.htm

(including VAT) is adopted, the IRR of the Project will still not reach the benchmark of 8%, even based on the biomass reside price in the FSR, but not the higher actual purchasing price. Meanwhile considering the tariff of 0.75 RMB/kWh is much higher than the traditional coal power plants, it will be impossible to increase the tariff in such a big extent by 25.15%.

Therefore, it can be regarded that the alternative Combination P1 and B4 is not economically feasible.

Outcome of Step 3:
In summary, the baseline scenario of the Project is listed in the table 7 below:

Table 7. The baseline scenario

Combined scenario	Electricity generation	Use of biomass residues
2	P5	B1

If the Project can be successfully registered as a CDM project, the CERs sales revenues will guarantee the loan payback, supplement the high investment of the Project and significantly improve the financial indicators of the Project. Considering the CERs sales revenues, the IRR of the Project will be significantly improved to beyond the benchmark, as shown in Table 8.

Table 8. Comparison of the IRR of the Project with and without CERs sales revenues

	the Project	the benchmark
Without CERs sales revenues (%)	-7.52	8
With CERs sales revenues (%)	8.25	8

It is shown in Table 8 that the CERs sales revenues can alleviate the economic barriers to make the Project feasible.

STEP 4. Common practice analysis

As per the *Guidelines on Common Practice* (version 02.0), the common practice is conducted as below:

Sub-step 4-1: Calculate applicable capacity or output range as +/-50% of the total design capacity or output or capacity of the proposed project activity

The total installation capacity of the Project is 30MW, and thus the +/- 50% of the capacity of the Project, which is from 15MW to 45MW, is the applicable output range.

Sub-step 4-2: Identify similar projects (both CDM and non-CDM) which fulfil all of the following conditions:
(a) The projects are located in the applicable geographical area;
(b) The projects apply the same measure as the proposed project activity;
(c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity;
(d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant;
(e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step sub-step 4-1;
(f) The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity.

In China, the general environment of biomass power projects such as the biomass resources, tariff, and investment climate are only similar and comparable in the same province. Therefore, Anhui province is defined as the applicable geographical area. The start date of the Project was 28/03/2010, which is earlier than the date of publication for global stakeholder consultation (03/03/2012). Hence the similar projects are those biomass residues fired power plants within the applicable output range (15MW to 45MW) and operated before 28/03/2010 in Anhui province.

Sub-step 4-3: Within the projects identified in Sub-step 4-2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number N_{all}.

N_{all} is the number of biomass residues fired power plants within the applicable output range (15MW to 45MW) and operated before 28/03/2010 in Anhui province, except for the registered CDM projects, projects submitted for registration and under validation projects.

Sub-step 4-4: within similar projects identified in Sub-step 4-3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number N_{diff}.

In 2002, investment and operation environment for power generation projects in China have fundamentally changed[7]. Assume $N_{all} = N_{all\ before\ 2002} + N_{all\ after\ 2002}$, then the number $N_{all\ before\ 2002}$ is included in the N_{diff}.

Therefore, $N_{diff} = N_{all\ before\ 2002}$

Searching from public available sources, China's DNA website and UNFCCC website, all biomass power projects with capacity of 15MW-45MW operated from 2002 to 28/03/2010 in Anhui province are registered as CDM projects or undergoing validation. Therefore, $N_{all\ after\ 2002} = 0$.

Sub-step 4-5: Calculate factor $F=1-N_{diff}/N_{all}$ representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.

Since $N_{all} = N_{all\ before\ 2002} + N_{all\ after\ 2002}$, $N_{diff} = N_{all\ before\ 2002}$, $N_{all\ after\ 2002} = 0$
$N_{all} = N_{diff}$
Therefore, $N_{all} - N_{diff} = 0$, which is less than 3.

The Project activity is not a "common practice".

Outcome of Step 4:
Based on the analysis above, the project is additional.

Based on the analysis above, the baseline scenario is:
Combination of P5 and B1: The generation of power in the grid, and the biomass residues are dumped or left to decay mainly under aerobic conditions.

[7] http://news.sohu.com/64/31/news205353164.shtml

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):

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As per ACM0018, the additionality of the proposed project is demonstrated simultaneously during the identification of the baseline scenario in section B.4.

The starting date of the project activity is before the date of validation. Table 9 demonstrates that the incentive from the CDM was seriously considered in the decision to proceed with the project activity.

Table 9 Timeline of the Project

No.	**Date**	**Milestone**
1	08/ 2009	Feasibility Study Report (FSR) was finished. It shows the Project is financially unattractive and CDM revenues should be needed to make the Project feasible.
2	08/12/2009	The project owner held the board meeting, deciding to implement the Project considering the CDM revenue.
3	17/03/2010	Approval of FSR
4	28/03/2010	Construction Contract was signed
5	31/03/2010	Construction was started
6	02/04/2010	Boiler Purchase Contract was signed.
7	03/04/2010	Turbine and Generator Purchase Contract was signed
8	20/05/2010	China DNA Notification
9	26/09/2010	EB Notification*
10	03/01/2011	The Project was put into operation.
11	23/03/2011	The project owner signed CDM Termsheet with EDF Trading Limited.
12	09/11/2011	Emission Reductions Purchase Agreement was signed.
13	03/03/2012	The PDD was published for global stakeholder consultation.

* The project owner submitted the notification letter to UNFCCC secretariat on 26/09/2010, but due to the network problem between the UNFCCC secretariat and the project owner, the email hasn't been received by UNFCCC secretariat. Therefore, this notification hasn't been shown on UNFCCC website. The project owner sent an email to UNFCCC secretariat to ask about the status on 26/10/2011, but no response was received still due to the network problem.
On 29/11/2011, the buyer sent an email to UNFCCC secretariat to enquire about this type of issue. The UNFCCC secretariat replied that the secretariat is not in a position to retroactively date the notification forms, and the validating DOE is responsible for verifying that the project was submitted within the required submission time frame.

As described above, although the notification is not shown in UNFCCC website, the Project has obeyed the guideline to submit the notification letter to both China DNA and UNFCCC secretariat, which shows that he CDM has been seriously considered in the decision to implement the project activity. Relavant email records have been provided to DOE for verification.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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According to the ACM0018, the project reduces CO_2 emissions through substitution of power generation with fossil fuels by energy generation with biomass residues. The emission reduction ER_y by the project during a given year y is the difference between the emission reductions through substitution of electricity generation with fossil fuels (BEy)., project emissions (PE_y), emissions due to leakage (LE_y) as equation (1):

Emission Reductions

$$ER_y = BE_y - PE_y - LE_y \quad (1)$$

Where:
ER_y =Emissions reductions during year y (tCO_2)
BE_y =Baseline emissions during year y (tCO_2)
PE_y =Project emissions during year y (tCO_2)
LE_y =Leakage emissions during year y ((tCO_2)

Baseline Emissions

Note: The project activity will not claim the baseline emission reductions from decay of biomass residues. Therefore, the baseline emissions include the following emission source:

- CO_2 emissions from grid-connected fossil fuel power plants in the electricity system;

Baseline emissions are calculated as follows:

$$BE_y = BE_{EL,y} \quad (2)$$

Where:
BE_y =Baseline emissions in year y (tCO_2)
$BE_{EL,y}$ =Baseline emissions due to generation of electricity in year y(tCO_2)

Baseline emissions are determined through the following steps:

Step 1: Determination of $BE_{EL,y}$

Baseline emissions from electricity generation are calculated based on the net quantity of electricity generated at the project site under the project scenario ($EG_{PJ,y}$) and a baseline emission factor ($EF_{BL,EL,y}$) which expresses the weighted average CO_2 intensity of electricity generation in the baseline, as follows:

$$BE_{EL,y} = EG_{PJ,y} * EF_{BL,EL,y} \quad (3)$$

Where:
$BE_{EL,y}$ =Baseline emissions due to generation of electricity in year y (tCO_2)
$EG_{PJ,y}$ =Net quantity of electricity generated in all power plants which are located at the project site and included in the project boundary in year y (MWh)
$EF_{BL, EL,y}$ =Emission factor for electricity generation in the baseline in year y (tCO_2/MWh)

Step: 1.1 Determination of $EG_{PJ,y}$

The net quantity of electricity generated in all power plants which are located a the project site and included in the project boundary ($EG_{PJ,y}$) is determined as the difference between the gross electricity generation at the project site ($EG_{PJ,gross,y}$) and the total auxiliary electricity consumption required for the operation of the power plants at the project site ($EG_{PJ,aux,y}$), as follows:

$$EG_{PJ,y} = EG_{PJ. Gross. y} - EG_{PJ .aux y} \quad (4)$$

Where:
$EG_{PJ,y}$ =Net quantity of electricity generated in all power plants which are located at the project site and included in the project boundary in year y (MWh)
$EG_{PJ,gross,y}$ =Gross quantity of electricity generated in all power plants which are located at the project site

and included in the project boundary in year y (MWh)
$EG_{PJ,aux,y}$ =Total auxiliary electricity consumption required for the operated of the power plants the project site (MWh)

Step: 1.2 Determination of $EF_{BL,EL,y}$
The electricity generated under the project activity could be generated in the baseline in three different ways, depending on the baseline scenario and the particular situation of the project activity:

- **Use of biomass residues at the project site**. Electricity could be generated with biomass residues in power plants at the project site.
- **Use of fossil fuels at the project site.** Electricity could be generated with fossil fuels in power plants at the project site.
- **Power generation in the electricity grid.** Electricity could be generated by power plants in the electricity grid.

For some project types, electricity would be generated in the baseline by a combination of these three ways. Therefore, $EF_{BL,EL,y}$ is a weighted average baseline emission factor: it is determined based on each of the three ways electricity could be generated (grid, biomass residues, fossil fuels), multiplied with its respective emission factor over the total amount of electricity produced in the baseline.

For the project activity, the project activity exports all electricity to the grid and no electricity would be produced at the project site in the baseline.
ACM0018 gives an approach to calculate $EF_{BL,EL,y}$ as follows:

$$EF_{BL,EL,y} = \frac{EG_{BL,FF,y} \bullet EF_{BL,FF,y} + EG_{BL,grid,y} \bullet EF_{grid,CM,y} + EG_{BL,FF/grid,y} \bullet MIN(EF_{BL,FF,y}; EF_{grid,CM,y})}{EG_{BL,BR,y} + EG_{BL,FF,y} + EG_{BL,grid,y} + EG_{BL,FF/grid,y}}$$

(5)
Where:
$EF_{BL,EL,y}$ =Emission factor for electricity generation in the baseline in year y (tCO2/MWh)
$EG_{BL,BR,y}$ =Amount of electricity that would be generated with biomass residues in power-only Plants operated at the project site in the baseline in year y (MWh)
$EG_{BL,FF,y}$ =Minimum amount of electricity that would be generated with fossil fuels at the project site in the baseline in year y (MWh)
$EG_{BL,grid,y}$ =Minimum amount of electricity that would be generated by power plants in the electricity grid in the baseline in year y (MWh)
$EG_{BL,FF/grid,y}$= Amount of electricity that would be generated in the baseline either by power plants in the electricity grid or by power plants at the project site using fossil fuels in year y(MWh)
$EF_{grid,CM,y}$ =Combined margin CO2 emission factor for grid-connected electricity generation in year y (tCO_2/MWh)
$EF_{BL,FF,y}$ =CO_2 emission factor for electricity generation with fossil fuels in power plant(s) at the project site in the baseline in year y(tCO_2/MWh)

In the following , first amounts of electricity generated from the various sources in the baseline ($EG_{BL,BR,y}$,$EG_{BL,grid,y}$, $EG_{BL,FF,y}$ and $EG_{BL,FF/grid,y}$) are determined ,taking into account the project configuration the baseline scenario. Therefore, different cases have to be considered. Then the emission factors ($EF_{grid,CM,y}$ and $EF_{BL,FF,y}$) are determined.

Step 1.3: Determination of $EG_{BL,BR,y}$
In the baseline scenario for the project activity, there is no electricity that would be generated with biomass residues in power-only plants operated at the project site, therefore, according to ACM0018, $EG_{BL,BRy}$=0.

Step 1.4: Determination of $EG_{BL,FF,y}$

In the baseline scenario for the project activity, there is no electricity that would be generated with fossil fuels at the project site, therefore, according to ACM0018, $EG_{BL,FF,y}$=0.

Step 1.5: Determination of $EG_{BL,grid,y}$

In the baseline scenario for the project activity, the electricity supplied by the project will replace equivalent amount of electricity in the power grid, therefore, according to ACM0018,$EG_{BL,grid,y}=EG_{PJ,y}$.

Step 1.6 : Determination of $EG_{BL,FF/grid,y}$

$EG_{BL,FF,grid,y}$ represents the amount of electricity that could be generated in the baseline in the grid or at the project site using fossil fuels. $EG_{BL,FF/grid,y}$ corresponds to the remainder of electricity generation,i.e.the amount that exceeds the minimum electricity that would be generated by power plants in electricity grid($EG_{BL,grid,y}$), the minimum amount of electricity that could be generated with fossil fuels at the project site ($EG_{BL,FF,y}$), and the amount of electricity that would be generated with biomass residues at the project site ($EG_{BL,BR,y}$). Accordingly, $EG_{BL,FF/grid,y}$ is calculated as follows:

$$EG_{BL,FF/grid\,y} = EG_{PJ,y} - EG_{BL,BR\,y} - EG_{BL,FF\,y} - EG_{BL\,grid\,y} \qquad (6)$$

Where:

$EG_{BL,FF/grid,y}$ =Amount of electricity that could be generated in the baseline either by power plants in the electricity grid or by power plants at the project site using fossil fuels in year y (MWh)

$EG_{PJ,y}$ =Electricity generated in power plants included in the project boundary in year y (MWh)

$EG_{BL,BR,y}$ =Amount of electricity that would be generated with biomass residues in power-only plants operated at the project site in baseline in year y (MWh)

$EG_{BL,FF,y}$ =Minimum amount of electricity that would be generated with fossil fuels at the project site in the baseline in year y(MWh)

$EG_{BL,grid,y}$ =Minimum amount of electricity that would be generated by power plants in the electricity grid in the baseline in year y (MWh)

According to the analysis from Step 1.3 to step 1.5, the above function about be calculated as below:

$$EG_{BL,FF/grid\,y} = EG_{PJ,y} - EG_{BL,BR\,y} - EG_{BL,FF\,y} - EG_{BL\,grid\,y} = EG_{PJ,y} - 0 - 0 - EG_{PJ,y} = 0$$

Step 1.7: Determination of $EF_{BL,FF,y}$

$EF_{BL,FF,y}$ should be determined using Option A or Option B below. If fossil fuel power plants were operated at the project site prior to the implementation of the project activity, either Option A or Option B can be used to determine $EF_{BL,FF,y}$. For new power plants that would be constructed at the project site in the baseline scenario, Option B should be used.

According to the analysis of baseline scenario in section B.4, the project is a newly built power-only project and no power plants were or would be operated at the project site prior to the implementation of the project in the baseline scenario, then it is not applicable.

Step 1.8: Determination of $EF_{grid,CM,y}$

$EF_{grid,CM,y}$ should be determined as the combined margin CO_2 emission factor for grid connected power generation in year *y*, calculated using the latest approved version of the "Tool to calculate the emission factor for an electricity system". The Tool was applied in the following steps:

STEP 1. Identify the relevant electric power system

In accordance with the *Tool to Calculate the Emission Factor for an Electricity System*, the project electricity system of the Project is identified according to the delineation of the project electricity system and connected electricity systems published by China's DNA.

Electricity generated by the Project will be delivered to the Anhui Province. According to the *China's 2011 Baseline Emission Factors for Regional Power Grid in China* issued by China's DNA which provides the delineation of relevant electric power systems, the East China Power Grid is the relevant electric power system of the Project.

STEP 2: Choose whether to include off-grid power plants in the project electricity system (optional)
Option I (only grid power plants are included in the calculation) provided in Tool to Calculate the Emission Factor for an Electricity System is chosen to calculate the operating margin and build margin emission factor.

STEP 3. Select an operating margin (OM) method

Four methods are provided in the *Tool to calculate the emission factor for an electricity system* for the calculation of Operating Margin Emission Factor(s) ($EF_{grid,OM,y}$), they are

(a) Simple OM, or
(b) Simple adjusted OM, or
(c) Dispatch data analysis OM, or
(d) Average OM.

As per the *Tool to calculate the emission factor for an electricity system*, with reference to the *2010 Baseline Emission Factors for Regional Power Grid in China*, method (a) simple OM is employed for calculation of the operating margin emission factor(s) ($EF_{grid,OM,y}$) of the Project.

As per the *Tool to calculate the emission factor for an electricity system*, the simple OM method only can be used when low-cost/must run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production. Among the total electricity generation of the East China Power Grid which the Project is connected to, the amount of low-cost/must run resources accounts for about 11.94% in 2005, 11.44% in 2006, 10.92% in 2007, 12.32% in 2008 and 11.31% in 2009, all less than 50%. Thus, the method (a) simple OM can be used to calculate the baseline emission factor of operating margin ($EF_{grid,OM,y}$) for the Project.

The emission factors were determined ex ante (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) and will not be updated during the first crediting period.

STEP 4. Calculate the operating margin emission factor ($EF_{grid,OMsimple,y}$) according to the selected method

Three options are provided in the *Tool to Calculate the Emission Factor for an Electricity System* for the determination of the simple OM emission factor ($EF_{grid,OMsimple,y}$). Since the data on fuel consumption, net electricity generation, the average efficiency and the fuel type(s) used in each power unit in the East China Power Grid are not available, , Option A and B can't be used. According to *2011 Baseline Emission Factors for Regional Power Grid in China*, nuclear and renewable power generation are considered as low-cost / must-run power sources and the quantity of electricity supplied to the grid by these sources is known as stated in step 2 above, Option C (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) is adopted to calculate the simple OM emission factor ($EF_{grid,OMsimple,y}$). The formula of $EF_{grid,OMsimple,y}$ calculation is

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_y} \qquad (7)$$

where:
$EF_{grid,OMsimple,y}$ is the simple operating margin CO_2 emission factor in year y (tCO_2e /MWh);
$FC_{i,y}$ is the amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit);
$NCV_{i,y}$ is the net calorific value (energy content) of fossil fuel type i in year y (GJ/ mass or volume unit);
$EF_{CO2,i,y}$ is the CO_2 emission factor of fossil fuel type i in year y (tCO_2e /GJ);
EG_y is the 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 are all fossil fuel types combusted in power sources in the project electricity system in year y;
y is the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation.

With reference to the *2011 Baseline Emission Factors for Regional Power Grid in China*, the simple OM emission factor ($EF_{grid,OM,y}$) of the East China Power Grid is 0.8367 tCO_2e/MWh (see Annex 3 for details).

Step 5. Calculate the build margin emission factor

Considering data availability, CDM EB accepts the following deviation in application of methodology[8]:
1) Use of capacity additions during the last 1~3 years for estimating the build margin emission factor for grid electricity.
2) Use of weights estimated using installed capacity in place of annual electricity generation.

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

Therefore for the Project: First, calculate the share of different power generation technology in recent capacity additions. Second, calculate the weight for capacity additions of each power generation technology. And finally calculate the emission factor using the efficiency level of the best technology commercially available in China.

According to the *Tool to calculate the emission factor for an electricity system*, project participants shall choose between one of the following two options to calculate the Build Margin Emission Factor ($EF_{grid,BM,y}$).

Option 1. Calculate the Build Margin emission factor ($EF_{grid,BM,y}$) ex-ante based on the most recent

8 Http://cdm.unfccc.int/Projects/Deviations.

information available on plants already built for sample group m at the time of PDD submission.
Option 2. For the first crediting period, the Build Margin emission factor ($EF_{grid,BM,y}$) must be updated annually ex-post for the year in which actual project generation and associated emissions reductions occur. For subsequent crediting periods, the Build Margin emission factor ($EF_{grid,BM,y}$) should be calculated ex-ante, as described in option 1 above.

Option 1, calculate the Build Margin emission factor ($EF_{grid,BM,y}$) ex-ante based on the most recent information available on plants already built for sample group m at the time of PDD submission is employed by the Project.

According to the *Tool to calculate the emission factor for an electricity system*, calculate the Build Margin Emission Factor ($EF_{grid,BM,y}$) to the using equation (8):

$$EF_{grid,BM,y} = \frac{\sum_{m} EG_{m,y} \times EF_{EL,m,y}}{\sum_{m} EG_{m,y}} \qquad (8)$$

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

Since the data of installed capacity can not be separated into coal fired, oil fired and gas fired currently, BM is calculated by the following steps and formula:

Step a. Calculate the power generation emissions of solid fuel, liquid fuel and gas fuel and each share in the total emissions based on the *Energy Balance Table* of the most recent year.

$$\lambda_{Coal} = \frac{\sum_{i \in COAL, j} FC_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{\sum_{i,j} FC_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,y}} \qquad (9)$$

$$\lambda_{Oil} = \frac{\sum_{i \in OIL, j} FC_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{\sum_{i,j} FC_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,y}} \qquad (10)$$

$$\lambda_{Gas} = \frac{\sum_{i \in GAS, j} FC_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{\sum_{i,j} FC_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,y}} \qquad (11)$$

where:
$FC_{i,j,y}$ is the amount of fuel i (in a mass or volume unit) consumed by power plant j in year(s) y;
$NCV_{i,y}$ is the net calorific value (energy content) of fossil fuel type i in year y (GJ/ mass or volume unit);

$EF_{CO2,i,y}$ is the CO_2 emission factor of fossil fuel type i in year y (tCO_2/GJ);
COAL, OIL and GAS are footnote group for solid fuels, liquid fuels and gas fuels.

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

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv} \quad (12)$$

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

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

$$EF_{grid,BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal} \quad (13)$$

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

The data on different fuel consumptions for power generation and the net caloric values of the fuels are obtained from the *China Energy Statistical Yearbook* from 2008 to 2010. The emission factors and oxidation factors of the fuels employed are obtained from Table 1.3 and Table 1.4 on page 1.21-1.24 of volume 2 of 2006 *IPCC Guidelines for National Greenhouse Gas Inventories*.

With reference to the *2011 Baseline Emission Factors for Regional Power Grid in China*, the Build Margin emission factor ($EF_{grid,BM,y}$) of the East China Power Grid is 0.6622 tCO_2e/MWh.

Step 6. Calculate the combined margin emissions factor

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

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times \omega_{OM} + EF_{grid,BM,y} \times \omega_{BM} \quad (14)$$

According to the *Tool to calculate the emission factor for an electricity system*, the weight w_{OM} is 0.5 and the weight w_{BM} is 0.5 for biomass power projects. Therefore the combined baseline emission factor $EF_{grid,CM,y}$ =0. 5×0.8367+0.5×0.6622 =0.74945 (tCO_2e/MWh).

Therefore, $EF_{BL,EL,y} = EF_{grid,CM,y}$ =0.74945 tCO_2e/MWh

Project Emissions

The project activity will not claim the baseline emission reductions from decay of biomass residues, and biomass residue will be transported directly to the plant storage site, so there will be no electricity use off-site. Therefore, Project emissions are calculated as follows:

$$PE_y = PE_{FF,y} + PE_{TR,y} \quad (15)$$

Where:
PE_y = Project emissions during year *y* (tCO_2e)
$PE_{FF,y}$ = Emissions during the year *y* due to fossil fuel consumption (tCO_2)
$PE_{TR,y}$ = Emissions during the year *y* due to transport of the biomass residues to the project plant (tCO_2)

Determination of PE_{FFy}

The following emission sources should be included in determining $PE_{FF,y}$:

1. Emissions from on-site fossil fuel consumption for the generation of electric power.
2. If any fossilized or non-biodegradable materials are used in the processing of biomass residues and incorporated in the processed biomass residues (e.g. binders) then emissions arising from those materials should be accounted for when the processed biomass residues are combusted.
3. Emissions from on-site fossil fuel consumption of auxiliary equipment and systems related to the generation of electric power.
4. Fossil fuels required for the operation of equipment related to the on-site or off-site preparation, storage, processing and transportation of fuels and biomass residues (e.g. for mechanical treatment of the biomass, conveyor belts, driers, pelletization, shredding, briquetting processes, etc.).

As the Project will not co-fire fossil fuel and will not use any fossilized or non-biodegradable materials in the processing of biomass residues, only emission source 3 and emission source 4 listed above need to be considered.

The latest approved version of the *Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion* are applied to calculate $PE_{FF,y}$.

$$PE_{FF,y} = FC_{i,project,,y} * NCV_i * EF_{CO2,i} \quad (16)$$

Where:
$FC_{i,project,,y}$ =Quantity of fossil fuel type *i* combusted at the project site and off site attributable to the project activity during the year *y* (mass unit per year).
NCV_i =Net calorific value of fossil fuel type *i* (GJ / mass unit)
$EF_{CO2,i}$ =CO_2 emission factor for fossil fuel type *i* (tCO_2e/GJ)

Determination of $PE_{TR,y}$

For the Project, transportation is undertaken by vehicles. According to "*Project and leakage emissions from road transportation of freight*", project participants may choose between two different approaches to determine emissions: monitoring fuel consumption (Option A) or using conservative default values (Option B). Option B is adopted by the project, and, $PE_{TR,y}$ are determined as follows:

$$PE_{TR,y} = PE_{TR,m} = \sum D_{f,m} \times FR_{f,m} \times EF_{CO2,f} \times 10^{-6} \quad (17)$$

Where:
$PE_{TR,m}$ = Project emission from road transportation of freight in monitoring period m (tCO_2)
$D_{f,m}$ = Return trip road distance between the origin and destination of freight transportation activity *f* in monitoring period m (km)
$FR_{f,m}$ = Total mass of freight transported in freight transportation activity *f* in monitoring period m (t)
$EF_{CO2,f}$ = Default CO_2 emission factor for freight transportation activity *f* (gCO_2/t km)
f = Freight transportation activities conducted in the project activity in monitoring period m

Leakage

The main potential source of leakage for this project activity is an increase in emissions from fossil fuel combustion or other sources due to diversion of biomass residues from other uses to the project plant as a result of the project activity. Changes in carbon stocks in the LULUCF sector are expected to be insignificant since this methodology is limited to biomass residues, as defined in the applicability conditions above. The baseline scenarios for biomass residues for which this potential leakage is relevant are B5:, B6:, B7: and B8:. According to the analysis of baseline scenario in section B.4, the baseline for use of biomass residues is B1, which is the biomass residues are dumped or left to decay under mainly aerobic conditions. Therefore leakage effects do not need to be addressed according to consolidated methodology ACM0018, i.e. $L_y=0$ tCO_2e.

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

>>

With consideration of the fact of the Project, data and parameters that are available at validation are summarized in below tables. To make the PDD clear for understanding, parameters provided in the methodology ACM0018 but not used for the Project are not listed.

Data / Parameter:	$EF_{grid,OM,y}$
Data unit:	tCO_2e/MWh
Description:	The operating margin emission factor
Source of data used:	*2011 Baseline Emission Factors for Regional Power Grid in China*
Value applied:	0.8367
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data obtained from the *2011 Baseline Emission Factors for Regional Power Grid in China* issued by China's DNA are reliable.
Any comment:	-

Data / Parameter:	$EF_{grid,BM,y}$
Data unit:	tCO_2e/MWh
Description:	The building margin emission factor
Source of data used:	*2011 Baseline Emission Factors for Regional Power Grid in China*
Value applied:	0.6622
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data obtained from the *2011 Baseline Emission Factors for Regional Power Grid in China* issued by China's DNA are reliable.
Any comment:	-

Data / Parameter:	$EF_{grid,CM,y}$
Data unit:	tCO_2e/MWh
Description:	The combined baseline emission factor
Source of data used:	*2011 Baseline Emission Factors for Regional Power Grid in China*

Value applied:	0.74945
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data obtained from the *2011 Baseline Emission Factors for Regional Power Grid in China* issued by China's DNA are reliable.
Any comment:	-

Data / Parameter:	$GEN_{j,y}$
Data unit:	MWh
Description:	Total power generation of province j of East China Power Grid in year y
Source of data used:	*China Electric Power Yearbook* 2008~2010 edition
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data obtained from the *China Electric Power Yearbook* issued by authorized entity in China are reliable.
Any comment:	-

Data / Parameter:	$r_{j,y}$
Data unit:	%
Description:	Auxiliary electricity consumption rate of province j of East China Power Grid in year y
Source of data used:	*China Electric Power Yearbook* 2008~2010 edition
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data obtained from the *China Electric Power Yearbook* issued by authorized entity in China are reliable.
Any comment:	-

Data / Parameter:	$EF_{CO2,i,y}$
Data unit:	tC/TJ
Description:	CO_2 emission factor per unit of energy of the fuel i
Source of data used:	*2006 IPCC Guideline 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 :	The data obtained from *2006 IPCC Guideline for National Greenhouse Gas Inventories* are reliable.
Any comment:	-

Data / Parameter:	$CAP_{j,y}$
Data unit:	MW
Description:	Total installed capacity of province j of East China Power Grid in year y
Source of data used:	*China Electric Power Yearbook* 2008~2010 edition
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data obtained from the *China Electric Power Yearbook* issued by authorized entity in China are reliable.
Any comment:	-

Data / Parameter:	$NCV_{i,y}$
Data unit:	TJ per mass or volume unit of fuel i
Description:	Net caloric value of fuel i
Source of data used:	P287 of *China Energy Statistical Yearbook* 2010 edition
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data obtained from the *China Energy Statistical Yearbook* issued by authorized entity in China are reliable.
Any comment:	-

Data / Parameter:	$FC_{i,j,y}$
Data unit:	t or m^3
Description:	Consumption of fuel type i of province j of East China Power Grid in year y
Source of data used:	*China Energy Statistical Yearbook* 2008~2010 edition
Value applied:	See Annex 3 for details.
Justification of the	The data obtained from the *China Energy Statistical Yearbook* issued by

choice of data or description of measurement methods and procedures actually applied :	authorized entity in China are reliable.
Any comment:	-

Data / Parameter:	Oxidation rate
Data unit:	-
Description:	Oxidation rate of the fuel i
Source of data used:	*2006 IPCC Guideline 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 :	The data obtained from *2006 IPCC Guideline for National Greenhouse Gas Inventories* are reliable.
Any comment:	-

Data / Parameter:	$FC_{adv,coal}$
Data unit:	gCe/kWh
Description:	weighted average fuel consumption for power generation of top 30 sets of 600 MW coal fired power generation units set up in 2009 (taken as efficiency level of the best technology commercially available in China)
Source of data used:	*2011 Baseline Emission Factors for Regional Power Grid in China*
Value applied:	311.5
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data obtained from the *2011 Baseline Emission Factors for Regional Power Grid in China* made publicly available by China's DNA are reliable.
Any comment:	-

Data / Parameter:	$FC_{adv,oil/gas}$
Data unit:	gCe/kWh
Description:	weighted average fuel consumption for power generation of 200 MW oil/gas fired combined cycle power generation units (taken as efficiency level of the best technology commercially available in China)
Source of data used:	*2011 Baseline Emission Factors for Regional Power Grid in China*
Value applied:	237.4
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data obtained from *2011 Baseline Emission Factors for Regional Power Grid in China* are reliable.
Any comment:	-

<table>
<tr><td>Data / Parameter:</td><td>Biomass residues categories and quantities used for the selection of the baseline scenario selection and assessment of additionality</td></tr>
<tr><td>Data unit:</td><td>- Type;
- Source;
- Fate in the absence of the project activity (scenarios B);
- Use in the project scenario (scenarios P);
- Quantity (tonnes on dry-basis)</td></tr>
<tr><td>Description:</td><td>Refer to Table B.3 in section B.4</td></tr>
<tr><td>Source of data used:</td><td>Feasibility Study Report</td></tr>
<tr><td>Value applied:</td><td>
<table>
<tr><th>No.</th><th>Biomass residue type</th><th>Biomass residues source</th><th>Biomass residues fate in the absence of the project activity</th><th>Biomass residues use in project scenario</th><th>Biomass residues quantity (10^4 tonnes on dry-basis)</th></tr>
<tr><td>1</td><td>Rice straw</td><td>Offsite from local farmer</td><td>Dumped (B1)</td><td>Electricity generation on-site (biomass-only boiler)</td><td>4.80</td></tr>
<tr><td>2</td><td>Peanut straw</td><td>Offsite from local farmer</td><td>Dumped (B1)</td><td>Electricity generation on-site (biomass-only boiler)</td><td>2.56</td></tr>
<tr><td>3</td><td>Maize straw</td><td>Offsite from local farmer</td><td>Dumped (B1)</td><td>Electricity generation on-site (biomass-only boiler)</td><td>3.45</td></tr>
<tr><td>4</td><td>Wood residues</td><td>Offsite from local farmer</td><td>Dumped (B1)</td><td>Electricity generation on-site (biomass-only boiler)</td><td>8.86</td></tr>
</table>
</td></tr>
<tr><td>Justification of the choice of data or description of measurement methods and procedures actually applied :</td><td>Feasibility Study Report was finished by a qualified institute and approved by government. It is a reliable source.</td></tr>
<tr><td>Any comment:</td><td>-</td></tr>
</table>

Data / Parameter:	$EF_{CO2,f}$
Data unit:	g CO_2 / t km
Description:	Default CO_2 emission factor for freight transportation activity *f*
Source of data used:	*"Project and leakage emissions from road transportation of freight" (Version 01.0.0)*
Value applied:	245
Justification of the choice of data or description of measurement methods and procedures actually applied :	In *"Project and leakage emissions from road transportation of freight" (Version 01.0.0)*, the default value of emission factors for Light vehicles and Heavy vehicles are 245 (gCO_2 /t km) and 129 (gCO_2/t km), respectively. For conservativeness, the value of 245 (gCO_2/t km) will be adopted for $PE_{TR,m}$ calculations, no matter the freights are transported by Light vehicles or Heavy vehicles.
Any comment:	-

B.6.3 Ex-ante calculation of emission reductions:

>>

I. Baseline emission

As stated in B.6.1, $BE_y = BE_{EL,y} = (EG_{PJ,gross,y} - EG_{PJ,aux,y}) \bullet EF_{grid,CM,y}$

According to the FSR of the Project, the electricity generation is estimated to be 210,000 MWh, and the auxiliary consumption is 23,100 MWh. According to the *2011 Baseline Emission Factors for Regional Power Grid in China,* the baseline emission factor of the Project is 0.74945 tCO_2e/MWh.

The baseline emissions are calculated as

$BE_y = BE_{EL,y} = (EG_{PJ,gross,y} - EG_{PJ,aux,y}) \bullet EF_{grid,CM,y}$ =(210,000-23,100) ×0.74945=140,072 tCO_2e.

II. Project emission

1.Carbon dioxide emissions from combustion of fossil fuels for transportation of biomass residues to the project plant $PE_{TR,y}$

All the biomass residues supply sites are within 50 kilometers away around the site of the Project, therefore all the values of $D_{f,m}$ is chosen to be 100km for conservativeness.

For the Project, $\sum D_{f,m} \times FR_{f,m}$=100km $\times BF_{TR,y}$=100 km×31×10^4t.

According to *"Project and leakage emissions from road transportation of freight"*, the default value of emission factors for Light vehicles and Heavy vehicles are 245 (gCO_2 /t km) and 129 (gCO_2/t km), respectively. For conservativeness, the value of 245 (gCO_2/t km) is adopted for $PE_{TR,m}$ calculations no matter the freights are transported by Light vehicles or Heavy vehicles.

Therefore:

$PE_{TR,y} = PE_{TR,m} = \sum D_{f,m} \times FR_{f,m} \times EF_{CO2,f} \times 10^{-6} = 31\times10^4\times 100 \times 245 \times 10^{-6}$ = 7,595 tCO_2e.

2. Carbon dioxide emissions from on-site consumption of fossil fuels $PE_{FF,y}$

The Project is estimated to consume 125t diesel a year. The $NCV_{diesel,y}$ is 43.3 GJ/t and $EF_{CO_2e,diesel,y}$ is 0.0748tCO_2e/GJ as IPCC default value.

$PE_{FF,y} = FC_{diesel,project,,y} \bullet NCV_{diesel,y} \bullet EF_{CO_2e,diesel,y}$ =125×43.3×0.0748=405 tCO_2e.

Project emissions are aggregated as below:

$PE_y = PE_{FF,y} + PE_{TR,y}$ =405+7,595=8,000 tCO_2e

III. Estimated project leakage emissions:

As analysis of Section B6.1 above, there is no leakage caused by the project activity.

IV. Estimated emission reductions

$ER_y = BE_y - PE_y - L_y$ =140,072-8,000-0=132,072 tCO_2e/yr

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

>>

Renewable crediting period (7yrs×3) is adopted by the Project. It is expected that the project activity will generate emission reductions of about 924,504 tCO_2e over the first 7-year crediting period from 16/11/2012 to 15/11/2019.

Year	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of baseline emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of overall emission reductions (tonnes of CO_2e)
16/11/2012-31/12/2012	1,000	17,509	0	16,509
2013	8,000	140,072	0	132,072
2014	8,000	140,072	0	132,072
2015	8,000	140,072	0	132,072
2016	8,000	140,072	0	132,072
2017	8,000	140,072	0	132,072
2018	8,000	140,072	0	132,072
01/01/2019-15/11/2019	7,000	122,563	0	115,563
Total (tonnes of CO_2e)	56,000	980,504	0	924,504

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

B.7.1 Data and parameters monitored:

>>

With consideration of the fact of the Project, data and parameters monitored are summarized in below tables. To make the PDD clear for understanding, parameters provided in the methodology ACM0018 but not used for the Project are not listed in below tables.

Data / Parameter:	$EG_{PJ,gross,y}$
Data unit:	MWh
Description:	Gross quantity of electricity generated in all power plants which are located at the project site and included in the project boundary in year *y*
Source of data to be used:	The data used in the PDD are obtained from the FSR of the Project. Actual data will be obtained through on-site measurement.

Value of data applied for the purpose of calculating expected emission reductions in section B.5	210,000
Description of measurement methods and procedures to be applied:	Continuously measured by meter and monthly recorded
QA/QC procedures to be applied:	The accuracy of meter is at least 1.0. The consistency of metered electricity generation should be cross-checked with receipts from electricity sales (if available) and the quantity of fuels fired (e.g. check whether the electricity generation divided by the quantity of fuels fired results in a reasonable efficiency that is comparable to previous years)
Any comment:	-

Data / Parameter:	$EG_{PJ,aux,y}$
Data unit:	MWh
Description:	Total auxiliary electricity consumption required for the operation of the power plants at the project site
Source of data to be used:	The data used in the PDD are obtained from the FSR of the Project. Actual data will be obtained through on-site measurement.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	23,100
Description of measurement methods and procedures to be applied:	Continuously measured by meter and monthly recorded
QA/QC procedures to be applied:	The accuracy of meter is at least 1.0, The consistency of metered electricity generation should be cross-checked with receipts from electricity sales (if available) and the quantity of fuels fired (e.g. check whether the electricity generation divided by the quantity of fuels fired results in a reasonable efficiency that is comparable to previous years)
Any comment:	$EG_{PJ,aux,y}$ shall include all electricity required for the operation of equipment related to the preparation, storage and transport of biomass residues (e.g. for mechanical treatment of the biomass, conveyor belts, driers, etc.) and electricity required for the operation of all power plants which are located at the project site and included in the project boundary (e.g. for pumps, fans, cooling towers, instrumentation and control, etc.)

Data / Parameter:	Biomass residues categories and quantities used in the project activity
Data unit:	- Type; - Source; - Fate in the absence of the project activity (scenarios B);

<table>
<tr><td></td><td>- Use in the project scenario (scenarios P);
- Quantity (tonnes on dry-basis)</td></tr>
<tr><td>Description:</td><td>Refer to table 3 in section B4, the last column corresponds to the quantity of each category of biomass residues (tonnes on dry-basis). These quantities should be updated every year of the crediting period as part of the monitoring plan so as to reflect the actual use of biomass residues in the project scenario. These updated values should be used for emissions reductions calculations.

Along the crediting period, new categories of biomass residues (i.e. new types, new sources, with different fate) can be used in the project activity. In this case, a new line should be added to the table. If those new categories are of the type B1:,B2: or B3:, the baseline scenario for those types of biomass residues should be assessed using the procedures outlined in the guidance provided in the procedure for the selection of the baseline scenario and demonstration of additionality</td></tr>
<tr><td>Source of data to be used:</td><td>On-site measurements</td></tr>
<tr><td>Value of data applied for the purpose of calculating expected emission reductions in section B.5</td><td>
<table>
<tr><td>No.</td><td>Biomass residue type</td><td>Biomass residues source</td><td>Biomass residues fate in the absence of the project activity</td><td>Biomass residues use in project scenario</td><td>Biomass residues quantity (10^4 tonnes on dry-basis)</td></tr>
<tr><td>1</td><td>Rice straw</td><td>Offsite from local farmer</td><td>Dumped (B1)</td><td>Electricity generation on-site (biomass-only boiler)</td><td>4.80</td></tr>
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<tr><td>4</td><td>Wood residues</td><td>Offsite from local farmer</td><td>Dumped (B1)</td><td>Electricity generation on-site (biomass-only boiler)</td><td>8.86</td></tr>
</table>
</td></tr>
<tr><td>Description of measurement methods and procedures to be applied:</td><td>Use weight meters. Adjust for the moisture content in order to determine the quantity of dry biomass. Data monitored continuously and aggregated as appropriate, to calculate emissions reductions.</td></tr>
<tr><td>QA/QC procedures to be applied:</td><td>Crosscheck the measurements with an annual energy balance that is based on purchased quantities and stock changes</td></tr>
</table>

Any comment:	-

Data / Parameter:	For biomass residues categories for which scenarios B1:, B2: or B3: is deemed a plausible baseline alternative, project participants shall demonstrate that this is a realistic and credible alternative scenario
Data unit:	Tonnes
Description:	- Quantity of available biomass residues of type n in the region - Quantity of biomass residues of type n that are utilized (e.g. for energy generation or as feedstock) in the defined geographical region - Availability of a surplus of biomass residues type n (which can not be sold or utilized) at the ultimate supplier to the project and a representative sample of other suppliers in the defined geographical region
Source of data to be used:	Surveys or statistics
Value of data applied for the purpose of calculating expected emission reductions in section B.5	(see table below)
Description of measurement methods and procedures to be applied:	At the validation stage for biomass residues categories identified *ex-ante*, and always that new biomass residues categories are included during the crediting period.
QA/QC procedures to be applied:	-
Any comment:	-

Biomass residue type	Annual available amount (10^4 tonnes o)	Other use, excluding the Project (10^4 tonnes)	The Project use (10^4 tonnes)	Annual available amount/Total annual use
Rice straw	55.3	16.8	6.4	238%
Peanut straw	35.7	12.0	3.2	235%
Maize straw	55.1	16.4	5.3	254%
Wood residues	92.1	20.8	16.1	250%

Data / Parameter:	Moisture content of the biomass residues
Data unit:	% Water content
Description:	Moisture content of each biomass residue type *k*
Source of data to be used:	On-site measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Rice straw: 25%; Maize straw: 35%; Peanut straw: 20%; Wood residues: 45%.
Description of measurement methods and procedures to be applied:	The moisture content should be monitored for each batch of biomass of homogeneous quality. The weighted average should be calculated for each monitoring period and used in the calculations.
QA/QC procedures to be applied:	-
Any comment:	In case of dry biomass, monitoring of this parameter is not necessary.

Data / Parameter:	$NCV_{n,y}$
Data unit:	GJ/tonnes of dry-basis
Description:	Net calorific value of biomass residues of category n in year y
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	-
Description of measurement methods and procedures to be applied:	At least every six months, taking at least three samples for each measurement. Measurements shall be carried out at reputed laboratories and according to relevant international standards. Measure the NCV based on dry biomass.
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:	$D_{f,m}$
Data unit:	Kilometre
Description:	Return trip road distance between the origin and destination of freight transportation activity *f* in monitoring period *m*
Source of data to be used:	Records of vehicle operator or records by project participants
Value of data applied	100

for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Determined once for each freight transportation activity *f* for a reference trip using the vehicle odometer or any other appropriate sources
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	$FR_{f,m}$
Data unit:	tonnes
Description:	Total mass of freight transported in freight transportation activity *f* in monitoring period *m*
Source of data to be used:	Records by project participant
Value of data applied for the purpose of calculating expected emission reductions in section B.5	310,000
Description of measurement methods and procedures to be applied:	Use weight meters. Data monitored continuously and aggregated as appropriate.
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	$FC_{diesel,project,y}$
Data unit:	Mass unit per year
Description:	Quantity of diesel combusted that are attributable to the project activity during the year *y*
Source of data to be used:	On-site measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.5	125 tonnes
Description of measurement methods and procedures to be applied:	Use flow meter, and the volume will be converted into weight using a conservative 0.88 t/m3 specific gravity value (see Asian Development Bank, Annex 6 of *Opportunities for the CDM in the Energy Sector, China*, http://www2.adb.org/Documents/TARs/PRC/tar-prc-3840-fr-app-d.pdf).
QA/QC procedures to be applied:	Cross-check the measurements with an annual energy balance that is based on purchased quantities and stock changes.

	Where the purchased fuel invoices can be identified specifically for the CDM project, the metered fuel consumption quantities should also be cross-checked with available purchase invoices from the financial records.
Any comment:	-

Data / Parameter:	$NCV_{diesel,y}$
Data unit:	GJ/tonne
Description:	Net calorific value of diesel
Source of data to be used:	IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Value of data applied for the purpose of calculating expected emission reductions in section B.5	43.3
Description of measurement methods and procedures to be applied:	Any future revision of the IPCC Guidelines should be taken into account
QA/QC procedures to be applied:	-.
Any comment:	-

Data / Parameter:	$EF_{FF,diesel,y}$
Data unit:	tCO_2e/GJ
Description:	CO_2 emission factor of diesel
Source of data to be used:	IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.0748
Description of measurement methods and procedures to be applied:	Any future revision of the IPCC Guidelines should be taken into account
QA/QC procedures to be applied:	-.
Any comment:	-

B.7.2 Description of the monitoring plan:

>>

The monitoring plan is made as below:

1. Monitoring structure

The monitoring structure is shown by Figure 5 and implemented by the project owner.

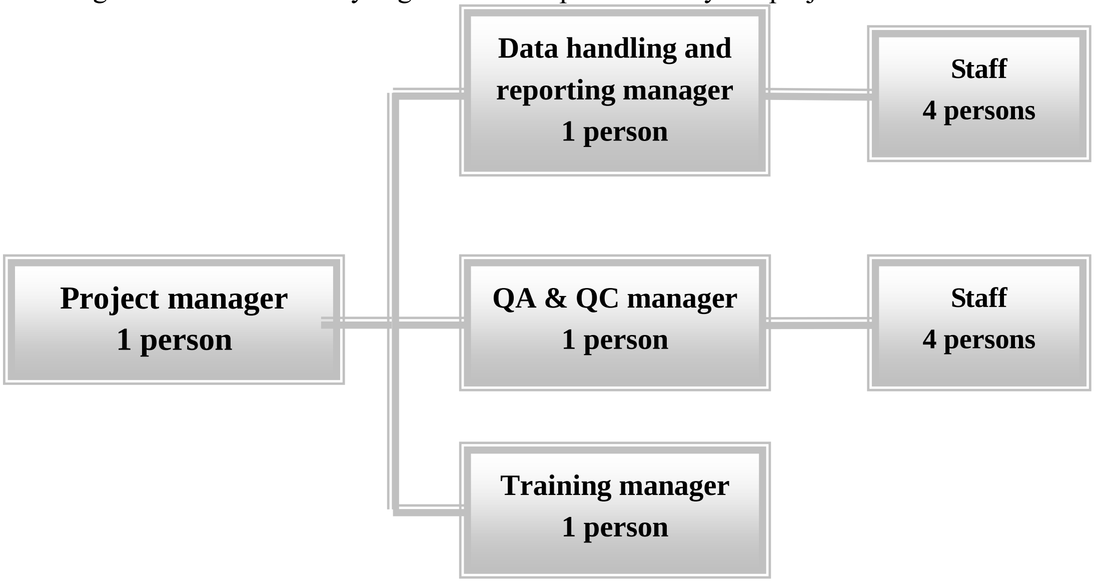

Figure 5. Monitoring structure of the Project

The project manager is responsible for 1) implementation and supervision of the monitoring activity 2) periodical training on the staff of the whole monitoring system 3) liaison of this CDM project.

The data handling and reporting staff is responsible for managing, processing and submitting data.

The QA & QC staff is responsible for calibration of meters and supervision of the whole process quality.

The training manger is in charge of training plan and implementation for relevant staffs

2. Installation of meters

Instruments used are described in section B.7.1, and their locations are as below:

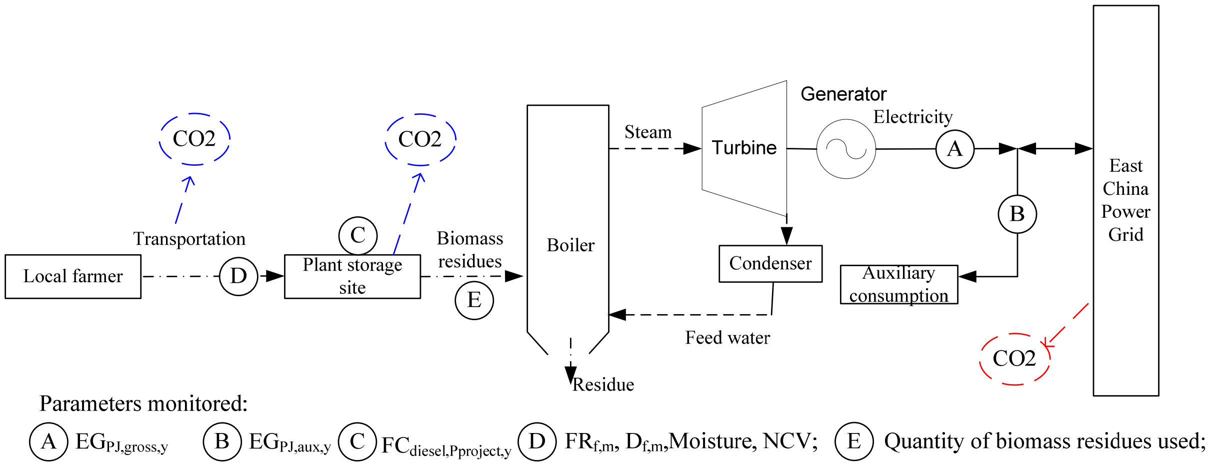

Figure 7 monitoring locations

3. Calibration

The meters, weigh bridges and moisture analyzers of the Project will be calibrated once a year by qualified third parties. And such calibration will be carried out in line with national norms.

4. Data Management System

·Specific staff will be appointed by the project owner to take the overall responsibility for monitoring greenhouse gas emission reductions and keeping all the data collected as part of monitoring archived electronically and kept at least for two years after the end of the last crediting period.
·Electronic data and documents, including readings from meters, will be regularly copied and archived via optical discs, and kept at least for two years after the end of the last crediting period.
·Written data and documents, including receipts for cross-checking of data, will be copied and archived with an explanation of the department or company where the original copy is kept, and kept for at least two years after the end of the last crediting period.

5. QA/QC

The QA/QC manager is in charge of calibration and maintenance of the instruments to ensure their accuracy and reliability; verify the data monitored according to the QA/QC procedure described in table B7.1 and the requirement of internal audit; report to the project manager immediately when find out any abnormal.

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 baseline study and monitoring methodology of the Project was completed on 21/09/2012 by:

Name/Origination	Project participate Yes/No
Energy Systems International 1101 CYTS Plaza, No.5, Dongzhimen South Avenue, Dongcheng District, Beijing, 100007, P.R.China Tel: +86 (10) 5815 6352 Fax: +86 (10) 5815 6003	No

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:

>>
28/03/2010

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

>>
20y-0m

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:

>>
16/11/2012.
If the Project is registered after 16/11/2012, the registration date will be the starting date of the first crediting period.

C.2.1.2. Length of the first crediting period:

>>
7y-0m

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
Not applicable

C.2.2.2. Length:

>>
Not applicable.

SECTION D. Environmental impacts

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

>>

The Environmental Impact Statement Form was completed by Anhui Institute of Environmental Science in Oct, 2009. And it was approved by the Anhui Environment Protection Bureau on 11 Dec, 2009 (Document No. [2009]523). According to the Environmental Impact Statement Form, environmental impacts possibly caused by the Project and corresponding measures employed by the project owner are analyzed as follows:

1. Environmental Impact Analysis During Construction Period

（1） Atmosphere Environment

The major pollutant is flying-dust, and is mainly caused by transportation and construction. The influence area of fling-dust is within 100m. The influence area of transportation dust can be effectively reduced by sprinkling the road. The construction dust has no impact on all the environmental sensitive points, which are all 300m away from the project plant.

（2） Waste water

The waster water is mainly concrete maintenance water, road sprinkling water and some domestic waste water. Temporary sedimentation tank and septic tank will installed to treat the waste water. The concrete maintenance water can be reused after treatment in the temporary sedimentation tank, and the domestic waste water can be discharged into the irrigation channel nearby after treated in the septic tank. Thus, the waste water will no impact the environment.

（3） Noise

Noises generated by the Project include primarily from the operation of construction machines and equipments. According to the on-site measurement, the noise value of 60m away doesn't beyond the construction noise standard on day time, and the noise value of 300m away doesn't beyond the construction noise standard on night time. The construction noise has no impact on all the environmental sensitive points, which are all 300m away from the project plant.

（4） Solid waste

The solid wastes during construction are mainly discarded earth, waste construction materials, waste decorating materials and living garbage. The discarded earth, waste construction materials, and some waste decorating materials will be backfilled. The packaging boxes and bags will be selected and sold. The living solid waste will be collected and stored at specific site, and delivered to environmental sanitation administrative department. Thus the solid waste generated during the construction period will not impact the surroundings.

2. Environmental Impact Analysis During Construction Period

（1） Atmosphere Environment

Biomass residues with low ash and sulphur content are used as fuel in the Project. The concentration of SO2 and dust will be much lower comparing with traditional coal power plant. The Project adopts clean combustion technology and is equipped with highly efficient bag-type dust collector and will release the flue gas through high stake, ensuring that the flue gas from the Project will not impact the atmosphere.

（2） Waste water

The waste water is mainly from water purification station and circulating cooling water process. The quality of the waste water can meet the requirement of *Integrated wastewater discharge standard*, and thus can be discharged into river and will not poison the water environment.

（3） Noise

The transportation attributed to the Project is much smaller than the present transportation condition, and thus will not increase any noise influence.

The noise of boiler venting is temporary. After taking the measures of venting on day time and installing noise muffler, this noise will not impact the surroundings.

（4） Solid waste

The ash from the Project will be transported in sealed vehicles by specific companies, and will be recycled as raw material for fertilizer, thus the storage, transportation and treatment of ash will not impact the environment.

In summary, by means of pollution avoidance and control, the Project will not have significant impact on the regional 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:

>>

The Project employs clean integrated resource utilization technology to generate electricity whose environmental impacts comply with relevant laws and regulations of the host country. Environmental impacts are considered not significant.

SECTION E. Stakeholders’ comments

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

>>
Stakeholders of the Project are identified as the local residents of Shouxian County and around the project site. The survey was conducted on 14/12/2009 through distributing and collecting responses to a questionnaire.

For the total 50 questionnaires distributed to the stakeholders, 50 returned with a response rate of 100%. The basic structure of the respondents is illustrated in Table 13.

Table 13. Structure of the respondents

Structure of gender		
Gender	**No.**	**Percentage (%)**
Male	48	96
Female	2	4

Structure of educational level		
Educational level	**No.**	**Percentage (%)**
Undergraduate or higher	0	0
Senior middle school	26	52
Junior middle school or lower	24	48

Structure of age		
Age	**No.**	**Percentage (%)**
18~35	11	22
36~50	33	66
50 and older	6	12

The questionnaires mainly focus on the following issues:
· What is the attitude of the environmental protection of Project?
· What is the understand level of the Project?
· What is the impact of the Project on the local economic growth?
· What is the impact of the Project on the life standard of stakeholders?
· What is the most concern of environmental impact of the Project?
· What is the attitude of the stakeholders on the construction of the Project?

E.2. Summary of the comments received:

>>
The summary of questionnaire survey is listed as the following:

- 58% of them very concern about the environmental protection of the Project, 40% of them concern about the Project, and 2% of them don’t concern.
- 64% of them know the Project well, 34% of them know the Project, 2% of them do not know the project;
- 96% think the Project will promote the local economic growth, 4% think the Project has no impact on the local economic growth;
- 100% of them think the Project will bring positive influence on living quality of local people;
- 36% of them worried about the noise issue, 24% of them worried about the wastewater issue, 40% of them worried about the air pollution issue.
- 100% of them support the construction of the Project.

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

>>
We know from the results of questionnaire statistics that the stakeholders support the construction of the Project.

Regarding the issues worried about by the stakeholders, such as noise, water pollution, air pollution, it has been analyzed and provided corresponding measures to prevent and handle these issues in section D.1, ensuring these issues will not impact the local environment and residents.

Based on the comments received from the stakeholders, there has been no necessity to modify the Project in the aspect of design, construction and operation.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

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

Annex 3

BASELINE INFORMATION

To determine the simple OM emission factor ($EF_{OM,y}$) and the Build Margin emission factor ($EF_{BM,y}$) for the Project, data recommended in the *2011 Baseline Emission Factors for Regional Power Grid in China* for the East China Power Grid are adopted.

The following tables summarise the numerical results from the equations listed in the *Tool to calculate the emission factor for an electricity system*. Information provided by the tables includes data, data sources and the underlying calculations.

Table A1. Thermal power generation of the East China Power Grid in 2007

	Electricity generation (MWh)	Auxiliary electricity consumption (%)	Electricity delivered to the grid (MWh)
Shanghai	72,600,000	4.72	69,173,280
Jiangsu	270,900,000	5.55	255,865,050
Zhejiang	172,300,000	5.83	162,254,910
Anhui	84,800,000	5.92	79,779,840
Fujian	72,300,000	5.59	68,258,430
Total			635,331,510

Data source: China Electric Power Yearbook 2008.

Table A2. Thermal power generation of the East China Power Grid in 2008

	Electricity generation (MWh)	Auxiliary electricity consumption (%)	Electricity delivered to the grid (MWh)
Shanghai	79,400,000	4.88	75,525,280
Jiangsu	273,500,000	5.51	258,430,150
Zhejiang	174,800,000	5.77	164,714,040
Anhui	107,400,000	5.72	101,256,720
Fujian	74,800,000	5.61	70,603,720
Total			670,529,910

Data source: China Electric Power Yearbook 2009

Table A3. Thermal power generation of the East China Power Grid in 2009

	Electricity generation (MWh)	Auxiliary electricity consumption (%)	Electricity delivered to the grid (MWh)
Shanghai	78,200,000	5.22	74,117,960
Jiangsu	282,500,000	5.38	267,301,500
Zhejiang	185,500,000	5.66	175,000,700
Anhui	129,900,000	5.59	122,638,590
Fujian	88,600,000	5.1	84,081,400
Total			723,140,150

Data source: China Electric Power Yearbook 2010

Table A4. Calculation of the simple OM emission factor of the East China Power Grid in 2007

Energy	**Unit**	**Shanghai** **A**	**Jiangsu** **B**	**Zhejiang** **C**	**Anhui** **D**	**Fujian** **E**	**Total** **F=A+B+C+D+E**	**Emission factor ($kgCO_2/TJ$)** **G**	**Oxidation Rate (%)** **H**	**NCV (MJ/t or $1000m^3$)** **I**	**Emission[9] (tCO_2e)** **J**
Raw coal	10^4t	2754.04	11060.78	7350	3929.9	3097.87	**28192.59**	87,300	100	20,908	514,590,436
Cleaned coal	10^4t						**0**	87,300	100	26,344	0
Other washed coal	10^4t		459.17		29.32		**488.49**	87,300	100	8,363	3,566,416
Briquetted coal	10^4t						**0**	87,300	100	20,908	0
Coke	10^4t			35.06			**35.06**	95,700	100	28,435	954,063
Coke oven gas	10^8m^3	0.89	9.73	0.22	1.56	0.75	**13.15**	37,300	100	16,726	820,402
Other coal gas	10^8m^3	98.92	70.45	3.41	36.3	1.71	**210.79**	37,300	100	5,227	4,109,712
Raw oil	10^4t			15.15			**15.15**	71,100	100	41,816	450,427
Gasoline	10^4t						**0**	67,500	100	43,070	0
Diesel	10^4t	1.23	5.37	2.76		1.01	**10.37**	72,600	100	42,652	321,111
Fuel oil	10^4t	40.76	1.55	29.52		2.04	**73.87**	75,500	100	41,816	2,332,156
LPG	10^4t						**0**	61,600	100	50,179	0
Refinery gas	10^4t	0.2	0.63		2.55		**3.38**	48,200	100	46,055	75,031
Natural gas	10^8m^3	4.61	19.17	11.01			**34.79**	54,300	100	38,931	7,354,444
Other petroleum products	10^4t	20.39	2.78				**23.17**	72,200	100	41,816	699,529
Other coke products	10^4t						**0**	95,700	100	28,435	0
Other energy	10^4tCe	6.89	28.88	44.93	7.52	9.43	**97.65**	0	0	0	0
Net electricity imported from the Central China Grid to the East China Power Grid（MWh）							31,823,310				
Emission factor of the Central China Grid (tCO_2/MWh)							1.10197				
Net electricity imported fromYangcheng to the East China Power Grid（MWh）							12,773,620				
Emission factor of Yangcheng (tCO_2e/MWh)							0.97254				
Emission of the East China Power Grid (tCO_2e)							582,765,035				
Thermal electricity delivered by the East China Power Grid (MWh)							679,928,440				
Emission factor of the East China Power Grid (tCO_2e/MWh)							0.85710				

Data source: China Energy Statistical Yearbook 2008

9 If the unit of the fuel is 10^4 t, then J=F×G×H×I×44/12/10^4; if the unit of the fuel is 10^8 m^3, then J=F×G×H×I×44/12/10^3. The same about the calculation of J in Table A5 and Table A6.

Table A5. Calculation of the simple OM emission factor of the East China Power Grid in 2008

Energy	Unit	Shanghai A	Jiangsu B	Zhejiang C	Anhui D	Fujian E	Total F=A+B+C+D+E	Emission factor ($kgCO_2/TJ$) G	Oxidation Rate (%) H	NCV (MJ/t or $1000m^3$) I	Emission (tCO_2e) J
Raw coal	10^4t	2964.04	10890.2	7316.17	4887.18	3264.88	**29322.47**	87,300	100	20,908	535,213,779
Cleaned coal	10^4t						**0**	87,300	100	26,344	0
Other washed coal	10^4t		513.34		33.49		**546.83**	87,300	100	8,363	3,992,351
Briquetted coal	10^4t						**0**	87,300	100	20,908	0
Coke	10^4t			31.12			**31.12**	95,700	100	28,435	846,847
Coke oven gas	10^8m^3	0.5	11.65	0.13	5.62	0.31	**18.21**	37,300	100	16,726	1,136,085
Other coal gas	10^8m^3	98.42	77.84	3.57		6.36	**186.19**	37,300	100	5,227	3,630,092
Raw oil	10^4t			8.31			**8.31**	71,100	100	41,816	247,066
Gasoline	10^4t						**0**	67,500	100	43,070	0
Diesel	10^4t	5.85	4.04	2.05		1.04	**12.98**	72,600	100	42,652	401,930
Fuel oil	10^4t	24.43	0.39	13.48		1.81	**40.11**	75,500	100	41,816	1,266,316
LPG	10^4t						**0**	61,600	100	50,179	0
Refinery gas	10^4t	0.05	0.28		1.5	0.57	**2.4**	48,200	100	46,055	53,276
Natural gas	10^8m^3	3.65	25.14	8.99		0.19	**37.97**	54,300	100	38,931	8,026,681
Other petroleum products	10^4t	21.33	3.09				**24.42**	72,200	100	41,816	737,268
Other coke products	10^4t						**0**	95,700	100	28,435	0
Other energy	10^4tCe	15.88	62.57	34.54		8.99	**121.98**	0	0	0	0

Net electricity imported from the Central China Grid to the East China Power Grid（MWh）	35,684,610
Emission factor of the Central China Grid (tCO_2/MWh)	1.04205
Net electricity imported fromYangcheng to the East China Power Grid（MWh）	16,903,640
Emission factor of Yangcheng (tCO_2e/MWh)	1.004945
Emission of the East China Power Grid (tCO_2e)	609,724,608
Thermal electricity delivered by the East China Power Grid (MWh)	723,118,160
Emission factor of the East China Power Grid (tCO_2e/MWh)	0.84319

Data source: China Energy Statistical Yearbook 2009

Table A6. Calculation of the simple OM emission factor of the East China Power Grid in 2009

Energy	Unit	Shanghai A	Jiangsu B	Zhejiang C	Anhui D	Fujian E	Total F=A+B+C+D+E	Emission factor ($kgCO_2/TJ$) G	Oxidation Rate (%) H	NCV (MJ/t or $1000m^3$) I	Emission (tCO_2e) J
Raw coal	10^4t	2860.29	10875.32	7592.14	5782.21	3539.1	**30649.06**	87,300	100	20,908	559,427,607
Cleaned coal	10^4t						**0**	87,300	100	26,344	0
Other washed coal	10^4t		324.83		50.83		**375.66**	87,300	100	8,363	2,742,656
Coke	10^4t			50.46			**50.46**	95,700	100	28,435	1,373,132
Coke oven gas	10^8m^3	1.02	8.96	0.29	5.64	0.47	**16.38**	37,300	100	16,726	1,021,915
Other coal gas	10^8m^3	109.27	101.42	3.67		8.42	**222.78**	37,300	100	5,227	4,343,477
Raw oil	10^4t			3.36			**3.36**	71,100	100	41,816	99,897
Gasoline	10^4t						**0**	67,500	100	43,070	0
Diesel	10^4t	1.03	1.67	1.49		4.16	**8.35**	72,600	100	42,652	258,561
Fuel oil	10^4t	13.13		8.87		0.46	**22.46**	75,500	100	41,816	709,086
LPG	10^4t						**0**	61,600	100	50,179	0
Refinery gas	10^4t	0.06	0.17		1.97	14.15	**16.35**	48,200	100	46,055	362,946
Natural gas	10^8m^3	5.37	22.78	8.87	0.23	5.74	**42.99**	54,300	100	38,931	9,087,885
Other petroleum products	10^4t	18.6	5.31				**23.91**	72,200	100	41,816	721,870
Other coke products	10^4t						**0**	95,700	100	28,435	0
Other energy	10^4tCe	14.84	89.4	43.75	33.62	12.59	**194.2**	0	0	0	0
Net electricity imported from the Central China Grid to the East China Power Grid（MWh）						36,599,120					
Emission factor of the Central China Grid (tCO_2/MWh)						0.95455					
Net electricity imported fromYangcheng to the East China Power Grid（MWh）						16,626,120					
Emission factor of Yangcheng (tCO_2e/MWh)						0.964179					
Emission of the East China Power Grid (tCO_2e)						631,115,148					
Thermal electricity delivered by the East China Power Grid (MWh)						776,365,390					
Emission factor of the East China Power Grid (tCO_2e/MWh)						0.81291					

Data source: China Energy Statistical Yearbook 2010

Based on the data provided in Table A1~Table A6, the OM emission factor of the East China Power Grid is calculated as 0.8367 tCO_2/MWh.

Table A7. Data and results of Step a.

Energy	Unit	Shanghai A	Jiangsu B	Zhejiang C	Anhui D	Fujian E	Total F=A+B+C+D+E	Emission factor ($kgCO_2/TJ$) G	Oxidation Rate (%) H	NCV (MJ/t or $1000m^3$) I	Emission (tCO_2e) J
Raw coal	10^4t	2,860.29	10,875.32	7,592.14	5,782.21	3,539.1	30,649.06	87,300	100	20,908	559,427,607
Other washed coal	10^4t	0	324.83	0	50.83	0	375.66	87,300	100	8,363	2,742,656
Coke	10^4t	0	0	50.46	0	0	50.46	95,700	100	28,435	1,373,132
Sub-total											563,543,395
Crude oil	10^4t	0	0	3.36	0	0	3.36	71,100	100	41,816	99,897
Diesel	10^4t	1.03	1.67	1.49	0	4.16	8.35	72,600	100	42,652	258,561
Fuel oil	10^4t	13.13	0	8.87	0	0.46	22.46	75,500	100	41,816	709,086
Other petroleum products	10^4t	18.6	5.31	0	0	0	23.91	72,200	100	38,369	721,870
Sub-total											1,789,414
Coke oven gas	10^8m^3	53.7	227.8	88.7	2.3	57.4	429.9	37,300	100	16,726	9,087,885
Other coal gas	10^8m^3	1,092.7	1,014.2	36.7	0	84.2	2,227.8	37,300	100	5,227	4,343,477
Natural gas	10^8m^3	36.5	251.4	89.9	0	1.9	379.7	54,300	100	38,931	8,026,681
Refinery gas	10^4t	0.06	0.17	0	1.97	14.15	16.35	48,200	100	46,055	362,946
Sub-total											14,816,223
Total											**580,149,033**

Data source: China Energy Statistical Yearbook 2010.

Calculated with the data provided in Table A7 and formula (9)~(11), the value of λ_{Coal} is 97.14%, the value of λ_{Oil} is 0.31% and the value of λ_{Gas} is 2.55%.

Therefore, $EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y}$ = 0.7852 tCO_2e/MWh.

Table A8. Installed capacity of the East China Power Grid in 2009

	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	Total
Thermal power (MW)	16,540	52,420	43,300	26,790	18,920	157,970
Hydro power (MW)	0	1,140	9,560	1,620	10,980	23,300
Nuclear power (MW)	0	2,120	3,010	0	0	5,130
Wind power and Others (MW)	42.1	952.5	233.9	0	460	1689
Total (MW)	16,582	56,633	56,104	28,410	30,360	188,089

Data source: China Electric Power Yearbook 2010.

Table A9. Installed capacity of the East China Power Grid in 2008

	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	Total
Thermal power (MW)	16,780	50,680	40,990	24,820	15,430	148,700
Hydro power (MW)	0	1,140	8,960	1,560	10,580	22,240
Nuclear power (MW)	0	2,000	3,070	0	0	5,070
Wind power and Others (MW)	40	610	150	0	260	1,060
Total (MW)	16,820	54,420	53,170	26,380	26,270	177,070

Data source: China Electric Power Yearbook 2009.

Table A10. Installed capacity of the East China Power Grid in 2007

	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	Total
Thermal power (MW)	14,150	53,340	39,490	17,760	13,910	138,650
Hydro power (MW)	0	140	8,520	1,510	9,800	19,970
Nuclear power (MW)	0	2,000	3,070	0	0	5,070
Wind power and Others (MW)	268.8	517.8	40	0	269	1,095.6
Total (MW)	14,418.8	55,997.8	51,120	19,270	23,979	164,785.6

Data source: China Electric Power Yearbook 2008.

Table A11. Calculation of the BM emission factor of the East China Power Grid

	Installed capacity in 2006 (MW) A	Installed capacity in 2007 (MW) B	Installed capacity in 2008 (MW) C	Installed capacity in 2009 (MW) D	Capacity additions from 2006 to 2009 (MW) E	Capacity additions from 2007 to 2009(MW) F	Share in total capacity additions E
Thermal power	128,828	138,650	148,700	157,970	44,336.5	29,812.3	84.33%
Hydro power	18,463	19,970	22,240	23,300	5,032.2	3,396.2	9.57%
Nuclear power	3,066	5,070	5,070	5,130	2,064	60	3.93%
Wind power and Others	547	1,096	1,062	1,689	1,142	584	2.17%
Total	**150,904**	**164,786**	**177,072**	**188,089**	**52,574.7**	**33,861.5**	**100.00%**
Share in the total installed capacity of 2009					27.95%	18.00%	

Therefore, $EF_{grid,BM,y}$ = 0.7852×84.33%=0.6622 tCO_2e/MWh.

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Annex 4

MONITORING INFORMATION

Refer to Section B7.2. No additional information.